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Published by Harold N. Moldenke and Alma L. Moldenke

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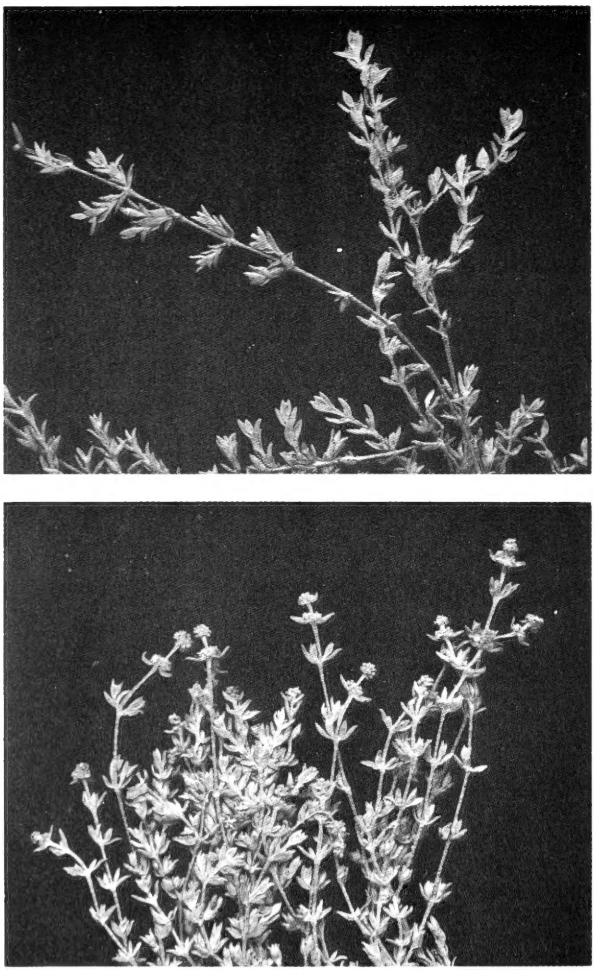
ATRIPLEX FRANKENIOIDES (CHENOPODIACEAE), A NEW SPECIES FROM BAJA CALIFORNIA, MEXICO

Reid Moran
Natural History Museum, San Diego, California 92112

Atriplex frankenioides Moran, species nova.

Herba dioica perennis ramosa furfuracea 1-3 dm alta vel prostrata. Caulis basin versus 1 1/2-4 mm crassus, ramis gracilibus diam. 1/2-1 mm, aliquibus decumbentibus ad 5 dm. Folia opposita sessilia lanceolata ad elliptica 2-5 mm longa 1-2 1/2 mm lata. Flores staminati 4-meri, in 1-4 glomerulis terminalibus et subterminalibus 2-3 1/2 mm latis. Flores pistillati in axillis foliorum solitarii, bracteis fertilibus sessilibus complanatis rhombo-ovatis integris 3-4 mm longis 2-3 mm latis apice ca. 1 mm libris infra connatis. Semina lenticularia brunnea 1.2-1.5 mm longa 0.55-0.7 mm crassa, radicula superiore. Typus: Moran 21184 (SD 86932). Atriplici watsoniae affinis sed ob folia multo parviora habituque saepe erectiorem aspectu valde dissimilis, in illa foliis 8-20 (-35) mm longis 4-10 (-15) mm latis, bracteis fertilibus 4-8 mm longis.

Much-branched gray scurfy dioecious perennial 1-3 dm tall, weakly erect with decumbent branches to 5 dm long, or prostrate and forming mats. Stem 1 1/2-4 mm thick and slightly woody at base, the branches 1/2-1 mm thick, densely scurfy but in age bare and gray-brown with peeling bark, leafy for 5-15 cm, often with axillary fascicles; internodes 5-15 (-25) mm long. Leaves opposite and subconnate, rarely alternate, sessile, lanceolate or narrowly ovate to elliptic, entire, narrowly rounded at apex, densely and persistently scurfy on both sides, 2-5 mm long, 1-1 1/2 (-2 1/2) mm wide, rather thick, channeled ventrally. Staminate inflorescence a terminal glomerule 2-3 1/2 mm wide, with the leaf pair often reduced, or a terminal series of 2-4 well separated glomerules, the lower commonly with unreduced leaves; flowers 4-merous, often purplish red in age; sepals ovate, rounded and somewhat erose above, cucullate, ca. 1 mm long, united 1/3 or mostly less, scurfy without, glabrous within; filaments ca. 1 mm long, the anther ca. 1/2 mm long; pistil vestigial. Pistillate flowers solitary in leaf axils; fruiting bracts purplish red at first, sessile, compressed, rhombic-ovate to triangular-ovate, entire, 3-4 mm long, 2-3 mm wide, united except for a triangular tip ca. 1 mm long, bony in area around seed cavity, softer elsewhere, the rather strong midvein and weaker reticulations largely obscured by persistent scurf; perianth none; style 0.3-1.5 mm long, ca. 0.3 mm wide, the stigmas to 2 mm long. Seed lenticular, shiny dark reddish brown, 1.2-1.5 mm long, 1.1-1.25 mm wide, 0.55-0.7 mm thick; radicle superior.



Dried specimens of Atriplex frankenioides, of the type collection (Moran 21184): pistillate above, staminate below. X 1.0.

Type collection.—Fairly common in upper level of salt marsh, with Allenrolfea occidentalis (S. Wats.) Kuntze, Batis maritima L., Cressa truxillensis HBK., and Monanthochloe littoralis Engelm., near Rocky Point, east shore of Laguna de San Ignacio, Territorio Sur de Baja California, México (near 26°47.2'N, 113°14.7'W), 26 March 1974, Moran 21184—holotype: SD 86932; isotypes to go.

Other collection.—"Prostrate mat-forming perennial, with ends of stems purple tinged"; in high marsh with Monanthochloe littoralis Engelm. and Salicornia subterminalis Parish, Estero de la Laguna, south of La Laguna, P. Mudie 805 (SD).

The new species is named from its resemblance to Frankenia palmeri S. Wats., a shrubbier plant abundant in maritime habitats of Baja California.

Atriplex frankenioides appears to be rather local. At least Peta Mudie, in a survey of salt-marsh plants of Baja California, found it (she tells me) only at Estero de la Laguna—apparently 3 or 4 miles easterly of the type locality. Johnson (1973) failed to find it in other maritime habitats.

In the treatment of Hall and Clements (1923) the new species would become the third in the distinctive (unnamed) group of dioecious herbs, which is further marked by opposite leaves. It seems closest to A. watsonii A. Nels. (A. decumbens S. Wats.), with which it agrees further in general shape of leaves and of fruiting bracts. However, A. watsonii has quite a different aspect because of its much larger leaves—which are 8-20 (-35) mm long and 4-10 (-15) mm wide according to Hall and Clements, though in fact occasionally slightly smaller. Also, the branches of A. watsonii are somewhat thicker; the leaves tend to be somewhat wider for their length; the staminate inflorescence is usually less leafy, occasionally more crowded and spikelike, and often longer, with more glomerules; the pistillate flowers are clustered in the leaf axils; and the fruiting bracts are larger (4-8 mm long) and often denticulate. Plants at the type locality of A. frankenioides differ from A. watsonii further in being weakly erect; but Mrs. Mudie's collection is described as prostrate and mat-forming. Typical A. watsonii occurs along the coast, sometimes near the upper limits of salt marshes but often higher, from Santa Barbara County, California, to northern Baja California. Hall and Clements reported it only as far south as San Quintín (near 30°30'N); and Shreve and Wiggins (1964), whose northern limit is just south of San Quintín, omitted it.

Apparently to be referred to A. watsonii, however, is a specimen (Mudie & Johnson 1038, SD) from Arroyo San Juan, at 26°23'N, about 40 miles southeast of the type locality of A. frankenioides. Leaves are 8-15 mm long and 3-5 mm wide and thus rather narrow for

the species; fruits are clustered, the bracts 4-5 mm long and thus near the lower size limit. Thus, though closer to A. watsonii, this specimen in both these respects somewhat approaches A. frankenioides.

Two staminate plants of this relationship (Mudie & Johnson 842a, 842b, SD) from Boca de Animas, near 25°42'N, show that all is not simple and clearcut. (Pistillate material is lacking.) No. 842a has prostrate stems with internodes to 4 cm long; the opposite or subopposite leaves are linear-lanceolate, acute, to 18 mm long and 3 mm wide; and the inflorescence is more spikelike than sharply glomerulate. The leaves are much narrower than in typical A. watsonii; but considered with the rather-narrow-leaved 1038, from Arroyo San Juan, this specimen might perhaps be taken for an extreme of that species. No. 842b is prostrate and matting, with short internodes, with opposite leaves about 4-8 mm long and 1-1 1/2 mm wide, and with an inflorescence of a single glomerule. Thus this plant approaches A. frankenioides in leaves and staminate inflorescence and is perhaps to be referred to that species. The question is whether these two dissimilar plants from Las Animas represent two populations or one.

References

Hall, Harvey M., and Frederic E. Clements. 1923. The phylogenetic method in taxonomy: Genus Atriplex. Carnegie Inst. Wash. Publ. 326: 235-346, figs. 29-47, pls. 36-58.

Johnson, Ann Frances. 1973. A survey of the strand and dune vegetation along the Pacific coast of Baja California, Mexico. i-vi, 1-126, figs. 1-16, pls. 1-2. Unpublished thesis, University of California, Davis.

Shreve, Forrest, and Ira L. Wiggins. 1964. Vegetation and flora of the Sonoran Desert. i-xi, 1-1740, maps 1-27, pls. 1-37. Stanford University Press.

NEW NAMES AND SPECIES OF NEOTROPICAL PLANTS: COMPOSITAE

W. G. D'Arcy
Missouri Botanical Garden

BLUMEA VISCOSA (Mill.) D'Arcy, comb. nov. Conyza viscosa Mill., Gard. Dict. ed 8. 1768. Type: Veracruz, Houston (BM, not seen).

BLUMEA VISCOSA var. LYRATA (H.B.K.) D'Arcy, comb. nov. Conyza lyrata H.B.K., Nov. Gen. 4: 70. 1820. Type: Guayaquil, Humboldt & Bonpland (P, not seen).

Earlier presentation (PHYTOLOGIA 25: 281. 1973) of synonomy and relationships of the above species was made without reference to Randeria's study of Blumea (Blumea 10: 176-317. 1970). Study of her work shows Blumea viscosa to be a member of sect. Paniculatae.

WEDELIA INCONSTANS D'Arcy, spec. nov. Type: Panama, roadside along approach to Cerro Jefe, Croat 15241 (MO). Herba v. frutex ad 1 m alta, W. calycina simile, differt: foliis minoris, gracilioribus, capitulis achaenisque minoris, omnino magis pugescentibus.

This species resembles Wedelia calycina L. C. Rich. but has shorter involucre bracts, achenes in a head dissimilar but not of two distinct classes, less than 5 mm long. It has been collected many times in lowland Panama.

WEDELIA KEATINGII D'Arcy, spec. nov. Type: Panama, trails and clearings N of El Valle de Anton, 700-800 m, Allen 4212 (MO). Herba, foliis ovatis, serratis; bracteis involucris subfoliaceous tenuis ve scariosis; acheniis alatis, alis ciliatis, pappo cupuliformo; aristis carentibus ve parvis. Named in honor of Richard C. Keating, botanist at Southern Illinois University at Edwardsville and close associate of the Missouri Botanical Garden

This species has broadly winged achenes and small, persistent awns. The outer phyllaries are narrow and herbaceous. It is in some ways intermediate between Wedelia calycina and Calyptocarpus vialis Less. which has both winged and unwinged achenes in the same head and broader phyllaries.

MONTANOA HIBISCIFOLIA (Benth.) D'Arcy, comb. nov. Montagnea hibiscifolia Benth., Vidensk. Meddel. Dansk Naturhist. Foren. Kjobenhavn 1852: 89. 1852. Type not seen.

MELANTHERA AMELLUS (P. Br.) D'Arcy, comb. nov. Amellus l. ramosus, foliis ovatis dentatis.... P. Browne, Hist. Jamaica 317. 1756. Lectotype: Jamaica, P. Browne, not seen (cf. Moore in Fawcett & Rendle, Fl. Jamaica 7: 233. 1936). Santolina amellus (P. Bro.) L., Plant. Jamaic. pug. 21. 1759; Fl. Jamaic. 381. 1760.

While it is not usual to cite authors of genera transferred to rank of species, literal reading of the current Code requires that P. Browne be cited in parentheses.

MELANTHERA AMELLUS var. SUBHASTATA (O. E. Schulz) D'Arcy, comb. nov. Melanthera angustifolius var. subhastata O. E. Schulz, Fedde Rep. 26: 109. 1929. Type: Cuba, Ekman 12359 (NY).

This taxon, which has been known under several names, differs from the typical in its smaller, narrow leaves. It appears to be an edaphic varient of habitats with impeded drainage and has been collected from a number of sites widespread through the range of the typical variety.

VIGUIERA CORDATA (Hook. & Arn.) D'Arcy, comb. nov. Wedelia cordata Hook. & Arn., Bot. Beech. Voy. 435. 1841. Type: Nicaragua, Sinclair (K, not seen).

This species was discussed at several points by S. F. Blake (Contr. Gray Herb. 54: 1-205. 1918.), but he did not make this combination.

LASIANTHAEA NOWICKEANA D'Arcy, spec. nov. Type: Panama, along headwaters of Rio Cuasi, Duke et al. 3632 (MO). Herba, distincta ab Lasianthaeis aliis, aspectu minori, foliis lanceolatis, capitulis minoribus, ligula florum radiorum lata, tubo longo pubescenti, ovario tenui. This species is named for Joan W. Nowicke, earlier collaborator in the Flora of Panama project and contributor of several important families.

Lasianthaea nowickeana represents an expansion of concept for the genus Lasianthaea in its diminutive habit, its single-nerved leaves and in having achenes with 1-4 awns. It is known only from a unicate specimen from the San Blas.

WEDELIA FUSCASICCANS D'Arcy, spec. nov. Type: Panama, Campo Tres beyond Cerro Jefe, 700 m, Croat 27091 (MO). Herba magna frutexve, differt speciebus aliis panamensium, foliis fuscis siccatis, ramunculis crassis pallidis, capitulis nigrescentibus, nectario ovarii urceolato.

This species with its large obovate leaves is known from the type and one other collection, Blum & Duke 2189a (MO), both from the Province of Panama.

Concepts supporting the above taxa will be presented in the treatment of the Compositae in Woodson & Schery, Flora of Panama (Ann. Missouri Bot. Gard.) when it is issued.

AN EARLIER NAME FOR BOBEA ELATIOR (RUBIACEAE)

HAWAIIAN PLANT STUDIES 46

Harold St. John and Derral Herbst
B. P. Bishop Museum, Honolulu, Hawaii, 96818, and
Lyon Arboretum, University of Hawaii, Honolulu, Hawaii, 96822, U. S. A.

The Frenchman Charles Gaudichaud-Beaupré was not the first botanist to explore and collect plant specimens on the Hawaiian Islands, but his accomplishments were preeminent. A large percentage of the local genera and species were discovered and described by him. Most of this, too, was accomplished on his first trip, in 1819 on the ship Uranie. On each excursion he started from the ship in the harbor and hiked up the valleys and mountains on foot. He visited only three islands, and his total of days on shore was only seven, still his gatherings and discoveries were phenomenal.

One such discovery on the island of Oahu was his Bobea elatior (1830: 473, t. 93). It had been previously studied by Chamisso, of the voyage of the Rurik, and published one year earlier. Because of this priority, the following new combination is needed.

Bobea Gaudichaudii (C. & S.) comb. nov.
Burneya Gaudichaudii C. & S., Linnaea 4: 190-191, 1829.
Timonius Gaudichaudii (C. & S.) DC., Prodr. 4: 461, 1830, late Sept.
Bobea elatior Gaud. Voy. Uranie Bot. 473, 1830, March 6; Atlas t. 93, 1830.
B. Gaudichaudii (C. & S.) Skottsb., Acta Hort. Gotob. 15: 467, 1944, an invalid binomial.

De Candolle (1830: 461) had specimens of both species available, recognized their identity and listed B. elatior as a synonym of his Timonius Gaudichaudii. There seems no question but that the two binomials apply to the same common tree of Oahu.

The binomial published by Skottsberg (1944: 467) is in need of a discussion. Under his treatment of Bobea elatior Gaud., which he accepted, Skottsberg

remarked: "The oldest name for this species is perhaps Burneya Gaudichaudii Cham. et Schlecht., 1829, . . . In Freyc. Uranie Bot. the text for B. elatior was published on 6 March 1830. The dates for the publication of the plates are not known. If . . . pl. 93, which is valid as a description, was published before 1830, the correct combination will be Bobea Gaudichaudii (Cham. et Schlecht.)."

The combination Bobea Gaudichaudii proposed by Skottsberg is clearly a provisional one, and also one not accepted by its author. Such names are invalid under the provisions of Article 34 of the International Code of Botanical Nomenchature (1972).

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXVII.

TWO NEW SPECIES OF NEOMIRANDEA.

R. M. King and H. Robinson
Smithsonian Institution, Washington, D.C. 20560.

Final efforts in the study of the Eupatorieae for the Flora of Panama have shown that previous concepts of Neomirandea psoralea (B.L.Robinson) R.M.King & H.Robinson were much too broad. The specimens used for a working concept prove to be very different from the type and actually more closely related to the recently described N. biflora R.M.King & H.Robinson (King & Robinson, 1975, Phytologia 29:351-361. CXXXVI.). The type and presently only known specimen of N. psoralea has 5 flowers per head, has lavender corollae with narrowly triangular lobes, and has nearly entire apical margins on the inner involucral bracts. The two species described here and N. biflora all have a tendency toward reduced numbers of flowers in the head, the corollae have narrowly oblong to linear lobes, and the inner involucral bracts have deeply cleft tips. The most reduced flower number occurs in N. biflora which also has lavender corollae. The two undescribed species have white corollae and more flowers per head.

Neomirandea pseudopsoralea R.M.King & H.Robinson, sp. nov.
Plantae subcarnosae epiphyticae frutescentes usque ad 12 m altae pauce vel multo ramosae. Caules teretes parce puberuli vel glabri. Folia opposita anguste petiolata, petiolis 1-5 cm longis; laminae subcarnosae late ellipticae vel parum ovatae usque ad 12 cm longae et 6 cm latae, base breviter cuneatae, margine integrae vel parum subserrulatae, apice distincte breviter acuminatae, supra et subtus glabrae, nervis pinnatis, nervis secondariis non prominentibus. Inflorescentiae pyramidaliter paniculatae usque ad 17 cm altae et 13 cm latae, ramis ultimis plerumque 1-3 mm longis dense puberulis. Capitula 5-6 mm alta. Squamae involucri ca. 20-25 imbricatae 4-5-seriatae valde inaequilongae 0.5-4.5 mm longae plerumque anguste ovatae vel anguste oblongae, extus glabrae vel subglabrae, interiores ad apicem bi-tri-laciniatae; receptacula pauce puberula. Flores 4-5 in capitulo; corollae albae ca. 3.5 mm

longae late infundibulares extus inferne sparse puberulae, faucis intus dense hirsutis, lobis elongatis; 1.0-1.5 mm longis et 0.3-0.4 mm latis, cellulis quadratis; filamenta in parte superiore ca. 300μ longa; thecae antherarum 1.0-1.2 mm longae, appendicibus ca. 300μ longis et 170μ latis; styli inferne valde nodulosi glabri; achaenia prismatica ca. 1.5 mm longa (immatura) glabra vel in costis parum scabrida; carpopodium breviter cylindricum, cellulis parvis 6-8-seriatis; setae pappi 35-40 scabridae ad apicem distincte clavatae, cellulis apicalibus obtusis. Grana pollinis ca. 25μ diam.

Type: PANAMA: Chiriqui: disturbed cloud forest along road between Cerro Punta and Quebrada Iglesia. July 22, 1971. Croat & Porter 16056 (Holotype MO).

The new species is closely related to N. turrialbae described below but the latter has larger heads, ca 8 mm high rather than 5-6 mm. larger corollae, ca. 5 mm long rather than 3.5 mm long, and has mostly 3 flowers per head rather than 4-5.

Neomirandea turrialbae R.M.King & H.Robinson, sp. nov.

Plantae subcarnosae epiphyticae frutescentes usque ad 8 m altae pauce vel multo ramosae. Caules teretes parce puberuli vel glabri usque ad 3 cm diam. Folia opposita anguste petiolata, petiolis plerumque 2.5-4.0 cm longis; laminae subcarnosae late ellipticae vel parum ovatae plerumque 8-14 cm longae et 3-5 cm latae, base cuneatae, margine integrae, apice distincte breviter acuminatae, supra et subtus glabrae, nervis pinnatis, nervis secondariis non prominentibus. Inflorescentiae pyramidaliter paniculatae usque ad 25 cm altae et 20 cm latae, ramis ultimis 0-1 cm longis dense puberulis. Capitula ca. 8 mm alta. Squamae involucri ca.20-25 imbricatae 4-5-seriatae valde inaequilongae 1.0-5.5 mm longae plerumque anguste ovatae vel anguste oblongae, extus glabrae vel subglabrae, interiores ad apicem bi-tri-laciniatae; receptacula pauce puberula. Flores 3-4 in capitulo; corollae albae ca. 5.0 mm longae late infundibulares extus inferne sparse puberulae, faucis intus dense hirsutis, lobis elongatis 1.7-2.0 mm longis et 0.4 m latis, cellulis quadratis; filamenta in parte superiore 300-350μ longa; thecae antherarum 1.7 mm longae, appendicibus ca. 300μ longis et 200μ latis; styli inferne valde nodulosi glabri; achaenia prismatica ca. 2 mm longa glabra vel in costis scabrida; carpopodium breviter cylindricum, cellulis parvis ca. 8-seriatis;

setae pappi ca. 50 ca. 6 mm longae ad apicem distincte clavatae, cellulis apicalibus obtusis. Grana pollinis ca. 23-25μ diam.

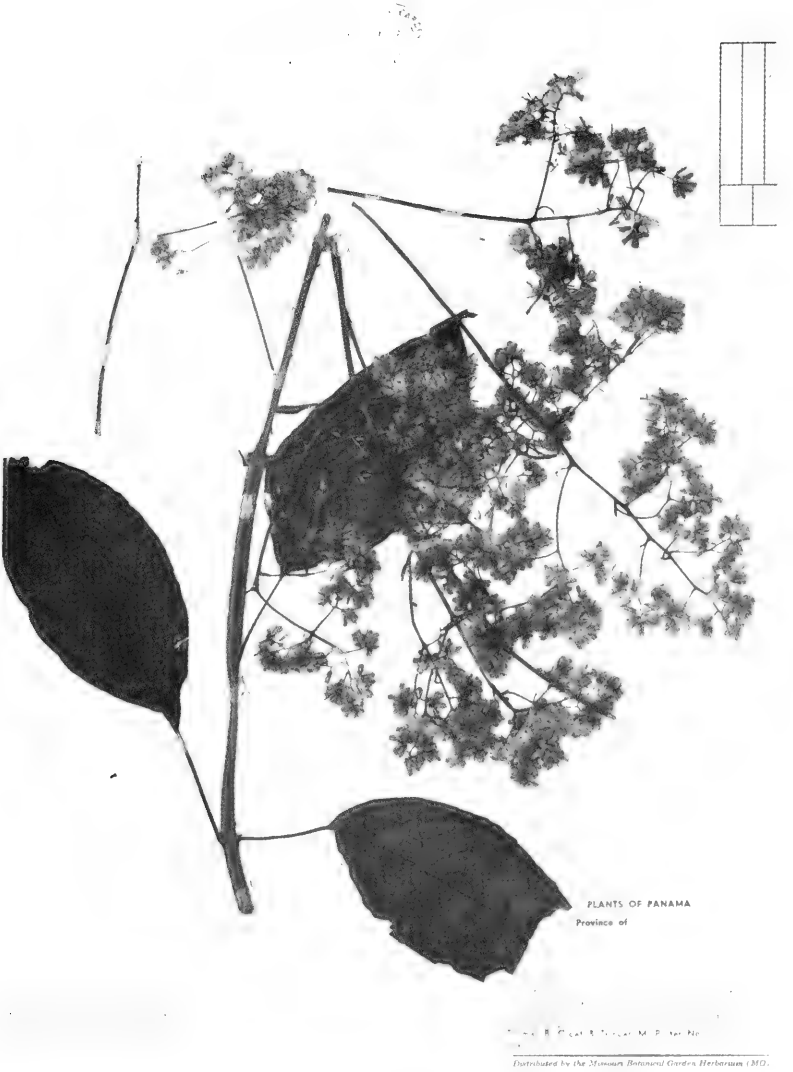
Type: COSTA RICA: Cartago: southern slopes of Volcan Irazu and Volcan Turrialba, ca. 2 kms S of San Rafael de Irazu. Elevation ca. 7,000 ft. June 19, 1974. Robert Merrill King 6833 (Holotype US, 2 sheets).

The distinctions of the species are summarized under N. pseudopsoralea.

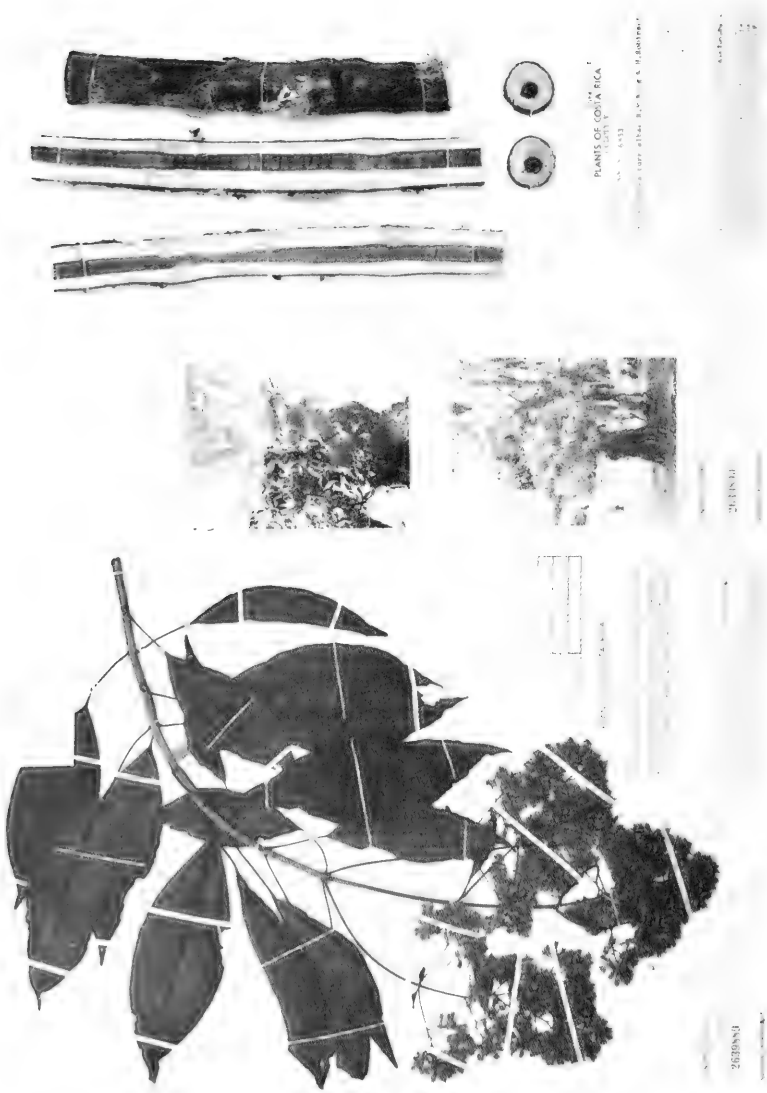
Acknowledgement

This study was supported in part by the National Science Foundation Grant BMS 70-00537 A04 to the senior author. Field work in Costa Rica was supported by a grant from the National Geographic Society, Washington, D. C.

Enlargements of heads of Neomirandea. Top; N. pseudopsoralea. Bottom; N. turrialbae.



Neomirandea pseudopsoralea R.M.King & H.Robinson, Holotype, Missouri Botanical Garden. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Neomirandea turrialbae R.M.King & H.Robinson, Holotype, United States National Herbarium.

NOTES ON NEW AND NOTEWORTHY PLANTS. LXXV

Harold N. Moldenke

AVICENNIA ELLIPTICA var. MARTII Moldenke, var. nov.

Haec varietas a forma typica speciei foliis late ellipticis 7--13 cm. in toto longis 2--3.5 cm. latis as apicem basinque argute acutis vel acuminatis.

This variety differs from the typical form of the species in having its leaves more broadly elliptic, 7--13 cm. long (including the petiole), 2--3.5 cm. wide, and very sharply and conspicuously acute or acuminate at both apex and base.

The type of the variety was collected by Carl Friedrich Philipp von Martius "in sylvis ripariis ad ostia fluv. maritimorum in Provincia Paraënsi", in September (probably of 1820), Brazil, and is deposited in the herbarium of the Botanische Staatssammlung in Munich.

AVICENNIA GERMINANS var. CUMANENSIS (H.B.K.) Moldenke, comb. nov.

Avicennia tomentosa var. cumanensis H.B.K., Nov. Geb. & Sp. Pl., ed. folio, 2: 229--230. 1817.

LANTANA TRIFOLIA f. BREVIPES Moldenke, f. nov.

Haec forma a forma typica recedit petiolis brevissimis, laminis foliorum usque ad 16 cm. longis 6.5 cm. latis et inflorescentiis brevissimis in toto 1--1.5 cm. longis, pedunculis floriferis 5--10 mm. longis.

This form differs from the typical form of the species in apparently having its leaves decussate-opposite (or binary), the petioles practically obsolete, the blades broadly elliptic or oval-elliptic, to 16 cm. long and 6.5 cm. wide, and the inflorescences in anthesis very much abbreviated, 1--1.5 cm. long in all, the peduncles during anthesis only 5--10 mm. long.

The type of the variety was collected in a garden at Mergentheim, Germany, by Prince Paul, Duke of Würtemberg, and is deposited in the herbarium of the Botanische Staatssammlung in Munich.

PAEPALANTHUS KARSTENII var. MINIMUS Moldenke, var. nov.

Haec varietas a forma typica speciei recedit planta pusilla, foliis brevioribus, et inflorescentiis foliam brevioribus vel paullo excedentibus.

This variety differs from the typical form of the species in being a very dwarf unbranched plant, the leaves more uniformly shorter and narrower, and the inflorescences in anthesis and fruit shorter than the leaves or only slightly surpassing them.

The type of the variety was collected by Brother Aristé Joseph (no. A.73) at Laguna de Verjón, Cundinamarca, Colombia, on July 27, 1917, and is deposited in the United States National Herbarium at Washington.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LIII

Harold N. Moldenke

PAEPALANTHUS HYMENOLEPIS Alv. Silv., Fl. Mont. 1: 183--184, pl. 118. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 183--184, pl. 118. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 118. 1928.

This species is based on A. Silveira 584, collected "In campis arenosis in Serra do Cabral", Minas Gerais, Brazil, in May, 1920, and is deposited in the Silveira Herbarium. The collector says of it "Specie a P. lombense A. Silv. bracteis glabirs [sic] et forma earum praecipue differt". Hatschbach found it growing in a wet sandy campo, at 1800 meters altitude, flowering in August.

Citations: BRAZIL: Minas Gerais: Hatschbach 30119 (Z).

PAEPALANTHUS IBITIPOCENSIS Alv. Silv., Fl. Serr. Min. 41. 1908.

Synonymy: Paepalanthus ibitiporensis Alv. Silv. apud Wangerin in Just, Bot. Jahresber. 57 (1): 476, sphalm. 1937.

Bibliography: Alv. Silv., Fl. Serr. Min. 41. 1908; Alv. Silv., Fl. Mont. 1: 54--55 & 408, pl. 30. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 30. 1928.

This species is based on A. H. Magalhães Gomes 267 from "In campis arenosis in Serra de Ibitipoca", Minas Gerais, Brazil, collected in June, 1896, and deposited in the Silveira Herbarium. Silveira (1928) says that the "Species P. leucoblepharo Koern. proxima, a quo foliis eciliatis, pubescentibus, vagina tota pubescenti, bracteis involucrantibus acutiusculis et antheris haud rotundis differt".

PAEPALANTHUS IMPLICATUS Alv. Silv., Fl. Mont. 1: 158--160, pl. 100. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 158--160, pl. 100. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49.

1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 952. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 100. 1928.

This species is based on A. Silveira 510, which was found "Sub rupibus, locis umbrosis arenosisque, in campis praealtis secus margines viae inter Pouso Alto et Camillinho, districtu Diamantinense", Minas Gerais, Brazil, collected in April of 1908, and deposited in the Silveira Herbarium. On page 408 of his work (1928) Silveira gives the type locality merely as "Pouso Alto (Serro)". He comments that the "Species propter ramificationem implicatam et diffuso-confertam caespitem valde distincta".

Citations: BRAZIL: Minas Gerais: Mexia 5756, in part (N).

PAEPALANTHUS INCANUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 380. 1863.

Synonymy: Eriocaulon incanum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 623. 1831. Paepalanthus incanus Körn. in Mart., Fl. Bras. 3 (1): 277. 1863. Paepalanthus incanus var. α Körn. in Mart., Fl. Bras. 3 (1): 380. 1863. Paepalanthus incanus var. β Körn. in Mart., Fl. Bras. 3 (1): 380. 1863. Dupatya incana (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya incana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus frigidulus Mart. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 168 & 290, in syn. 1903.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 623. 1831; Bong., Ess. Monog. Erioc. 23. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 573 & 613. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 275 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 277, 380, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 9, 10, 168--170, 172, [283], 286, & 290, fig. 3A. 1903; Alv. Silv., Fl. Mont. 1: 408. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 42. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 36, 48, & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 209. 1949; Moldenke, Alph. List Cit. 3: 731. 1949; Moldenke, Phytologia 4: 146. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 280, 289, 325, & 487. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 167 & 190. 1969; Moldenke, Phytologia 20: 36. 1970; Moldenke, Fifth Summ. 1: 163 & 481 (1971) and 2: 501, 583, 584, & 952. 1971; Moldenke, Phytologia 25: 241 (1973), 26: 46, 144, 145, & 184 (1973), and 29: 302.

1974.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 9, fig. 3A. 1903.

Bongard's original description (1831) of this species is "Caule adscendente, ramoso, folioso; foliis amplexicaulibus, adpressis, lanceolatis, villosis; pedunculis fasciculatis, longissimis, sericeo-incanis; vaginis villosis, bifidis". It is so short because he intended it merely to supplement his illustration ["t. 61"], but the latter, unfortunately, was never published and doubtless exists only in the Leningrad herbarium or library. The type of the species is an L. Riedel collection from sandy places at Tejuco, Minas Gerais, Brazil, deposited in the Leningrad herbarium. Macbride photographed a Martius collection from Cocaes, Minas Gerais, as his type photograph number 18705, but this collection is not a type of anything, although Paepalanthus frigidulus is apparently based on a Martius s.n. about which the collector notes on the label "Habitat in altis frigidiusculis districtu Serro Frio in Bras. prov. Minarum. Affinis P. canescenti Bong. sed omni modo major et ramosior", deposited at Munich.

Körnicke (1863) proposed two varieties: "var. α.: caule perbrevi....in Brasilia orientali: Princ. Neovid.; et in prov. Minarum altis frigidiusculis districtus Serro Frio: M[artius]" and "var. β.: caule elongato....in prov. Minarum altis supra saxum Itacolumiten ad Cocaes: M[artius]; in arenosis distr. ademantini prope Tejuco, Decembri, et in prov. Bahiensi prope Ilheos et Camamu: Riedel". His var. β is obviously the typical form of the species, but his other proposed variety does not seem worthy of nomenclatural designation; in fact, he himself says of it "Var. α. vel si mavis forma α."

Recent collectors describe this species as an erect herb, 1 to 1.5 m. tall, or procumbent, the inflorescences to 35 cm. tall, the peduncles erect, and the flowering-heads white, light-gray, or gray-white. It has been found growing in wet ground of rocky cerrado, on campos, in moist sand on open rocky slopes, in cerrado of cerrado and low gallery forest areas, and in wet places in cerrado in narrow valleys or on steep rocky slopes with thin gravelly soil, at altitudes of 685 to 1350 meters, flowering from January to May and December, and fruiting in January, February, April, and May.

Anderson and his associates encountered the plant in the open on sandy soil near a stream in an area of gently sloping open hillside with sandy soil and sandstone boulders, mostly wet with seeping water, and a rocky area along a rushing stream at the base of the hill. Mrs. Mexia describes it as an "herb with whitish flowers common locally in colony in open grasslands." Irwin and his associates found it in wet places on campos in an area of disturbed slope forest and adjacent rocky campo.

Ruhland (1903) cites from Bahia: L. Riedel s.n. [bei Ilheos und Camamu], and from Minas Gerais: Glaziou 19994, Martius s.n. [an hoch und kühl gelegenen Standorten des Gebietes von Serro Frio] and s.n. [an hohen Standorten oberhalb des Itavolumy bei Co-

caes], L. Riedel s.n. [an sandigen Stellen bei Tejuco], and Schwacke 8477. Silveira (1928) cites Collector undesignated 260 from Serra dos Crystaes, Minas Gerais.

Material has been misidentified and distributed in some herbaria as P. canescens (Bong.) Körn. and as Lachnocaulon sp. On the other hand, the Irwin, Reis dos Santos, Souza, & Fonsêca 22586, distributed as P. incanus, is actually P. actinocephaloides Alv. Silv.

Citations: BRAZIL: Bahia: L. Riedel s.n. (B). Minas Gerais: Anderson, Stieber, & Kirkbride 35467 (Ld, N); M. A. Chase 10365 (Mi, W--1495693); Duarte & Graziela Barroso s.n. [A. P. Duarte 7934; Herb. Brad. 27771] (Ld, N); Glaziou 19994 (Br, W--1194856); Irwin, Maxwell, & Wasshausen 20803 (Ld, N, N); Irwin, Reis dos Santos, Souza, & Fonsêca 22363 (Ac, Ca--1369769, N, S), 22662 (Ld, Mi, N, S), 22909 (N, Z); Martius s.n. [ad Cocaes; Macbride photos 18705] (Mu, N--photo, W--photo), s.n. [Serro Frio] (Mu, Mu), s.n. [Habitat in altis frigidiusculis districtu Serro Frio] (Mu); Mexia 5748 (B, Ba, Ca--509762, Gg--286185, Go, Mi, N, Qu, S, Ug, Ut--50243a, W--1571901), s.n. [May 3, 1931; Herb. Leonard 7655] (B); Schwacke 8477 [Herb. Magalhães Gomes 2967; Herb. Jard. Bot. Belo Horiz. 26664, in part] (N), 8482 [Herb. Jard. Bot. Belo Horiz. 26665] (N); Williams & Assis 6901 (Ca--744438, Er, N, S, W--1932837). State undetermined: R. E. Pohl s.n. [in Brasilia] (Mu). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS INSIGNIS Alv. Silv., Fl. Mont. 1: 193--194, pl. 127. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 193--194 & 408, pl. 127. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 127. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 778) "In campis siccis in Serra dos Crystaes, prope Diamantina", Minas Gerais, Brazil, in June of 1925, and is deposited in the Silveira Herbarium. On page 408 of his work, Silveira (1928) gives the type locality and date as "Diamantina, 1908"; whether this is a misprint or is intended as a correction of the date given in the original description - or even refers to another collection - is not clear. He notes that the "Species ob caulem fertilem in sectione Actinocephalo valde insignis".

Citations: BRAZIL: Minas Gerais: Tryon & Tryon 6812 (Z).

PAEPALANTHUS INTERMEDIUS Körn. in Mart., Fl. Bras. 3 (1): 371—372. 1863.

Synonymy: Dupatya intermedia (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya intermedia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 371—372 & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 173—175, [283], & 290. 1903; Ruhl. in Urb., Symb. Ant. 7: 173. 1912; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 280, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 953. 1971; Moldenke, Phytologia 26: 142 & 261. 1973.

According to Körnicke's original description (1863) this species is based on a specimen from "Brasilia? Herb. Hort. Petrop. acceperat (ex Herb. Fischer) a cl. Fielding cum schedula numerum 1407 Julio nec patriam nec collectorem pronunciante". Ruhland (1903) adds "Specimen originarium non vidi. Secundum Koernicke inter P. repentem Koern. et P. Bongardi Kunth intermedia".

Irwin and his associates describe the plant as having stems to 50 cm. long and white flower-heads. They found it growing in running water in burned-over cerrado, at 1100 meters altitude, flowering and fruiting in September.

Citations: BRAZIL: Distrito Federal: Irwin, Souza, & Reis dos Santos 8729 (N, Z).

PAEPALANTHUS ITACAMBIRENSIS Alv. Silv., Fl. Mont. 1: 123—124, pl. 75. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 123—124 & 408, pl. 75. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 487. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 75. 1928.

This species is based on A. Silveira 813 from "In campis humidis arenosisque prope Itacambira", Minas Gerais, Brazil, collected in July of 1926, and deposited in the Silveira Herbarium.

Citations: BRAZIL: Minas Gerais: J. E. Oliveira 1316 [Herb. Jard. Bot. Belo Horiz. 45178] (N).

PAEPALANTHUS ITAMBEENSIS Alv. Silv., Fl. Mont. 1: 46--47, pl. 24. 1928.

Synonymy: Paepalanthus itambeënsis Alv. Silv. apud A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938.

Bibliography: Alv. Silv., Fl. Mont. 1: 46--47 & 408. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 24. 1928.

This species is based on A. Silveira 708 from "In campis ad basin montem Itambé do Serro", Minas Gerais, Brazil, collected in April of 1918, and deposited in the Silveira Herbarium. On page 408 of his work (1928) Silveira gives the type locality as "Serra do Itambé do Serro". Hatschbach found the plant growing at "margens rochosas sombrias de rio encachoeirado", flowering and fruiting in September.

Citations: BRAZIL: Minas Gerais: Hatschbach 27512 (S, W--2706773, Z).

PAEPALANTHUS ITATIAIENSIS Ruhl. in Engl., Pflanzenreich 13 (4-30): 211. 1903.

Synonymy: Paepalanthus itatiayensis Ruhl. ex Moldenke, Phytologia 25: 241, in syn. 1973.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 211, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 408. 1928; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Phytologia 20: 368. 1970; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158, map 1778, & Ind. 20. 1972; Moldenke, Phytologia 25: 241 (1973) and 26: 243. 1973.

This species is based on Ule s.n., collected on campos in the Serra do Itatiaia, Rio de Janeiro, Brazil, in March of 1894, and deposited in the herbarium of the Botanisches Museum in Berlin. Ruhland (1903) comments that the "Species foliis densissime ciliatis, utrinque hirsutis, pedunculis angustis, et vagina arcta, ore breviter bifida insignis". It appears to be related to P. batocephalus Ruhl. Silveira (1928) cites A. Silveira 607 from the same Serra do Itatiaia, collected in 1913.

The Tryons found the plant growing "in shrubby grassland and sedgeland with local elfin-woods dominated by granitic rocks", the Eitens "in moist black humusy soil among outcropping rocks on planalto of steep hilly terrain, many hills topped with mountainous outcrops of bare sienite quartz". Smith found it in hard soil along trails. It has been collected at altitudes of 2100--2500 m., in flower in February, March, May, November, and December, and in fruit in March and December. The abbreviation for the surname of the author of the binomial name for this taxon is misspelled

"Rhul." on the labels of the Tryons' collection.

Citations: BRAZIL: Rio de Janeiro: Atala 271 [Herb. Cent. Pesq. Florest. 85] (Ac); Brade I.14 (Bd--25450); Cabrera & Fabris 14206 (Mu); Dusén 2143 (S, S), 4321 (S); Eiten & Eiten 6549 (W--2688354); Glaziou 6744 (B, Z); N. Santos 5758 [239-20] (Ja, Ja); Segadas-Vianna 750 (Ja), 5030 [Brade 20370] (Ja); Segadas-Vianna, Clausen, Lorêdo, & Chagas 1128 (Ja), 1130 (Ja), 1131 (Ja); Segadas-Vianna, Dau, Ormond, & Machline 1425 (Z); L. B. Smith 1732 (N, N--photo, S, W--1571777, Z--photo); Strang 767 [A. Castellanos 25761; Herb. Brad. 49654] (Ac, Ld); Tryon & Tryon 6721 (Ac, N, N); Ule s.n. (B--type). São Paulo: Lutz & Lutz 1727 [Herb. Lutz 1727] (Ja).

PAEPALANTHUS ITATIAIENSIS var. GLABER Ruhl. in Engl., Pflanzenreich 13 (4-30): 21 [as "var. glabra"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 13. 1946.

Synonymy: Paepalanthus itatiaiensis var. glabra Ruhl. in Engl., Pflanzenreich 13 (4-30): 211. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 211 & 290. 1903; Moldenke, Known Geogr. Distrib. Erioc. 13. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 487. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971; Moldenke, Phytologia 25: 241. 1973.

This variety is described by Ruhland (1903) as "Differt a forma typica foliis dense ciliatis, utrinque citissime glaberrimis, pedunculis latioribus, vaginis calvulis" and is based on Glaziou 5456 from damp campos at Itatiaia, Rio de Janeiro, Brazil, deposited in the herbarium of the Botanisches Museum in Berlin.

Citations: BRAZIL: Rio de Janeiro: Glaziou 5456 (B--type, Z--isotype); Segadas-Vianna 5170 (Ja).

PAEPALANTHUS ITHYPHYLLUS (Mart.) Mart. ex Walp., Ann. 1: 890. 1849.

Synonymy: Eriocaulon (Paepalanthus) ithyphyllum Mart., Flora 24, Beibl. 2: 35--36. 1841. Paepalanthus (Eriocaulon) ithyphyllus Mart. ex Walp., Ann. 1: 890. 1849. Eriocaulon ithyphyllum Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 274. 1855. Eriocaulon ithiphyllum Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334. 1855. Paepalanthus ithyphyllus Mart. apud Körn. in Mart., Fl. Bras. 3 (1): 334. 1863. Dupatya ithyphylla (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus ithyphyllus Walp. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya ithyphilla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Eriocaulon ithyphyllum Steud. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 196, in syn. 1903. Dupatya ithyphylla Kuntze ex Moldenke, Known Geogr. Distrib. Erioc. 30, in syn. 1946.

Bibliography: Mart., Flora 24, Beibl. 2: 35--36. 1841; Walp., Ann. 1: 890. 1849; Steud., Syn. Pl. Glum. 2: [Cyp.] 274 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 281, 334--335, 499, & 507, pl. 46, fig. 1 I. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 12, 190, 196, 197, 284, 286, & 290. 1903; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 36, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99, 280, 289, & 487. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158. 1969; Moldenke, Résumé Suppl. 18: 9. 1969; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 503 & 953. 1971; Moldenke, Phytologia 25: 238, 239, & 241. 1973.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 46, fig. 1 I. 1863.

Martius' original description (1841) of this species is "caule ramoso foliisque villoso-canescentibus, tandem glabrescentibus; ramis patulis; foliis lanceolatis acuminatis acutis, caulinis rameisque dense appressis; pedunculis umbellatis dense pilosis, vaginis obtusis glabriusculis. In ferruginosis ad Capâo, Pires, in Serra do Caraça rel., prov. Minarum. Oreas. Affine praesertim divaricato, a quo directione foliorum et pube facile dignoscitur". Ruhland (1903) says that the collector of the above unnumbered type specimen was George Gardner. He cites also G. Gardner 5240 and Sellow C.277 from Minas Gerais and Martius s.n. and Pohl s.n. [near Caretâo] from Goiás. Macbride photographed an unnumbered Schott collection in the Munich herbarium as his type photograph number 18706, but it isn't a type of any named taxon.

Walpers (1849) apparently regarded Martius' "Eriocaulon (Paepalanthus) ithyphyllum" as an attempt by Martius to publish a binomial both in the genus Eriocaulon and in the genus Paepalanthus at the same time. This has been done by several other botanists at various times, although it is now illegal under the present edition of the International Code of Botanical Nomenclature. At least, Walpers definitely accredits the binomial, Paepalanthus ithyphyllus, to Martius and I am following him in this.

The Holway & Holway 1868 and Martius 990, distributed as P. ithyphyllus, are actually P. polyanthus (Bong.) Kunth.

Citations: BRAZIL: Goiás: Martius 104 (Mu, Z). Minas Gerais: G. Gardner 5240 (B, N, W--1067046); Hatschbach, Smith, & Ayensu 28951 (Z); J. E. Pohl s.n. [Minas, 1839] (Br); Sellow C.277 (B, B), s.n. [Brasilia] (Br). State undetermined: Herb. Jard. Bot.

Brux. s.n. (Br); Schott s.n. [Macbride photos 18706] (Mu, N—photo, W—photo). MOUNTED ILLUSTRATIONS: drawings by Körnicke (B, B); Körn. in Mart., Fl. Bras. 3 (1): pl. 46, fig. 1 I. 1863 (N, Z).

PAEPALANTHUS JAUENSIS Moldenke, Résumé Suppl. 17: 2, nom. nud. (1968) and in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 850—852, fig. 5. 1972.

Bibliography: Moldenke, Résumé Suppl. 17: 2. 1968; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 953. 1971; Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 22: 850—852, fig. 5. 1972; Hocking, Excerpt. Bot. A.23: 290. 1974.

Illustrations: Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 851, fig. 5. 1972.

Citations: VENEZUELA: Bolívar: J. A. Steyermark 97906 (Z—type, Z—drawings of type).

PAEPALANTHUS JORDANENSIS Alv. Silv., Fl. Mont. 1: 92—93, pl. 56 & 57. 1928.

Synonymy: Paepalanthus jordadensis Alv. ex Alv. Silv., Fl. Mont. 1: pl. 57, sphalm. 1928. Paepalanthus jordadensis Alv. Silv. ex Moldenke, Fifth Summ. 2: 584, in syn. 1971.

Bibliography: Alv. Silv., Fl. Mont. 1: 92—93 & 408, pl. 56 & 57. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99, 326, & 487. 1959; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158 & Ind. 20. 1970; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 584 & 953. 1971; Moldenke, Phytologia 25: 241. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 56 & 57. 1928.

This species is apparently based on two collections according to Silveira (1928), who says "In campis secus rivulos in Campos do Jordão, Serra da Mantiqueira, Minas Geraes: Alvaro Silveira, Oct. 1909; n. 263 in herbario Silveira; in campis prope Marim, Serra da Mantiqueira, altitudine 2.000 m, Minas: dr. Benedicto Quintino, jul. 1922". On page 408 of the same work Silveira cites "G. Edwall s.n., Campos do Jordão, S. Paulo, 1909", apparently a third collection, but since it is not cited with the original description, it cannot be regarded as another cotype. Silveira comments that the "Species ob colorem bractearum involucrantium et vaginam oblique truncatam ab affinibus valde distincta".

PAEPALANTHUS KARSTENII Ruhl. in Engl., Pflanzenreich 13 (4-30): 155—156. 1903.

Synonymy: Dupata karstenii (Ruhl.) Gleason, Bull. Torrey Bot. Club 52: 195, sphalm. 1925. Dupatya karstenii Gleason apud A. W. Hill, Ind. Kew. Suppl. 7: 79. 1929. Paepalunthus karstenii Ruhl. ex Acosta-Solis, Divis. Fitogeogr. Ecuad. 89, sphalm. 1968. Pae-

palanthus karstenii Pohl ex Moldenke, Résumé Suppl. 4: 12, in syn. 1962. Paepalanthus karsteni Ruhl. ex Moldenke, Phytologia 25: 241, in syn. 1973. Eriocaulon capitatum Tessene ex Moldenke, Phytologia 25: 238, in syn. 1973.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 155--156, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Gleason, Bull. Torrey Bot. Club 52: 195. 1925; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 60 [42]. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 79. 1929; Moldenke, Known Geogr. Distrib. Erioc. 5 & 50. 1946; Moldenke, Alph. List Cit. 1: 93 & 131--133. 1946; Moldenke, Phytologia 2: 229 & 373. 1947; R. Espinosa, Estud. Bot. Sur Ecuad. 1: 78. 1948; Moldenke, Alph. List Cit. 2: 460 & 611 (1948), 3: 758, 805, 807, 817, 924, & 974 (1949), and 4: 1030, 1060, 1074--1076, 1165, 1166, & 1274. 1949; R. Espinosa, Estud. Bot. Sur Ecuad. 2: 25. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 51, 64, 70, 73, & 210. 1949; Moldenke, Phytologia 3: 80 (1949) and 4: 146. 1952; Moldenke, Résumé 67, 72, 80, 84, 418, & 487. 1959; Moldenke, Résumé Suppl. 3: 12 (1962), 4: 12 (1962), 5: 5 (1962), and 6: 6. 1963; Acosta-Solis, Divis. Fitogeogr. Ecuad. 89. 1968; Moldenke, Phytologia 18: 307. 1969; Moldenke, Résumé Suppl. 18: 9 & 13. 1969; Oberwinkler, Pterid. & Sperm. Venez. 27 & 52. 1970; Moldenke, Fifth Summ. 1: 88, 118, 125, 136, 142, 477, & 482 (1971) and 2: 585, 593, 774, & 953. 1971; Moldenke, Phytologia 25: 126, 228, 238, & 241 (1973), 28: 456 (1974), and 29: 386. 1975.

This species is based on an unnumbered collection of Hermann Karsten — for whom it is named — from the Páramo de Chipaque, Bogotá, Cundinamarca, Colombia, deposited in the Vienna herbarium, where it was photographed by Macbride as his type photograph number 29991. Recent collectors describe the species as a cushion-plant with the leaves "rich green" and the "inflorescence white". They have found it growing in dense mats to 15 cm. in diameter on damp clay banks, in wet swales on open páramos, low tussocks in grassy places, wet open or wet grassy páramos, marshes, limestone outcrops, bushy páramos, alpine meadows, and areas of much Sphagnum, forming dense patches on páramos or mats in swampy places, in the Espeletia graminosa association, and in wet areas surrounded by slopes with grasses, Espeletia, and a few shrubs.

Langenheim refers to the species as "common in hummocks in bogs"; Holm & Iltis describe it as a "common cushion plant in Sphagnum below shrubs in shrub páramo of Chusquea-Hypericum-Vaccinium association"; Fosberg describes it as "forming compact grayish cushions, common on brushy slopes and ridges in páramo above timberline, with occasional seeps of water", "forming dense cushions on exposed ridge-tops on rocky windswept backbone of mountain", and "common in wet spots of open rocky páramo, springy and seeping with water". Fosberg & Valencia call it "rare on grassy wet slopes, forming small dense cushions", while Barclay & Juajibioy encountered it "in wet areas traversed by small streams below Distichia cushions", "in open páramo dominated by Espeletia",

"in very wet portions of extensive Espeletia-grass cienaga", and "on wet grassy slopes with Sphagnum".

Tessene refers to the plant as "very abundant, forming large dome-shaped mats in open areas near shrubs", while Mori & Anderson found it on open windswept subpáramos where the dominants were ericaceous shrubs, Chusquea subtesselata, Hypericum, Pernettya, and Vaccinium consanguineum and the characteristic herbs were Poa sp., Brachypodium mexicanum, Agrostis vinosa, Trisetum pringlei, Carex sp., Alchemilla sp., Veronica sp., Eriocaulon microcephalum, and Geranium mexicanum. Kirkbride & Forero refer to it as a "mat-forming herb with white heads along [the] edge of [a] lake" in Magdalena, Colombia.

It has been found growing at altitudes of 2200 to 5500 meters, flowering from January to April and June to December, and fruiting from January to March and in September, November, and December.

The Killip & Smith 15626 collection, cited below, does not represent P. pilosus (H.B.K.) Kunth in spite of the notation accompanying it to the effect that it was compared with the type of P. dendroides by E. P. Killip in the Berlin herbarium and found to be "identical" to it. On the other hand, the Barclay & Juajibioy 10394, also cited below, is very immature but has a decided anomalous appearance; it is placed here tentatively.

Material of P. karstenii has been misidentified and distributed in some herbaria under the names Eriocaulon microcephalum H.B.K., Paepalanthus dendroides (H.B.K.) Kunth, P. muscosus Körn., P. pilosus (H.B.K.) Kunth, and P. pilosus Kunth. On the other hand, the Aristeguieta 2442, Barclay & Juajibioy 5833, 5977, & 9565, E. L. Core 272a, Cuatrecasas 19099, F. R. Fosberg 20654 & 20788, Killip & Aristeguieta-Joseph 11957, and R. E. Schultes 20157, distributed as typical P. karstenii, are now regarded by me as var. corei Moldenke, while the Cuatrecasas & León 26543, Holm & Iltis 460, Mori & Anderson 220, and Tessene 1488 are actually P. kupperi Suesseng. and Cuatrecasas & García Barriga 10301 is P. pilosus (H.B.K.) Kunth.

Ruhland (1903) has this to say about the similarity between P. pilosus and P. karstenii: "Species P. piloso Kunth proxima ab illo indumento et acumine foliorum, bracteis involucrantibus latioribus et dorso glabris et perigoniorum forma diversa".

Additional citations: COLOMBIA: Boyacá: Barclay & Juajibioy 7432 (N), 7629 (N); Cuatrecasas 1559a (F--1321966). Cundinamarca: Barclay & Juajibioy 6097 (N), 7743 (N), 7757 (N); Cuatrecasas 5553 (W--1796658), 10455 (W--1796510); Cuatrecasas, Idrobo, Jaramillo Mejía, & Mora 25574 (Fg, W--2342142); Cuatrecasas & Jaramillo Mejía 25734 (Fg), 25882 (Fg); F. R. Fosberg 21462 (N), 21684 (N); García-Barriga 11681 (W--1952197), 17181 (W--2569584A); Grubb, Curry, & Fernandez-Perez 12 (K, W--2279091); Haught 5619 (W--

1709780); Humbert, Idrobo, Jaramillo Mejía, Perez Arbelaez, & Uribe Uribe 26894 (S, W--2282395); Karsten s.n. [Bogotá, Páramo de Chipaque; Macbride photos 29991] (B--isotype, N--photo of type, N--photo of type, Z--isotype); Køie 4689 (Bs, Cp), 5365 (Cp, Ok, W--2253585); Langenheim, Idrobo, Jaramillo Mejía, & Mora 3688 (W-2266638); F. W. Pennell 2074 (E--843859, F--485468, N, W--1042097), 2085a (N); M. Schneider 628 (S), 1014 (S), 1099 (S), 1177 (S); R. E. Schultes 18780 (W--2172255, W--2198908). Magdalena: Barclay & Juajibioy 6584 (N); Cuatrecasas & Romero Castaneda 25143 (Fg, W--2339487). Nariño: Vareschi 4079 (Ve--41618). Norte de Santander: Cuatrecasas & García-Barriga 10302 (F--1289774, W--1798461). Santander: Araque Molina & Barkley 18S014 (W--1985463); Barclay & Juajibioy 10394 (N); Fassett 25929 (E--1570199); Killip & Smith 15626 (N, S), 19557 (S); H. Saint John 20761 (N, N, W--2107548). Department undetermined: Herb. Kegel s.n. (B); Køie 5376 [Páramo de Palacio] (Cp). VENEZUELA: Bolívar: Pannier & Schwabe s.n. [Auyantepui] (Ve). Mérida: Badillo 996 (Ve--18304); Bernardi 681 (N); Jahn 1034 (N); Merxmüller 22918 (Mu, Mu); Oberwinkler & Oberwinkler 12814 (Mu); Ruiz-Terán & López-Figueiras 1490 (Tu), 8318 (Ac); Ruiz-Terán & López-Palacios 6581a (Ld); J. A. Steyermark 55727 (N); Steyermark & Koyama 102359 (Ld); Vareschi 2092 (Mu), 2208 (Ve--43147), 6997 (Ve--43418); Vareschi & Gerstner 2152a (Ve--34214); Vareschi & Pannier 3054 (Mu). Táchira: Ruiz-Terán, López-Figueiras, Wurdack, Wurdack, & Tillett 8153 (Z); J. A. Steyermark 57377 (W--1901729); Vareschi 5374 (Ve), 5579 (Ve). Trujillo: Aristeguieta 3598 (N); J. A. Steyermark 104862 (Ft, S). ECUADOR: Azuay: Barclay & Juajibioy 8656 (N). Carchi: Barclay & Juajibioy 9374 (N).

PAEPALANTHUS KARSTENII var. COREI Moldenke, Phytologia 29: 386. 1975.

Bibliography: Moldenke, Phytologia 29: 386. 1975.

Barclay & Juajibioy describe this plant as having small rosettes with long hairs on the leaves, the flower "heads on low stalks" or forming "low mats of crowded stems with sharp-pointed leaves; leaves 15 x 3 mm. at base; heads small, reaching 3 cm. in height, whitish" and found it "in cienaga (swamp) by lakeside with grasses, herbs, but no Espeletia, in very wet peaty soil" and forming "very low rosettes, leaves to 1.5 cm. x 3 mm., heads small, white, in very wet portions of extensive Espeletia-grass cienagas" or "under rock overhang on open slopes dominated by Espeletia surrounding lake in basin, some separated by wet quebradas draining into the lake, [on] coarse gravel [with] some large rocks [and] mostly incomplete ground cover". Aristeguieta refers to it as an "herba diminuta, efalpada, flores cremosas", while Cuatrecasas says "Céspedes muy densos, alfombrosos. Hoja

brillante, verde luego amarillenta".

Ruiz-Terán and his associates describe the plant as "Hierba [or hierbita] mínima, cespitosa, rosulada, diminuta, hasta do 5 cm., musciforme, que forma cojines compactos, convexos, densos, de contorno más o menos circular y 5--12 cm. de diámetro" or "que forma almohadillas muy compactas, de contorno ± orbicular" or "agrupada en almohadillas subhemisféricas, convexas, de 8--20 cm. de diámetro. Hojas adultas pequeñas, sésiles, deltado-lineares, 8--20 mm. de largo, virtualmente glabras, ciliadas, verde claras, concolores, las proximales generalmente secas y estramíneas, mucronulado-subespinascentes, con vaina blanca y limbo verde intenso. Escapos exsertos, más cortos que las hojas" [or "0.6-4 cm. de largo"]. "Capítulos floríferos inclusos o a nivel de ápice de las hojas; capítulos fructíferos cortamente exsertos, hemisféricos, 2,5--4,5 x 4--6 mm., blanquecino grisáceos, pequeños, escapíferos. Flores pequeñas [or muy pequeñas], blanquecinas o blancas [or blanco verdósulos]. Frecuente [or abundante or muy abundante]".

The plant has been found growing at alpine lakesides, on exposed ridge-tops of rocky windswept "backbone of mountains" and "forming dense patches on páramos", at altitudes of 1350 to 4200 meters, flowering in February, March, May, and from July to December, and fruiting in March, August to October, and December. Fosberg reports it as "common in wet spots on open rocky páramo, springy and seeping with water, forming small colonies".

Dr. Core, in a letter to me dated November 27, 1974, says: "It is interesting to know that my collection of the Paepalanthus from Purace has turned out to be a new variety. I well remember the day we climbed to the top of the volcano. Four years later a class of 18 students from the University of Cauca, who must have been standing almost exactly where I stood, met their death in a sudden eruption".

Cuatrecasas & Jaramillo Mejía describe the plant as forming "rosettes in cushions, leaves bright-green, flowers white", while García-Barriga says of it "planta pequeña, inflorescencia blanca".

Material of this taxon has in the past mostly been identified as typical P. karstenii Ruhl. or P. muscosus Körn.

Citations: COLOMBIA: Cauca: Barclay & Juajibioy 5733 (N), 5977 (N); E. L. Core 272 (N--type, We--isotype), 272a (W--2105161); Cuatrecasas 19099 (N); H. Pittier s.n. [February 1906] (W--531755, W--1114760). Cundinamarca: Cuatrecasas & Jaramillo Mejía 25734 (W--2342295), 25882 (W--2373930); F. R. Fosberg 20654 (N, W--2108783), 20788 (N, W--2108825); García-Barriga 17181 (W--2569584); Killip & Ariste-Joseph 11957 (N, W--1140040); R. E. Schultes 20157 (Ld, W--2198936). VENEZUELA: Apure: Ruiz-Terán & López-Figueiras 8855 (Z). Mérida: Aristeguieta 2442 (N, W--2248796); Barclay & Juajibioy 9565 (N); Ruiz-Terán 7028 (Z), 7235 (Ac), 7325 (Ac); Ruiz-Terán & López-Figueiras 309 (Tu). Trujillo: Ruiz-Terán 9023 (Ld); Ruiz-Terán & López-Figueiras 2142 (Ld), 7518

(Kh). BOLIVIA: La Paz: G. H. H. Tate 382 (N); R. S. Williams 842 (N, N).

PAEPALANTHUS KARSTENII var. MINIMUS Moldenke, Phytologia 30: 15. 1975.

Bibliography: Moldenke, Phytologia 30: 15. 1975.

Pennell comments that in this plant the "bracts [are] short and broad, barely pubescent, [the] petals barely exceeding 1 mm. long, spatulate-oblong", while E. P. Killip notes that the taxon is "near P. karstenii Ruhl. but bracts smaller, leaves more obtuse, involutish".

Collectors describe the plant as a mat-forming herb with white flower-heads and have found it growing on páramos, wet open or bushy páramos, and the edges of alpine lakes, at altitudes of 2400 to 3700 meters, flowering from July to October and fruiting in October and January. Langenheim refers to it as "common on hummocks"; Killip & Arbelaez say of it "formando grupas esféricos", while Barkley & Araque Molina found it growing "en selvas húmedas y densas en las montañas" and describe it as a "yerba con flores blancas en la suelos húmedos y poco húmedos".

Citations: COLOMBIA: Boyacá: Langenheim 3508 (W—2266624). Cauca: Cuatrecasas & Willard 26421 (Fg, W—2402606); H. Pittier 1105 (W—631303). Cundinamarca: Ariste-Joseph A.73 (W—888761—type, Z—isotype); Killip & Perez Arbelaez 1142 (W—1517759); F. W. Pennell 2256 (F—485508, N, W—1042205). Magdalena: Kirkbride & Forero 1784 (Ld, N). Santander: Araque Molina & Barkley 18S719 (W—1985511); Barkley & Araque Molina 18S134 (W—1985489); Cuatrecasas & García-Barriga 9980 (Er, F—1289775, N, W—1798459).

PAEPALANTHUS KILLIPII Moldenke, Bull. Torrey Bot. Club 68: 67—68. 1940.

Bibliography: Moldenke, Bull. Torrey Bot. Club 68: 67—68. 1940; Moldenke, Known Geogr. Distrib. Erioc. 5 & 50. 1946; Moldenke, Alph. List Cit. 2: 610 (1948) and 4: 1060. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 210. 1949; Moldenke, Fieldiana Bot. 28: 124. 1951; Moldenke, Phytologia 4: 146. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Anon., U. S. Dept. Agr. Bot. Subj. Index 5: 4227. 1958; Moldenke, Résumé 67, 72, & 487. 1959; Moldenke, Résumé Suppl. 4: 4 (1962) and 12: 2. 1965; J. A. Steyerm., Act. Bot. Venez. 1: 94. 1966; Moldenke, Fifth Summ. 1: 118 & 125 (1971) and 2: 953. 1971.

This species is based on Killip & Smith 15299 from marshy land, at 1500 meters altitude, on the Mesa de los Santos, in the Eastern Cordillera, Santander, Colombia, collected between December 11 and 15, 1926, and deposited in the United States National Herbarium at Washington. Recent collectors describe the plant as an herb whose flower-heads are grayish in appearance. They have found it growing in wet white sand in open places, at the base of bluffs, and on wet roadside banks, at altitudes of 3300 to 4500 feet, flowering in November, December, and February, and fruiting in November.

Fosberg found it "forming loose clumps on a small open sandstone ridge decomposing into white sand", while he and Holdridge encountered it "near a stream, between rocks with water trickling between them".

It should be noted here that the original description of this species was validly and officially published on December 31, 1940, not in "1941" as is stated on the title-page of the issue.

Additional citations: COLOMBIA: Boyacá: Grubb, Curry, & Fernandez-Perez 716 (K, W--2322623). Huila: Fosberg & Holdridge 19388 (W--2059696). Méta: F. R. Fosberg 19511 (Ew, N). Norte de Santander: Fassett 26026 (W--2166234, Ws). Santander: Killip & Smith 15299 (Ca--938954--isotype, Mi--isotype, S--isotype). VENEZUELA: Bolívar: Bunting 2969 (Z); Cardona 2702 (W--1997708); Steyermark, Dunsterville, & Dunsterville 92619 (N); Steyermark & Nilsson 722 (N).

PAEPALANTHUS KLOTZSCHIANUS Körn. in Mart., Fl. Bras. 3 (1): 389. 1863.

Synonymy: Paepalanthus (Eupaepalanthus) klotzschianus Körn. ex Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23. 1888. Dupatya klotzschiana (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya klotzschiana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 276, 389, 499, & 506, pl. 50. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 E & F. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 126, 141, 284, & 290. 1903; Herzog in Fedde, Repert. Spec. Nov. 20: 83. 1924; Stapf, Ind. Lond. 4: 518. 1930; J. Hutchinson, Fam. Flow. Pl. 2: 66, fig. 21. 1934; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 280, & 487. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 556, fig. 230 O & P. 1964; Moldenke, Phytologia 20: 305. 1970; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 953. 1971; J. Hutchinson, Fam. Flow. Pl., ed. 3, [711] & 949, fig. 364. 1973; Moldenke, Phytologia 25: 241. 1973.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 50. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 E & F. 1888; J. Hutchinson, Fam. Flow. Pl., ed. 1, 2: 66, fig. 21. 1934; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 556, fig. 230 O & P. 1964; J. Hutchinson, Fam. Flow. Pl., ed. 3, [711], fig. 364. 1973.

This species is based on an unnumbered Sellow collection from somewhere in eastern Brazil, probably deposited in the Munich herbarium. Ruhland (1903) cites only the original collection, and,

indeed, it would seem that this is the only known collection of the species, although Herzog (1924) comments that it is closely related to P. albo-tomentosus Alv. Silv. If he made this comment from seeing only the original specimen or bases it on newer material is not clear.

Citations: BRAZIL: State undetermined: Sellow s.n. [Brasilia] (Br--isotype, N--isotype, N--photo of isotype, Z--photo of isotype). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 50. 1863 (N, Z).

PAEPALANTHUS KUNHARDTII Moldenke, Mem. N. Y. Bot. Gard. 8: 97--98. 1953.

Synonymy: Paepalanthus fraternoides Moldenke, Résumé 325, in syn. 1959.

Bibliography: Moldenke, Mem. N. Y. Bot. Gard. 8: 97--98. 1953; G. Taylor, Ind. Kew. Suppl. 12: 101. 1959; Moldenke, Résumé 72, 325, & 487. 1959; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 583 & 953. 1971.

This species is based on Maguire & Politi 27588 from wet Sphagnum hummocks at Camp Savanna, altitude 4500 feet, in the Cerro Sipapo (Paraque), Amazonas, Venezuela, collected on December 11, 1948, and deposited in the Britton Herbarium at the New York Botanical Garden. It is known thus far only from the type collection.

Citations: VENEZUELA: Amazonas: Maguire & Politi 27588 (Bm--isotype, E--isotype, F--isotype, G--isotype, Gl--isotype, Hn--isotype, Ja--isotype, K--isotype, N--type, Ut--isotype, Ve--isotype, W--isotype).

PAEPALANTHUS KUPPERI Suesseng. in Engl., Bot. Jahrb. 72: 293. 1942.

Bibliography: Suesseng. in Engl., Bot. Jahrb. 72: 293. 1942; Moldenke, Known Geogr. Distrib. Erioc. 4 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 39 & 210. 1949; Moldenke, Phytologia 4: 146. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 47 & 487. 1959; Moldenke, Fifth Summ. 1: 88 (1971) and 2: 953. 1971; Moldenke, Phytologia 29: 208. 1974.

This species is based on Kupper 1315 from an altitude of 3450 meters at Chirripo Grande, Cartago, Costa Rica, collected on April 27, 1932, and deposited in the herbarium of the Botanische Staatssammlung in Munich. Collectors describe the plant as growing in scattered clumps to 30 cm. in diameter and as a "common cushion plant on Sphagnum below shrubs in shrub páramos of Chusquea, Hypericum, and Vaccinium associations". They have found it at altitudes of 2900 to 3500 meters, flowering in April, July, and November, and fruiting in July.

The species is obviously very closely related to P. karstenii of northern South America and may well prove not to be specifically distinct. Material has been misidentified and distributed in some herbaria as Eriocaulon microcephalum H.B.K. and as Pae-

palanthus karstenii Ruhl.

Citations: COSTA RICA: Cartago: Cuatrecasas & León 26543 (Fg, W--2402780); Holm & Iltis 460 (N, Z); Kupper 1315 (Mu--type, Mu--photo of type, N--isotype); Lent 143 (N); Mori & Anderson 220 (Ws); Tessene 1488 (Ws).

PAEPALANTHUS LAMARCKII Kunth, Enum. Pl. 3: 506--507. 1841.

Synonymy: Eriocaulon fasciculatum Lam., Encycl. Méth. Bot. 3: 276. 1789 [not E. fasciculatum Bong., 1831, nor Rottb., 1778, nor Weig., 1959]. Eriocavlon fasciculare Raeusch., Nom. Bot. 30. 1797. Eriocavlon fasciculatum Lam. apud Willd. in L., Sp. Pl., ed. 4, 1: 486--487. 1797. Eriocaulon fasciculatum "Lam. (et? Rottb.)" apud Steud., Nom. Bot., ed. 1, 312. 1821. Paepalanthus lamarkii Kunth ex Klotzsch in Schomb., Vers. Faun. & Fl. Brit.-Guian. 1116. 1848. Paepalanthus ottonis Klotzsch in Schomb., Vers. Faun. & Fl. Brit.-Guian. 3: 1115, hyponym. 1848. Eriocaulon lamarckii Kunth ex D. Dietr., Syn. Pl. 5: 260. 1852. Eriocaulon lamarckii (Kunth) Steud., Syn. Pl. Glum. 2: [Cyp.] 276. 1855. Paepalanthus lamarckii H.B.K. ex Sauv., Anal. Acad. Ci. Habana 8: 49. 1871. Lasiolepis pilosa Böck., Flora 56: 91. 1873. Dupatya lamarckii (Kunth) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon lamarckii Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893. Dupatya lamarckii Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus lamarckii Kuntz apud H. Lecomte, Bull. Soc. Bot. France 55: 595, sphalm. 1908. Lasiolepsis pilosa Böck. apud Milne-Redhead, Kew Bull. Misc. Inf. 1948: 472, sphalm. 1948. Eriocaulon fasciculatum Willd. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Eriocaulon lamarcki Steud. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Paepalanthus lamarckii Knuth ex W. Robyns, Excerpt. Bot. A.1: 215, sphalm. 1959. Eriocaulon fasciculare L. ex Moldenke, Fifth Summ. 2: 500, in syn. 1971. Paepalanthus lamarckii (Schrad.) Kunth ex Moldenke, Fifth Summ. 2: 585, in syn. 1971. Eriocaulon vivum Burchell ex Moldenke, Phytologia 25: 239, in syn. 1973.

Additional & emended bibliography: Lam., Encycl. Méth. 3: 276. 1789; J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Lam., Tabl. Encycl. Méth. Bot. [Illustr. Pl.] 1: 214, pl. 50, fig. 3. 1791; Henckel, Nom. Bot. 68. 1797; Raeusch., Nom. Bot. 30. 1797; Willd. in L., Sp. Pl., ed. 4, 1: 486--487. 1797; Rottb., Descr. Pl. Surin. pl. 2. 1798; Pers., Syn. Pl. 1: 111. 1805; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 867. 1817; Pers., Sp. Pl. 1: 284. 1817; Steud., Nom. Bot. Phan., ed. 1, 312. 1821; Poir. in Cuvier, Dict. Sci. Nat. 24: 240. 1822; Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826; Bong., Ess. Monog. Erioc. 24. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 505--507, 613, & 625. 1841; Mart., Flora 24, Beibl. 2: 60. 1841; Klotzsch in Schomb., Vers. Faun. & Fl. Brit.-Guian. [Reise Brit.-

Guian.] 3: 1064, 1115, & 1116. 1848; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 298, 356, 505, & 507. 1863; Sauv., Anal. Acad. Ci. Habana 8: 49. 1871; Sauv., Fl. Cub. 163. 1871; Böck., Flora 56: 91. 1873; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Gomez de la Maza, Not. Bot. Sist. 49 & 110. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 35 & 402. 1894; Huber, Bol. Mus. Para. 2: 499. 1898; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 29. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 153, 159—161, 284—286, 290, & 291. 1903; H. Lecomte, Journ. de Bot. 21 [ser. 2, 1]: 136. 1908; Alv. Silv., Fl. Mont. 1: 408. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930; Stapf, Ind. Lond. 3: 90. 1930; Herzog in Fedde, Repert. Spec. Nov. 29: 205. 1931; Moldenke, N. Am. Fl. 19: 40—41. 1937; Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelmus. 11]: 216 & 218. 1938; Moldenke, Phytologia 1: 319, 333, 350, 351, 353, 355, 356, 360, 361, & 363. 1939; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Ann. Mo. Bot. Gard. 31: 69. 1944; A. Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 76 & 104. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; León, Fl. Cuba 1: 283. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4—7, 13, 30, 34, 36, 42, 50, & 52. 1946; Moldenke, Alph. List Cit. 1: 32, 67, 68, 132, 186, 187, 190, 231, 232, 265, 298, & 326. 1946; Le Cointe, Amaz. Bras. III Arv. & Pl. Uteis, ed. 2, 113. 1947; Moldenke, Phytologia 2: 375. 1947; Moldenke, Alph. List Cit. 2: 412, 429, 486, & 574 (1948), 3: 818 & 902 (1949), and 4: 1074, 1144, 1158, 1209, 1219, & 1304. 1949; Moldenke, Phytologia 3: 143. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 36, 41, 44, 45, 48, 57, 64, 66—68, 95, 111, 112, 114, 117, & 210. 1949; Meikle & Baldwin, Am. Journ. Bot. 39: 45, 48, & 50, fig. 19—27. 1952; Moldenke, Phytologia 4: 146—148. 1952; Moldenke, Mem. N. Y. Bot. Gard. 8: 98. 1953; Moldenke in Humbert, Fl. Madag. 36: 30, 31, & 35—36, fig. 4 (8—17). 1955; Angely, Fl. Paran. 10: 5. 1957; Alain, Revist. Soc. Cub. Bot. 15: 56. 1958; Standl. & Steyerm., Fieldiana Bot. 24: 377 & 378. 1958; Van der Veken, Bull. Soc. Roy. Bot. Belg. 91: 100. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 43, 48, 52, 54, 57, 63, 67, 72, 75, 77, 78, 99, 112, 136, 137, 140, 145, 156, 280, 288, 289, 309, 327, & 487. 1959; Moldenke, Résumé Suppl. 1: 4, 9, & 17. 1959; Rickett & Stafleu, Taxon 8: 232. 1959; A. Robyns, Excerpt. Bot. A.1: 215. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 35 & 402. 1960; Moldenke, Résumé Suppl. 3: 12 & 34 (1962) and 11: 4. 1964; E. Good, Geogr. Flow. Pl. 227, 440, & 495. 1964; J. A. Steyerm., Act. Bot. Venez. 3: 96. 1968; Lindeman & Görts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 331 & 332. 1968; Moldenke, Phytologia 17: 456. 1968; Moldenke, Résumé Suppl. 17: 11 (1968) and 18: 12. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 187, & 191. 1969; Moldenke, Phytologia 18: 92 & 280 (1969), 19: 20 (1969), and 20:

11, 294, 295, 297, 414, 417, & 418. 1970; Moldenke, Fifth Summ. 1: 82, 91, 97, 99, 103, 112, 118, 125, 130, 132, 134, 163, 180, 217—219, 226, 231, 238, 239, 262, & 482 (1971) and 2: 500, 504, 517, 546, 585, 587, & 953. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1157 & Ind. 20. 1972; Rouleau, Taxon Index Vols. 1-20, part 1: 271. 1972; Stafleu, Internat. Code Bot. Nomencl. 354. 1972; Moldenke, Phytologia 23: 434 (1972), 25: 228 & 239 (1973), and 26: 24, 195, & 196. 1973; Thorne in Meggers, Ayensu, & Duckworth, Trop. For. Ecosyst. Afr. & S. Am. 33 & 36. 1973; Moldenke, Phytologia 29: 211, 298, 304, 311, 317, & 318. 1974.

Illustrations: Lam., Tabl. Encycl. Méth. Bot. [Illustr. Pl.] 1: pl. 50, fig. 3. 1791; Rottb., Descr. Pl. Surin. pl. 2. 1798; Meikle & Baldwin, Am. Journ. Bot. 39: 48, fig. 19—27. 1952; Moldenke in Humbert, Fl. Madag. 36: 31, fig. 4 (8—17). 1955.

Recent collectors have found this plant growing in forests and savannas, moist or inundated campos and exposed swamps, in wet places and wet sand, at the edge of wet campos, in sandy ground in open low forests, in open dry drainage ditches and on low waste ground, along small roads, on sandy creek banks, in cerrado on white sand, in wet open ditches, and in wet places in gallery forests, at altitudes from near sealevel to 1800 meters, flowering in February, March, and from May to December, fruiting in February, June, August, October, and November. They describe it as an annual herb, 5—7 cm. tall, the heads light-gray or grayish-white, with dark bracts, the flowers themsleves "gray", "gray-purple", or "white-purple". Vernacular names reported for it are "capim manso" and "joncinelle fasciculée".

Maguire, Cowan, & Wurdack refer to the species as "occasional on moss-covered boulders in rapids"; Wurdack & Monachino report that it is "locally abundant on moist riverbanks" and "frequent in morichal"; Maguire, Wurdack, & Bunting describe it as "locally frequent in moist sand". Lützelburg found it growing "in clumps of Rhynchospora aberrans Clarke in caatinga vegetation on a plateau top"; Prance and his associates found it "in small clumps in small streams on savanna on large plateau", while Goodland encountered it "in wet sandy open savanna grassland with scattered trees, the dominants being Curatella, Byrsonima, Trachypogon, and Fimbristylis". McKee speaks of it as having light-green leaves and white inflorescences, noting that it is "common in very sandy soil with impeded drainage".

It should be noted here that the Eriocaulon fasciculatum of Bongard and that of Weigelt are now known as Paepalanthus bifidus (Schrad.) Kunth, while that of Rottbøll is P. fasciculatus (Rottb.) Kunth. Paepalanthus ottonis is based on Otto 942 from Venezuela, deposited in the Berlin herbarium, while Eriocaulon vivum seems to be based on Burchell 8717 in the Torrey Herbarium. The binomial, Lasiolepis pilosa Böck., is sometimes erroneously cited to page "9" or to page "90" in Flora, volume 56 (1873) instead of "91".

Kunth (1841) comments that P. lamarckii is very similar in ap-

pearance to P. polytrichoides Kunth and to what he called P. congestus Kunth [now known as P. fasciculatus (Rottb.) Kunth]. I would add that it is also very similar to P. viridis Körn., P. cearaensis Ruhl., P. manicatus V. A. Pouls., and P. microcaulon Ruhl.

Good (1964) tells us that P. lamarckii is a good example of "discontinuous tropical zone" species, being found both in America and Africa. However, if the Wegener hypothesis is correct, then its distribution was at one time continuous, since the species is most common in easternmost tropical South America and in westernmost tropical Africa. In the Humbert work (1955) its present known distribution is given as follows: "Espèce à aire très étandue, mais curieusement disjointe (peut-être paraissant telle à cause du petit nombre des récoltes): de Cuba et du Honduras britannique au Brésil au Sud; aussi en Guinée française, Sierra Leone, Liberia, Gabon, Tanganyika et Madagascar".

It should be noted that the Gentle 3780, cited below, is anomalous, being much more husky than is normal for this species. The species apparently often grows in close association with other species of Eriocaulaceae, but, being so small and inconspicuous, is often overlooked and occurs as a mixture with other species in collections. The Collector undetermined 177 collection, cited below, is a mixture with Eriocaulon melanocephalum Kunth; Gentle 4238a is a mixture with E. fuliginosum C. Wright; Cardona Puig 2866 is a mixture with Syngonanthus caulescens (Poir.) Ruhl.; Goodland 254 is a mixture with S. glandulosus Gleason; Boon 1154 is a mixture with Tonina fluviatilis Aubl.; and Blanchet 5 is a mixture with Paepalanthus ramosus var. affinis (Bong.) Ruhl. Gentle 992 was a mixture of P. lamarckii and the type collection of P. gentlei Moldenke -- the P. lamarckii portion later renumbered as "992a".

Because of the considerable difference of opinion as to the interpretation of this taxon, it may be worthwhile to repeat Kunth's original (1841) description of it: "P. Lamarckii. Caulibus erectis, simplicibus, foliosis; foliis rigidulis, subensiformi-linearibus, acutato-mucronatis vel obtusis, glabris, patenti-subrecurvatis; pedunculis per crebros fasciculato-congestis, filiformibus, subhexagonis, villosulis; vaginis acutato-mucronatis, glabriusculis, apice pilosis; capitulis subglobosis, sordide albido-villosis; bracteis sepalisque exterioribus apice albido-hirsutis: fructiferis rigescentibus. - Eriocaulon fasciculatum Lam. Encycl. 3. 276. t. 50. f. 3. (v. s.) Willd. herb. n. 2372. fol. 1. (nec reliq. auct.) - Guiana. - Caules subpollicares. Folia 9--10 lineas longa, 1 lineam lata, basi dilatata, amplexicaulis. Pedunculi 1 --1 3/4-pollicares. Vaginae 5 lineas longae. Capitula magnitudine grani cannabis. Bracteae olivaceae, late cuneatae, apice ciliato-hirsutae. Flores masculi pedicellati: Sepala 3 exteriora olivacea, obovata, apice rotundato-hirsuta; 3 interiora in tubum tubaeformem

connata. Flores feminei pedicellati: Sepala 3 exteriora olivacea, spathulata, apice albido-hirsuta: fructifera rigescentia, ima basi connata, reflexa; 3 interiora parum breviora, tenuiora et pallidiora, apice ciliato-hirsuta. Pili bractearum et calycum obtusiusculi, articulati. Ovarium subrotundo-ovatum, tricoccum. Stylus 1. Stagmate....."

Böckeler's description (1873) of Lasiolepis pilosa is also worth repeating here: "Culmo abbreviato, pollicem circ. alto, subcurvato dense foliato, parte subterranea radicante, fibrillis numerosissimis capillaribus fasciculatis; foliis spiraliter dispositis patentissimis evaginatis basi dilatata amplectentibus, linearilanceolatis obtusiusculis pagina interiore asperulis, 11—5 lin. long. lineam latis flavescenti-viridulis subglabris; pedunculis numerosis in apice culti confertis patentibus setaceis inaequalibus 2 1/2 — 1 poll. longis leviter tortis, teretiusculis vaginisque pilis subtilissimis vestitis; vaginis ore lanceolato-productis acutiusculis 6—4 lin. longis; capitulis exacte globosis 1 1/2 — 1 lin. crassis dense setulosis cinerascenti-bruneis; squamis perdense imbricatis late ovalibus convexiusculis olivaceo-fuscis, superne setis longiusculis subtilibus (fragillimis) albidis obsitis; perigynii foliolis interioribus anguste oblongo-linearibus pellucido-albis glabris, exterioribus ternis fuscis anguste cuneiformibus superne dense setuloso-ciliatis; caryopsi (minima) oblonga sulcato-subangulata. — Herb. Musei Warsoviani."

Gleason, in his unpublished Flora of British Guiana, described the species as "Stems 2—12 cm. high, smooth; leaves numerous, often firm in texture, nearly glabrous; peduncles numerous, sparsely hirsute to nearly glabrous, 3—5 (rarely 10) cm. long, their sheaths hirsute and ciliate; heads blackish, subglobose or depressed, 2—3 mm. wide; bracts short, usually concealed, ovate, acute. Wet places, Mazaruni River, Jenman 728, 5803; Kaieteur Falls, Jenman 894; Macreba Falls, Alston 328; without definite locality, Appun 1579, Jenman 7278 (Cuba to Brazil)."

Uittien & Heyn (1938) cite the following collections from Surinam: Boon 1154, Collector undetermined s.n., Focke 124 & 480, Hostmann 31 & 977, Kegel 301 & 1472, Lanjouw 750 & 751, Pulle 215, Rombouts 139, Splitgerber 392, Tulleken 78, Versteeg 772, and Wullschlägel 759, flowering from July to September, November, and December. They comment that Pulle 215 and Versteeg 772 "have broader, yellowish leaves and very long, nearly entirely glabrous peduncles".

Thorne (1973) says that of the 108 species of plants native to both tropical west Africa and tropical America, 45 are aquatic or nearly so. Such plants are wide-ranging generally, readily transported by water and shore birds. Apparently P. lamarckii is regarded by him as one of these.

Silveira (1928) cites Huber 44 from Marajo Island, Brazil; Meikle & Baldwin (1952) cite "Bequaert in Linder 1451" from Liberia; Steyermark (1968) cites his no. 88885 from Venezuela. Van der Veken (1958) cites Bequaert 7623, Coûteaux 1007, and Gillet

s.n. ["anno 102 leg."] from Zaire and refers to the plant as a therophyte, commenting that "En Afrique, l'espèce a été récoltée de la Guinée française au Congo et sur la côte orientale de l'île de Mafia. En Amérique du Sud elle existe des Antilles au Brésil."

The Gentle 992a, cited by me in 1939 as being in the University of Michigan herbarium is now in the Lundell Herbarium.

Material of P. lamarckii has been misidentified and distributed in some herbaria as Eriocaulon caesium Griseb., E. dendroides Kunth, E. gibbosum Körn., Eriocaulon sp., Paepalanthus cearensis Ruhl., P. exiguus (Bong.) Körn., P. polytrichoides Kunth, and P. tortilis Mart. On the other hand, the Luschnath 38 [Martius 555] and Ridley & Lea s.n., distributed as P. lamarckii, are actually P. bifidus (Schrad.) Kunth, Pulle 215 is P. leucocyaneus Tutin, Ackermann s.n. [1832] is P. melaleucus (Bong.) Kunth, Wessels Boer 1460 is P. oyapockensis Herzog; and Irwin, Reis dos Santos, Souza, & Fonsêca 23353 is P. viridis Körn.

The G. Gardner 1170 collection, cited below, is a mixture with P. bifidus (Schrad.) Kunth, while Lützelburg 20687 is a mixture with Eriocaulon neglectum Ruhl. and Syngonanthus gracilis var. tenuissimus Ruhl.

Additional citations: BRITISH HONDURAS: Gentle 3780 (Ld, Mi), 4238 (Ld, Ld), 4238a (Ld), 9486 (Ld), 9631 (Ld, S); McKee 11378 (W--2641488); Schipp S.130 (Ca--465322, F--641532, S). CUBA: Pinar del Río: Ekman 18121 (S). Santa Clara: Ekman 17124 (S). Province undetermined: C. Wright 3742 (S). ISLA DE PINOS: Alain & Killip 2190 (Le); Ekman 12015 (Ca--491271, S); Killip 42864 (Le). HISPANIOLA: Dominican Republic: Meyerhoff s.n. [St. Domingo, 1859] (B). TRINIDAD AND TOBAGO: Trinidad: W. E. Broadway 2145 (W--1047691). COLOMBIA: Amazonas or Vaupés: Schultes & Cabrera 14968, in part (Z). Magdalena: C. Allen 591 (E--1015283), 670 (E--1014519). VENEZUELA: Amazonas: Maguire, Cowan, & Wurdack 29499 (F, K, N, Ve, W); Maguire, Wurdack, & Bunting 36138 (N); J. A. Steyermark 57804, in part (N). Angostura: Bailey & Bailey 1697a (Ba). Bolívar: Cardona Puig 2886, in part (W--2195081); J. A. Steyermark 88885 (N), 90849 (Ca); Wurdack & Monachino 39831 (Mu, N), 39950 (N), 41031 (N, S). Guaricó: Guyon 141 (P). State undetermined: Otto 942 (B, Br, N--photo, Z--photo). GUYANA: Goodland 254, in part (W--2546169); V. Graham 168 (K); Jenman 5803 (N); Sandwith 1256 (S). SURINAM: Boon 1154, in part (Ut--367); Dirven LP.419 (Ut--29223b); Focke 480 (Ut--366); Hostmann 31 (Ut--366), 31a (S), 977 (B, Ut--366); Kappler s.n. (S); Lanjouw 750 (Ut--44067a), 751 (Ut--44066a); Maguire, Schulz, Soderstrom, & Holmgren 53960 (N); Mennega 141 (Ut--93615b); Rombouts 139 (Ut--44068a); Wullschlägel 759 (Br). FRENCH GUIANA: Barbier s.n. (N);

Bentham s.n. (Ut--366); Collector undetermined 177, in part (N); Degelius s.n. [4/VI/1958] (Go); Herb. Bentham 2 (S); Herb. Mus. Paris. 224 (Br); Leprieur 49 (B), 1308 (N), s.n. [Cayenne] (Br), s.n. [Guyane] (W--2501740), s.n. (B); Mélinon 178 (B); Poiteau s. n. (B); Richard s.n. [Guyane] (B); Sagot 1329 (Br, S, Ut--365). BRAZIL: Amazônas: Lützelburg 20687, in part (Mu). Bahia: A. P. Duarte 5950 [Herb. Brad. 15415] (Lw). Ceará: Dias da Rocha 3508 [Macbride photos 18697] (Mu, N--photo, N--photo, W--photo); Drouet 2243 (Er, Mi, N, S, W--1673759); Ducke s.n. [Herb. Mus. Goeldi 1573] (Gl). Goiás: Irwin, Maxwell, & Wasshausen 21291 (Ld, N), 21628 (N); Weddell 2129 (Br). Maranhão: G. Don 12 (Br); Murça Pires & Black 2011 (N), 2252 (N), 2600 (Be--59019). Mato Grosso: Malme 1661 (S), 3237 (S), 3237a (S). Minas Gerais: Burchell 8717 (Br, T). Pará: Black 51-10009 (Z), 52-15541 (Be--77477); Black & Ledoux 50-10609 (Z); Ducke s.n. [Herb. Mus. Goeldi 11982] (Bs); Murça Pires & Silva 4270 (N); Spruce 608 (Mu), 2742 (B), s.n. [In vicinibus Santarem] (N), s.n. [Prope Santarem, Aug. 1850] (S, S); Tavares 18 (N). Pernambuco: G. Gardner 1169 (N, W--1066502), 1170 (W--1066503); Pickel 2772 (Mi), 2774 (W--1518914). Piauí: Lützelburg s.n. [with no. 1294] (Ac); Martius s.n. [in adscensu M. Serra dos Dois Irmãos, Maio 1819] (Mu). Roraima: Prance, Steward, Ramos, & Farias 9909 (Ac, N, S); Ule 7664 [Herb. Mus. Goeldi 12773] (Bs, K). State undetermined: Allemão 1549 (P); Blanchet 5, in part (S); G. Gardner 1170, in part (N), 2747 (W--1440334); Lützelburg 20547 [Igarapé](Mu), 21037 [Vera Cruz] (Mu); Martius s.n. (Mu); J. E. Pohl s.n. [in Brasilia] (Mu); Weddell 2129 [Salinas] (N). MARAJO ISLAND: Swallen 4930 (W--1592047). REPUBLIC OF GUINEA: Boismare 52 [Herb. Chillou 3482] (An). MADAGASCAR: Perrier de la Bâthie 1736 (N, P), 7253 bis (P). LOCALITY OF COLLECTION UNDETERMINED: Herb. Jard. Bot. Brux. s.n. (Br). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS LANATO-ALBUS Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 342--343, pl. 47 I. 1863.

Synonymy: Dupatya lanato-alba (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya lanato-alba Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Xeractis dubia Körn. ex Moldenke, Phytologia 25: 245, in syn. 1973.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 299, 342--343, 499, & 507, pl. 47 I. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 213, 215, 284, & 290. 1903; Alv. Silv., Fl. Mont. 1: 408. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40 & 53. 1930; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941;

Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99 & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 556, fig. 230 M & N. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158. 1969; Moldenke, Phytologia 20: 357. 1970; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971; Moldenke, Phytologia 25: 245 (1973) and 29: 308. 1974.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 47 I. 1863; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 556, fig. 230 M & N. 1964.

This species is based on an unnumbered collection of Martius, collected "auf dem Gipfel des Berges Itambé", at an altitude of 1700 meters, Minas Gerais, Brazil, flowering in May of 1818 and deposited in the Munich herbarium, where it was photographed by Macbride as his type photograph number 18700. This specimen is apparently also the basis for Martius' unpublished name, Xeractis dubia. Ruhland (1903) cites only the original collection, but Silveira (1928) cites A. Silveira 688 from Chapada do Couto, Minas Gerais, collected in 1918.

Material has been misidentified and distributed in some herbaria as P. dubius Körn.

Citations: BRAZIL: Minas Gerais: Maguire, Mendes Magalhães, & Maguire 49150 (N, Z); Martius s.n. [In summo monte Itambé, 5300' alt., Maio 1818; Macbride photos 18700] (Mu--type, Mu--isotype, N-photo of type, W--photo of type). State undetermined: J. E. Pohl s.n. [in Brasilia] (Mu). MOUNTED ILLUSTRATIONS: Mart., Fl. Bras. 3 (1): pl. 47 I (B, B, N, Z); drawings & notes by Körnicke (B, B).

PAEPALANTHUS LANATUS Alv. Silv., Fl. Mont. 1: 42--43, pl. 21. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 42--43 & 408, pl. 21. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 21. 1928.

This species is based on A. Silveira 804, collected "In campis arenosis siccisque inter Itacambira et Juramento", Minas Gerais, Brazil, in July of 1926, deposited in the Silveira herbarium. Silveira (1928) says that the "Species ob lana nivea copiosaque foliorum et apicis caulis certe distinctissima".

Material has been misidentified and distributed in some herbaria under the name P. falcatus Körn.

Citations: BRAZIL: Minas Gerais: Brade 13599 [Herb. Jard. Bot. Rio Jan. 25381] (B); Glaziou 19966 (Br, N); E. Pereira 7273 [Herb.

Brad. 26312] (Z).

PAEPALANTHUS LANCEOLATUS Körn. in Mart., Fl. Bras. 3 (1): 396—397. 1863.

Synonymy: Dupatya lanceolata (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya lanceolata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 396—397 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 202, 284, & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Phytologia 4: 148. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 280, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 953. 1971; Moldenke, Phytologia 25: 157 (1973) and 26: 240. 1973.

The type of this species was collected by Georg Heinrich von Langsdorff somewhere in Minas Gerais, Brazil, and is probably deposited in the Munich herbarium. Macbride photographed Warming 82 in the Copenhagen herbarium as his type photograph number 22284, but this collection is not a type of any sort.

Recent collectors have found P. lanceolatus growing at 3700 feet altitude, flowering from December to February. The species is very similar in appearance to P. bromelioides Alv. Silv. and P. corymbosus (Bong.) Kunth, as well as to P. melaleucus (Bong.) Kunth, P. rigidulus Mart., and P. vellozioides Körn.

Material has been misidentified and distributed in some herbaria under the name Eriocaulon tuberosum Bong. On the other hand, the Costa 138, Macedo 2995, and Maguire, Maguire, & Murça Pires 44680, distributed as P. lanceolatus, are actually P. vellozioides Körn.

Ruhland (1903) cites only Langsdorff s.n. and Warming s.n. from Minas Gerais.

Additional citations: BRAZIL: Minas Gerais: P. Clausen s.n. [Aug.—April 1840] (Br); Héringer 5268 (Z); Warming 82 [53/2; Macbride photos 22284] (N--photo, W--photo).

PAEPALANTHUS LANGSDORFFII (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 338—339. 1863.

Synonymy: Eriocaulon langsdorffii Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 632. 1831. Dupatya langsdorffii (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus langsdorffii Körn. in Mart., Fl. Bras. 3 (1): 338. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya langsdorffii Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145.

1902. Paepalanthus langsdofii Körn. ex Alv. Silv., Fl. Mont. 1: 408, sphalm. 1928. Paepalanthus langsdorfii Körn. ex Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960. Paepalanthus langsdorfii Moldenke, in herb.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 632. 1831; Bong., Ess. Monog. Erioc. 13 & 32. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 577 & 613. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 282 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 338—339 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 214, 218, 284, 286, & 290. 1903; Alv. Silv., Fl. Mont. 1: 408. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 36, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 280, 289, 326, & 488. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 174 & 189. 1969; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 504, 585, & 953. 1971; Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 25: 229 & 241. 1973.

This species appears to be based on L. Riedel 396, collected in shady places on Mt. Itacolumi, Minas Gerais, Brazil, and deposited in the Leningrad herbarium. Macbride photographed an isotype in the Berlin herbarium as his type photograph number 10618.

Bongard's original description of the plant (1831) is: "Caulescens; caule simplici, folioso; foliis caulinis vaginantibus, lanceolatis, acuminatis, ciliatis; pedunculo axillari, solitario, pilosiusculo; vagina pilosa". The pl. 51 which he (as well as Jackson, 1893) cites was apparently never actually published and probably is now to be seen only in the Leningrad library or herbarium. His description is so brief because he obviously intended the illustration to supplement it.

Ruhland (1903) cites, besides the type collection, Glaziou 15521a from Campo de Fora at Caraça, Minas Gerais, flowering in June. Silveira (1928) cites A. Silveira 239 from Serra do Lenheiro, Minas Gerais, collected in 1896. Ruhland (1903) comments that the species "Ad sequentem [P. xiphophyllus Ruhl.] proxime accedit".

Citations: BRAZIL: Minas Gerais: Glaziou 15521 (B); L. Riedel 396 [Macbride photos 10618] (B—isotype, N--photo of isotype, N--photo of isotype, W—photo of isotype, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS LANGSDORFFII var. CARACENSIS Moldenke, Phytologia 25:

430--431. 1973.

Synonymy: Paepalanthus langsdorffii var. chapadensis Moldenke, Phytologia 25: 229, nom. nud. 1973. Paepalanthus langsdorfii var. caracensis Moldenke, in herb.

Bibliography: Moldenke, Phytologia 25: 229 & 430--431. 1973; Moldenke, Biol. Abstr. 56: 3000. 1973.

Citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 29110 (N--isotype, Z--type, Z--drawings of type).

PAEPALANTHUS LATIPES Alv. Silv., Fl. Mont. 1: 230--231, pl. 153. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 230--231 & 408, pl. 153. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 153. 1928.

This species is based on A. Silveira 730, collected "In campis arenosis in Serra do Cipó", Minas Gerais, Brazil, in April of 1925 and deposited in the Silveira herbarium. On page 408 of his work Silveira (1928) gives the year of collection of the type as "1923"; whether this is meant as a correction of the date given on page 231 or if it represents a misprint is not clear. He comments that the species is "A P. villosulo Mart. valde affinis, foliis haud pruinosis, pilis basi non bulbosis et bracteis canescentibus precipue differt". Thus far the species is known only from the original collection.

PAEPALANTHUS LAXIFOLIUS Körn. in Mart., Fl. Bras. 3 (1): 395--396. 1863.

Synonymy: Dupatya laxifolia (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya laxifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 288, 395--396, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 284, & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 280, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 953. 1971.

This species is based on Sellow 1297 from Serra de Itambé, Minas Gerais, Brazil, deposited in the Berlin herbarium, where it was photographed by Macbride as his type photograph number 10619. Thus

far it is known only from the original collection.

Citations: BRAZIL: Minas Gerais: Sellow 1297 [Macbride photos 10619] (B--type, B--isotype, N--photo of type, N--photo of type, W--photo of type, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS LEIOTHRICOIDES Alv. Silv., Fl. Mont. 1: 127--128, pl. 1928.

Synonymy: Paepalanthus leiotrichoides Alv. Silv. ex Rennó, Levant. Herb. Inst. Agron. Minas 70, sphalm. 1960.

Bibliography: Alv. Silv., Fl. Mont. 1: 127--128 & 408, pl. 79. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Résumé Suppl. 3: 34. 1962; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 585 & 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 79. 1928.

This species is based on A. Silveira 839, collected "Sub rupibus, locis arenosis, inter Serrinha et Itacambira", Minas Gerais, Brazil, in July of 1926, and deposited in the Silveira herbarium. On page 408 of his work (1928) Silveira emends the type locality and date to "Serrinha, Grão Mogol, 1926". He comments that the "Species a P. comoso Alv. Silv. forma foliorum et pedunculis pubescentibus praecipue differt". It is also very similar in appearance to P. exiguus (Bong.) Körn. and P. atrovaginatus Ruhl.

Citations: BRAZIL: Minas Gerais: Héringer & Castellanos 6114 (B, Z); Mello Barreto 10686 [Herb. Jard. Bot. Belo Horiz. 32742] (N); J. E. Oliveira 103 [Herb. Jard. Bot. Belo Horiz. 32624] (N).

PAEPALANTHUS LEISERINGII Ruhl. in Engl., Pflanzenreich 13 (4-30): 216--217. 1903.

Synonymy: Paepalanthus leisseringii Ruhl. ex Alv. Silv., Fl. Mont. 1: 408. 1928.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 214, 216--217, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 408. 1928; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 326 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 585 & 953. 1971; Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 28: 439. 1974.

The type of this species was collected by Henrique Carlos de Magalhães Gomes (no. 2195) in the Serra de Ibitipoca, Minas Gerais, Brazil, in April of 1896 and is deposited in the Berlin herbarium, where it was photographed by Macbride as his type photograph number 10621. Ruhland (1903) comments that the "Planta ab affinibus pedunculis brevibus et bracteis flores stipantibus pro ratione latis abhorrens, cl. Dr. Leisering dedicata".

The Smith & Klein 8241, distributed as P. leiseringii, is actually the type collection of var. kleinii Moldenke & Smith. Contrary to my statement in a previous publication (1971), the typical form of this species is not at present known from Santa Catarina.

Citations: BRAZIL: Minas Gerais: H. Magalhães Gomes 2915 [Macbride photos 10621] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS LEISERINGII var. KLEINII Moldenke & Smith ex Moldenke, Phytologia 25: 431. 1973.

Bibliography: Moldenke, Phytologia 25: 431. 1973; Moldenke, Biol. Abstr. 56: 3000. 1973.

This variety is based on Smith & Klein 8241, collected in a bog by the Rio Bandeirinhas, 23 km. north of Lajes, at an altitude of 800--900 meters, in the municipality of Lajes, Santa Catarina, Brazil, on December 4, 1956, and is deposited in the United States National Herbarium in Washington. It was previously misidentified as typical P. leiseringii Ruhl.

Citations: BRAZIL: Santa Catarina: Smith & Klein 8241 (N--isotype, W--2267638--type, Z--isotype).

PAEPALANTHUS LEPIDUS Alv. Silv., Fl. Serr. Min. 57, pl. 19. 1908.

Bibliography: Alv. Silv., Fl. Serr. Min. 57, pl. 19. 1908; Alv. Silv., Fl. Mont. 1: 241--243 & 409, pl. 161. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13. 1946; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 236--237. 1956; Moldenke, Résumé 99 & 488. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 19. 1908; Alv. Silv., Fl. Mont. 1: pl. 161. 1928.

This species is based on A. Silveira 374, collected "In campis arenosis prope Capão Redondo in Serra do Cipó", Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. The species has been collected in anthesis in April and from August to October.

Citations: BRAZIL: Minas Gerais: Macedo 3218 (N, S); Mello Barreto 1042 [Brade 14475; Herb. Jard. Bot. Rio Jan. 28453] (B); Mello Barreto & Brade 1042 [Herb. Jard. Bot. Belo Horiz. 10728] (N).

PAEPALANTHUS LEUCOBLEPHARUS Körn. in Mart., Fl. Bras. 3 (1): 388. 1863.

Synonymy: Dupatya leucoblephara (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya leucoblephara Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus leucoblepharus Ruhl. ex Alv. Silv., Fl. Mont. 1: 409, sphalm. 1928. Paepalanthus coriaceus Pouls. ex Moldenke, Résumé Suppl. 1: 20, in syn.

1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 293, 388, & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 128, 148, 284, & 290. 1903; Lützelburg, Estud. Bot. Nordést. 3: 149. 1923; Herzog in Fedde, Repert. Spec. Nov. 20: 84 & 85. 1924; Alv. Silv., Fl. Mont. 1: 55 & 409. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Phytologia 4: 148. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, & 488. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Phytologia 20: 366 & 367. 1970; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 580 & 953. 1971; Moldenke, Phytologia 25: 241. 1973.

This species is based on an unnumbered collection by Ludwig Riedel from somewhere in eastern Brazil, deposited in the Leningrad herbarium. Macbride photographed a specimen of Glaziou 15534 in the Berlin herbarium as his type photograph number 22285; this is the type of P. coriaceus Pouls. and is the collection cited by Ruhland (1903) as P. leucoblepharus and as the only one available to him when he wrote his monograph of the family. Ruhland comments that "Cum specimina originaria mihi non suppetant, confirmare atque declarare non possum, plantarum a cl. Glaziou collectam huc ducendam esse. Sed florum structura atque praesertim foliorum et vaginarum indumentum mirabile perbene ad descriptionem Koernickeanam quadrant. Monendum tamen est, folia in nostra specimine fere obtusiuscula esse et non acuminata, sed persuasum habeo, destructione praematura foliorum acumen jam in illo delapsum esse, quod etiam in aliis speciebus multis haud raro observatur." It should be noted that the Glaziou specimen referred to above bears a printed label reading "RIO DE JANEIRO", but the collection was actually made on Morro da Carapuça, Caraça, Minas Gerais.

Silveira (1928) cites A. Silveira 252 from Serra dos Crystaes, Minas Gerais, collected in 1908. He avers that the species is related to P. ibitipocensis Alv. Silv. Herzog (1924) claims that it is related to P. barbulatus Herzog and closely related to P. lützelburgii Herzog.

Lützelburg collected P. leucoblepharus in moist places at 1600—1700 meters altitude.

Citations: BRAZIL: Bahia: Lützelburg 219 (N), 219a (Mu, Z), 219b (Mu). Minas Gerais: Glaziou 15534 [Macbride photos 22285] (B, N--photo, N--photo, W--photo).

PAEPALANTHUS LEUCOCEPHALUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 200. 1903.

Synonymy: Thelxinoë leucocephala Ruhl. ex Moldenke. Résumé Sup-

pl. 3: 23, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 12, 199, 200, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40 & 52. 1930; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Bourdu, Bull. Soc. Bot. France 104: 156. 1957; Moldenke, Résumé 99 & 488. 1959; Moldenke, Résumé Suppl. 1: 23. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Phytologia 19: 35. 1969; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 642 & 953. 1971.

This species is based on W. Schwacke 8503, collected on April 4, 1892, in the Serra dos Cristaes, Minas Gerais, Brazil, and deposited in the herbarium of the Botanisches Museum in Berlin — a specimen which Ruhland first annotated as Thelxinoë leucocephala. The species is extremely close to P. scleranthus Ruhl. and I am not at all certain that the two are distinct. Ruhland (1903) notes that the "Species P. sclerantho habitu et florum structura valde affinis, sed optime ab illo jam capitulis albidis etc. diversa est."

Citations: BRAZIL: Minas Gerais: Schwacke 8503 (B--type, Z--isotype).

PAEPALANTHUS LEUCOCYANEUS Tutin, Journ. Bot. 72: 336. 1934.

Synonymy: Paepalanthus tafelbergensis Moldenke, Bull. Torrey Bot. Club 75: 199—200. 1948. Paspalum leucocyaneus Tutin ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959.

Bibliography: Tutin, Journ. Bot. 72: 336. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Moldenke, Known Geogr. Distrib. Erioc. 6, 7, & 50. 1946; Moldenke, Phytologia 2: 373 & 381. 1947; Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 198—200. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66, 67, 210, & 212. 1949; Moldenke, Alph. List Cit. 3: 701. 1949; Moldenke, Phytologia 4: 148. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 176. 1953; Moldenke, Résumé 75, 77, & 488. 1959; Moldenke, Résumé Suppl. 1: 22 (1959), 6: 6 (1963), and 14: 9. 1966; Lindeman & Görts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 331 & 332. 1968; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 130, 132, & 163 (1971) and 2: 591, 593, & 953. 1971.

This species is based on Tutin 481, collected in shallow sandy pools on the riverbank at Amatuk, along the Potaro River, at an altitude of about 300 feet, Guyana, on August 19, 1933, and is deposited in the herbarium of the British Museum (Natural History) in London. The collector says of the plant: "Leaves pale green, crowded at the summit of a short erect stem. Flowers white tinged with purplish-blue".

The type of P. tafelbergensis is Maguire 24485, said to have been frequent in Sphagnum border of seeps on bed rock on Savanna VIII, Tafelberg, Surinam, and collected there on August 25, 1944, deposited in the Britton Herbarium at the New York Botanical Gar-

den. Sandwith describes the plant as having "leaves pale green, flower-heads white".

The species has been found growing in muck soil on savannas, on open rock slabs in Clusia woodlands, in moist sand by pools, and in shallow sandy pools on riverbanks, flowering in August. It is certainly very similar to and probably closely related to P. tatei. A letter to me from Dr. A. Görts-van Rijn, dated April 25, 1966, states "I have been looking to the Paepalanthus species P. maguirei, P. leucocyaneus and P. tatei. As far as I could decide with the material of the Utrecht herbarium I can agree with you on the conspecificity of P. maguirei and P. tatei. I suppose that our isotype specimen of P. tafelbergensis is probably not P. tatei, but a P. leucocyaneus, but I am not quite sure on that because I have only seen this one specimen and cannot say anything on the whole species, but the leaves look mucronate, one of the characters of P. leucocyaneus along with long hairs outside the involucre. The form of the involucral bracts is a difficult character to use. I do not know if it changes within the species or that some of the outermost bractlets fall off rather soon. In Bull. Torrey Bot. Club 75: 198. 1948 you give the length of the female sepals as 2.6 mm. I suppose this to be an typographic error for 1.6 or something like that, at least I could not find any sepal of that length."

Lindeman & Görts-van Rijn (1968) cite the following collections from Surinam: Maguire 24750, Pulle 215, J. P. Schulz 10090, 10126, & 10298, Tutin 481, and Versteeg 772.

Material of P. leucocyaneus has been misidentified and distributed in some herbaria as P. lamarckii Kunth.

Additional citations: GUYANA: Maguire & Fanshawe 23264 (Se--182994); Sandwith 1256 (B, N, Ut--42280a); Tutin 481 (Ut--39784a--isotype); Whitton 127 (K). SURINAM: Pulle 215 (Ut--44069a); Versteeg 772 (Ut--421). BRAZIL: Amapá: Irwin, Egler, & Murça Pires 47133 (N).

PAEPALANTHUS LILLIPUTIANUS Moldenke, Phytologia 3: 115. 1949.

Bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 210. 1949; Moldenke, Phytologia 3: 115 (1949) and 4: 148. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 75 & 488. 1959; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 130 (1971) and 2: 953. 1971.

PAEPALANTHUS LINDENII Ruhl. in Engl., Pflanzenreich 13 (4-30): 206--207. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 206-207. & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 53. 1930; Moldenke, Known Geogr. Distrib. Erioc. 5 & 50. 1946; Moldenke, Alph. List Cit. 2: 611 (1948) and 3: 664. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 210. 1949; Moldenke, Phytologia 4:

148—149. 1952; Moldenke, Résumé 67 & 488. 1959; Moldenke, Résumé Suppl. 3: 12 (1962) and 12: 2. 1965; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 953. 1971.

This species is based on Linden 1318, collected at 3600 m. altitude on the páramo at Alvaracin, province Tunja, Boyacá, Colombia, deposited in the Berlin herbarium and there photographed by Macbride as his type photograph number 10622. Recent collectors have encountered the species along trails, while Fosberg describes it as "common on rocky banks and ledges of small rocky peak with brushy subpáramo vegetation, single or slightly cespitose, the flowers white with blackish involucres". It has been collected at altitudes of 2440—3600 meters, flowering in March, July, September, and November, and fruiting in July.

Additional citations: COLOMBIA: Boyacá: F. R. Fosberg 22242 (N, N); Grubb, Curry, & Fernandez-Perez 510 (K, W—2322456); Linden 1318 [Macbride photos 10622] (B—type, N—photo of type, N—photo of type, W—photo of type, Z—isotype). Cundinamarca: M. L. Grant 10205 (W—2166105). Santander: Fassett 25557 [Herb. U. S. Nat. Arb. 217370] (W—2166176, Ws).

PAEPALANTHUS LINEARIFOLIUS Alv. Silv., Fl. Mont. 1: 57—58. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 57—58 & 409. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

This species is based on A. Silveira 806, collected "In campis argillosis siccisque secus Serra da Moeda", Minas Gerais, Brazil, in July of 1926 and deposited in the Silveira herbarium. On page 409 of his work, however, Silveira (1928) cites A. Silveira 808 from Itacambira, Minas Gerais — whether this is intended as a correction of the citation given with his type description or actually refers to a second collection, is not clear. He comments that the "Species a P. Henriquei Alv. Silv. et Ruhl. proxima, sed foliis subulatis, bracteis involucrantibus subulatis et stigmatis haud bifidis praecipue differt."

PAEPALANTHUS LINGULATUS (Bong.) Kunth, Enum. Pl. 3: 522. 1841.

Synonymy: Eriocaulon lingulatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 626. 1831. Eriocaulon ligulatum Bong. ex D. Dietr., Syn. Pl. 5: 261, sphalm. 1852 [not E. ligulatum (Vell.) L. B. Sm., 1939]. Paepalanthus lingulatus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 376. 1863. Dupatya lingulata (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya lingulata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Eriocaulon ligulatus Bong. ex Moldenke, Phytologia 4: 149, in syn. 1952. Eriocaulon lingulatus Bong. ex Moldenke, Ré-

sumé 289, in syn. 1959.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 626. 1831; Bong., Ess. Monog. Erioc. 26 (1831) and 60—61 & 223—224, pl. 12 (sup.), fig. 1—4. 1832; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser 6, 2: 223—224, pl. 12 (sup.), fig. 1—4. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 522, 544, 574, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 376, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 123, 130, 284, 286, & 290. 1903; Alv. Silv., Fl. Mont. 1: 409. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 36, & 50. 1946; Moldenke, Phytologia 2: 378. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Phytologia 4: 149. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, 289, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Phytologia 18: 266 (1969) and 20: 421. 1970; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 504, 574, & 953. 1971; Moldenke, Phytologia 24: 471 (1972) and 25: 241. 1973.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2 (3): pl. 12 (sup.), fig. 1—4. 1832; Bong., Ess. Monog. Erioc. pl. 12 (sup.), fig. 1—4. 1832.

This species is based on L. Riedel 1410, collected "in glareosis Serra da Lapa", Minas Gerais, Brazil, flowering in November, and deposited in the Leningrad herbarium. Bongard's original (1831) description of this species is "pusillum; foliis pedunculos subaequantibus confertis lingulatis obtusis, parce ciliatis; pedunculis glabriusculis; vagina glabra albida. Tab. XII. Habitat in glareosis Serra da Lapa. Floret Novembri. Obs. Affine praecedenti [P. blepharophorus], a quo differt, praeter notas in characterem receptas, statura humiliore; foliis ad insertionem nudis (nec piloso-lanatis) et margine pilis longis distantibus ciliatis, qui in E. blepharophoro breves et densi."

Ruhland (1903) cites only the original type collection, but affirms that the hairs on the flower-parts are like those in P. blepharocnemis Mart. [a synonym of P. aequalis (Vell.) J. F. Macbr.]. Silveira (1928) cites A. Silveira 811 from Itacambira, Minas Gerais.

Citations: MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2 (3): pl. 12 (sup.). 1832 (N, Z).

PAEPALANTHUS LODICULOIDES Moldenke, Bull. Torrey Bot. Club 68: 68—69. 1940.

Bibliography: Moldenke, Bull. Torrey Bot. Club 68: 68—69. 1940; Moldenke, Known Geogr. Distrib. Erioc. 5 & 50. 1946; Molden-

ke, Alph. List Cit. 1: 131 (1946) and 4: 1074. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 210. 1949; Moldenke, Phytologia 4: 149. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Anon., U. S. Dept. Agr. Bot. Subj. Index 5: 4227. 1958; Moldenke, Résumé 67 & 488. 1959; Moldenke, Résumé Suppl. 5: 5 (1962) and 6: 5. 1963; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 953. 1971.

Recent collectors describe in inflorescence of this species as white and have found the plant growing on open hills, in very small groups with mosses, between hummocks near the edge of lakes, and with mosses and liverworts on mounds forming the raised edge of small lakebeds, at altitudes of 3000--4300 meters [on one label "4200 feet" appears as the altitude, but this is probably an error in transcription], flowering in February, March, August, September, November, and December, and fruiting in February, August, and September. Barclay & Juajibioy encountered it as "silvery separate cushions on páramo with Espeletia and few shrubs on rocky north-facing slopes". Little describes it as a "cushion plant of páramo, 2 cm. tall, scattered in bare places in bunch grass".

Langenheim 3590 bears a label describing the plant as a "cushion plant among grasses on excellent soil, evidence of much burning and clearing for cultivation", but on his no. 3589 it is called a "common small shrub, corolla white-lavender, among grasses on rocky ridges" -- probably this is a case of mixed labels in the mounting process.

It should be noted here that the original description of this species was validly and officially published on December 31, 1940 -- not in "1941" as is stated on the title-page of the issue.

Additional citations: COLOMBIA: Boyacá: Grubb, Curry, & Fernandez-Perez 418 (K), 762 (W--2322662); Langenheim 3589 (Ca--1356276, E--1980543), 3590 (W--2268617, Z). Cundinamarca: Barclay & Juajibioy 6113 (N), 7183 (N); Cuatrecasas & Jaramillo Mejía 25987 (Fg); García-Barriga 17171 (W--2569585a); Uribe Uribe 4672 (Lw). Méta: E. L. Little Jr. 7014 (W--2059694). Santander: Barclay & Juajibioy 10412 (N).

PAEPALANTHUS LOEFGRENIANUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 142. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 5, 126, 142, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 409. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 42. 1930; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1158--1159 & Ind. 20. 1972.

This species is based on Löfgren & Edwall 2227, collected in June of 1893 on a campo at São João da Boa Vista, São Paulo, Bra-

zil, on the exploratory expedition of the Commissão Geographica e Geologica de São Paulo, and is deposited in the Copenhagen herbarium, where it was photographed by Macbride as his type photograph number 22287. Silveira (1928) cites a Collector undetermined 421 from the same locality, also collected in 1893 — possibly this represents the field number of Löfgren and/or Edwall, while the number cited by Ruhland may be the expedition record number. If so, then the specimen in the Silveira herbarium is actually an isotype and the species is known thus far only from the original collection.

Citations: BRAZIL: São Paulo: Löfgren & Edwall 2227 [Macbride photos 22287] (B—isotype, N—photo of type, W—photo of type).

PAEPALANTHUS LOMBENSIS Alv. Silv., Fl. Mont. 1: 180—181, pl. 116. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 180—181, 184, & 409, pl. 116. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 116. 1928.

This species is based on A. Silveira 514 from "Secus margines rivulorum in praeditio Lomba vocato, locis arenosis humidisque, prope montem Itambé do Serro", Minas Gerais, Brazil, in April of 1908 and is deposited in the Silveira herbarium. Silveira (1928) comments that the "Species a P. glabrifolio Ruhl affinis, sed habitu robustiore; bracteis involucrantibus ac flores stipantibus dorso pilosis et exteriore florum masculorum sepalorum indumendo et sepalis florum femineorum linearibus basique connatis distincta". It belongs in the Subsection Actinocephaloides Ruhl. and is known thus far only from the original collection.

PAEPALANTHUS LONGICAULIS Alv. Silv., Fl. Mont. 1: 236—237, pl. 157. 1928.

Synonymy: Paepalanthus lingicaulis Moldenke, in herb.

Bibliography: Alv. Silv., Fl. Mont. 1: 236—237 & 409, pl. 157. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Hocking, Excerpt. Bot. A.7: 455, 1964; Moldenke, Résumé Suppl. 8: 2 (1964) and 11: 4. 1964; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 157. 1928.

This species is based on A. Silveira 632, collected "In campis humidis in serra do Cipó", Minas Gerais, Brazil, in April of 1915

and deposited in the Silveira herbarium. However, on page 409 of Silveira's work (1928) he cites an A. Silveira 692, collected in the Serra do Cipó in 1905 -- whether this represents a correction of the figures given in his original description or represents another earlier collection is not clear. He comments that the species "A P. macropode Ruhl. foliis, vaginis et bracteis involucrantibus praecipue differt".

PAEPALANTHUS LONGICAULIS var. GLABER Moldenke, Phytologia 9: 266. 1963.

Synonymy: Paepalanthus lingicaulis var. glaber Moldenke, in herb.

Bibliography: Moldenke, Phytologia 9: 266. 1963; Hocking, Excerpt. Bot. A.7: 455. 1964; Moldenke, Résumé Suppl. 8: 2 (1964) and 11: 4. 1964; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

Irwin, Maxwell, & Wasshausen describe this plant as "decumbent in tall grasses, the stem ends erect, to 1 m. long, heads white" and found it growing along creek margins at 1400 m. altitude, flowering in February.

Angely (1970) seems to imply that I published this trinomial in "Fl. Mont. 236. 1928 (a sp.)", but this is incorrect. I first published it in Phytologia 9: 266 (1963) and it has nothing whatever to do with the P. glaber of Körnicke, which is actually a synonym of Syngonanthus gracilis var. glabriusculus Ruhl. There is no Paepalanthus glaber mentioned on page 236 of A. Silveira's Fl. Mont., vol. 1 (1928).

Citations: BRAZIL: Minas Gerais: Héringer & Castellanos 6096 (Z--type); Irwin, Maxwell, & Wasshausen 20249 (Ld, N); Tryon & Tryon 6829 (Ac, Ld). São Paulo: Pabst 4777 (Bd--10932).

PAEPALANTHUS LONGIFOLIUS Körn. in Mart., Fl. Bras. 3 (1): 333. 1863.

Synonymy: Dupatya longifolia (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya longifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 333 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 190, 196, 284, & 290. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 953. 1971.

This species is based on an unnumbered Riedel collection from

central Brazil, probably deposited in the Leningrad herbarium. It is known thus far only from the original collection.

PAEPALANTHUS LOXENSIS Moldenke, Phytologia 2: 229—231. 1947.

Additional bibliography: Moldenke, Phytologia 2: 229—231, 373, & 380. 1947; Moldenke, Alph. List Cit. 3: 974. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 70 & 210. 1949; Moldenke, Phytologia 4: 149. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 80 & 488. 1959; Moldenke, Fifth Summ. 1: 136 (1971) and 2: 953. 1971.

This species has been found growing as a páramo herb in wet spots on mixed shrubby páramos and in dwarf woodland which is moist but subject to drying, at altitudes of 2500—3500 meters, flowering in June, October, and November.

Additional citations: ECUADOR: Loja: D. H. Knight 924 (Ld, Ws, Z), 974 (Ws); J. A. Steyermark 54452 (S—isotype).

PAEPALANTHUS LUNDII Körn. in Mart., Fl. Bras. 3 (1): 385—386. 1863.

Synonymy: Dupatya lundii (Körn.) Kuntze, Rev. Gen. Pl. 2: 74. 1891. Dupatya lundii Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 385—386 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 74. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 127, 140, 145, 284, & 290. 1903; Alv. Silv., Fl. Mont. 1: 409. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 482 & 953. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

Ruhland (1903) cites for this species only the two cotype collections, Lund s.n. and L. Riedel 2204 from "auf Campos, an feuchten Stellen, Sümpfen und ihren Rändern beim Berge Arara-Coara entlang dem Flusse Tieté und bei Villa Franca", São Paulo, Brazil, flowering from May to July. Macbride photographed the Riedel cotype in the Berlin herbarium as his type photograph number 10623. Silveira (1928) cites A. Silveira 495 from Serro Pouso Alto, collected in 1908.

Citations: BRAZIL: São Paulo: L. Riedel 2204 [Macbride photos 10623] (B—cotype, M—cotype, N—photo of cotype, N—photo of cotype, S—cotype, Ut—368—cotype, W—photo of cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS LUTEOLUS Alv. Silv., Fl. Mont. 1: 86—88, pl. 52. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 86—88 & 409, pl. 52.

1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 52. 1928.

This species is based on A. Silveira 766 from "in campis prope Baraunas, in Serra Geral", Minas Gerais, Brazil, collected in June of 1925 and deposited in the Silveira herbarium. Silveira (1928) says that the "Species a P. ruficepite Ruhl. et P. flavo-rutilo Ruhl. foliis acutis et bracteis dorso dense villoso praecipue differt". It is known thus far only from the original collection.

The M. A. Chase 9165, distributed as P. luteolus, is actually Syngonanthus xeranthemoides (Bong.) Ruhl.

PAEPALANTHUS LÜTZELBURGII Herzog ex Lützelburg, Estud. Bot. Nordést. 3: 138 & 150, hyponym (1923); Herzog in Fedde, Repert. Spec. Nov. 20: 84—85. 1924.

Synonymy: Paepalanthus luetzelburgii Herzog ex Lützelburg, Estud. Bot. Nordést. 3: 138. 1923. Paepalanthus lutzelburgii Herzog. ex Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946.

Bibliography: Lützelburg, Estud. Bot. Nordést. 3: 138 & 150. 1923; Herzog in Fedde, Repert. Spec. Nov. 20: 84—85. 1924; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 174. 1929; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Phytologia 4: 149. 1952; Moldenke, Résumé 99, 326, & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 585 & 953. 1971; Moldenke, Phytologia 25: 241. 1973.

This species is based on Lützelburg 468 from soil rich in mica, Rio das Contas, in the Serra Tres Irmãos, Bahia, Brazil, at an altitude of 1000 meters, deposited in the herbarium of the Botanische Staatssammlung in Munich, where it was photographed by Macbride as his type photograph number 18707. The original label on the specimen is inscribed "408" but was corrected by pen to "468" and Macbride's label, curiously, reads "4680".

Herzog (1924) notes that the species "Dem P. leucoblepharus Koern. nächst verwandt aber durch kleinere Hullbrakteen die langeren, auf der Köpfchenoberflache sichtbaren Blütentragblätter und die sehr stark entwickelten Lappen der Kronblattrohre gut unterschieden". It seems to me closely to resemble P. undulatus Ruhl.

Citations: BRAZIL: Bahia: Lützelburg 468 [Macbride photo 18707] (Mu—type, Mu—isotype, N—photo of type, W—photo of type, Z—isotype).

PAEPALANTHUS LYCOPODIOIDES Alv. Silv., Fl. Mont. 1: 160—161, pl. 101. 1928.

Synonymy: Paepalanthus lycopodiifolius Alv. Silv., Fl. Mont. 1: 409. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 160—161 & 409, pl. 101. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99, 326, & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 585 & 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 101. 1928.

This species is based on A. Silveira 694, from "In campis siccis arenosisque prope Diamantina", Minas Gerais, Brazil, collected in April, 1918, and deposited in the Silveira herbarium. On page 409 of his work, however, Silveira (1928) cites the type number as from "Baraunas 1925", but if this is intended as a correction of the data given in the original description or represents a second collection is not clear.

Recent collectors have found this plant growing in wet sandy campos, flowering in February.

Citations: BRAZIL: Minas Gerais: Hatschbach & Ahumada 31690 (N, Z).

PAEPALANTHUS MACARENENSIS Moldenke, Mutisia 6: 2—3. 1952.

Synonymy: Paepalanthus macarensis Moldenke, Résumé 488, sphalm. 1959.

Bibliography: Moldenke, Mutisia 6: 2—3. 1952; Moldenke, Biol. Abstr. 27: 428. 1953; Moldenke, Mutisia 25: 28. 1956; G. Taylor, Ind. Kew. Suppl. 12: 101. 1959; Moldenke, Résumé 67 & 488. 1959; Moldenke, Résumé Suppl. 5: 5. 1964; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 585 & 953. 1971.

Citations: COLOMBIA: Magdalena: Cuatrecasas & Castañeda 25025 (Z). Méta: Philipson 2295 (Bm—type, N—isotype).

PAEPALANTHUS MACROCAULON Alv. Silv., Fl. Mont. 1: 169—170, pl. 108 & 109. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 169—170 & 409, pl. 108 & 109. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Résumé Suppl. 10: 2. 1964; Moldenke, Bol. Soc. Venez. Cienc. Nat. 26: 411—412. 1966; Moldenke, Fifth Summ. 1: 125 & 163 (1971) and 2: 953. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 108 & 109. 1928.

This species is based on A. Silveira 815 from "In campis, inter saxa quartzosa, prope Serrinha", Minas Gerais, Brazil, collected in July, 1926, and deposited in the Silveira herbarium. On page 409 of his work, Silveira (1928) adds "Grão Mogol" to the descrip-

tion of the type locality. He comments that the "Species a P. refractifolio Alv. Silv. statura, pili acuti et aliis characteribus differt". Thus far it is known only from the original collection.

PAEPALANTHUS MACROCAULON var. VENAMENSIS Moldenke, Résumé Suppl. 10: 2, nom. nud. (1964); Bol. Soc. Venez. Cienc. Nat. 26: 411. 1966.

Bibliography: Moldenke, Résumé Suppl. 10: 2. 1964; Moldenke, Bol. Soc. Venez. Cienc. Nat. 26: 411. 1966; J. A. Clark, Card-Ind. Gen. Sp. & Var. issue 252. 1966; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 953. 1971; Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 852. 1972.

This variety is based on Steyermark, Dunsterville, & Dunsterville 92308, collected on semi-open wet ground, at an altitude of 950—1400 meters, in a "bosque enano muscoso, Nor-Este del afluente derecho (Oeste), subiendo el Río Venamo, arriba de la ladera escarpada de arenisca, Cerro Venamo (parte Sur-Oeste) cerca de los limites con la Guyana Inglesa", Bolívar, Venezuela, on December 28, 1963, deposited in my personal herbarium at present in Plainfield, New Jersey. The plant is described by the collectors as having leaves spreading horizontally, the inflorescence-heads gray-white with blackish at their base, or the "involucre gray-black below, whitish above", and that it is "common" in the type locality. The same collectors also found it growing at the "base of wet spray on vertical calcareous sandstone bluffs" at 1220—1275 meters altitude, flowering in January.

Citations: VENEZUELA: Bolívar: J. A. Steyermark 97921 (Ld); Steyermark, Dunsterville, & Dunsterville 92308 (Z—type), 92761 (Lw).

PAEPALANTHUS MACROCEPHALUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 379. 1863.

Synonymy: Eriocaulon macrocephalum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831. Paepalanthus macrocephalus Körn. in Mart., Fl. Bras. 3 (1): 378 & 379. 1863. Dupatya macrocephala (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya macrocephala Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Bong., Ess. Monog. Erioc. 30. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630 (1831) and 5 (2): 25, pl. 33. 1839; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 576 & 613. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 378, 379, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 168, 170—171, 284, 286, & 290. 1903; Alv. Silv., Fl. Mont. 1: 149. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930;

Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 36, & 50—52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Alph. List Cit. 4: 1297. 1949; Moldenke, Phytologia 4: 149. 1952; Moldenke, Résumé 99, 281, 290, & 488. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 505, 585, & 954. 1961; Moldenke, Phytologia 25: 241 (1973) and 26: 474. 1973.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 5 (2): pl. 33. 1839.

This species is based on L. Riedel 1036 from "In pratis humidis Serra da Lapa et Serra da Corassa", Minas Gerais, Brazil, deposited in the Leningrad herbarium. Ruhland (1903) has supplied the Riedel number and writes the second locality as "Caraça", telling us that the two Riedel collections, distributed under the same number, were gathered in anthesis in November and in January. He cites also Glaziou 19968 from campos at Formação, near Diamantina, in the same state, flowering in April.

Kunth (1841) claims that Bongard's plate 33 was never published, but actually it was published in the 1839 volume of Bongard's work. Bongard's original (1831) description is "Acaule; pubescens; foliis caespitosis vaginis brevioribus erectis lanceolato-obtusis; pedunculis caespitosis longissimis subincanis; vaginis bifidis; laciniis obtusiusculis....Praecedenti [P. elongatus (Bong.) Körn.] specei et E. gnaphaloidi Michx. [E. compressum Lam.] affine. A priori distinguendum: 1) foliis brevioribus et obtusioribus; 2) vaginis foliis duplo longioribus bifidis (nec oblique fissis). Alterum differt: foliis subulato-ensiformibus. E. decangulare H. et B. equidem affinis species."

Additional citations: BRAZIL: Minas Gerais: Glaziou 19968 (B); L. Riedel 1036 (B--cotype, Ut—369—cotype, Z—cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS MACROCEPHALUS var. MINARUM (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 171. 1903.

Synonymy: Paepalanthus minarum Körn. in Mart., Fl. Bras. 3 (1): 378—379. 1863. Dupatya minarum (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya minarum Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus macrocephalus var. minarum Ruhl. ex Moldenke, Résumé Suppl. 12: 11, in syn. 1965. Paepalanthus obtusifolius Mart. ex Moldenke, Phytologia 25: 241, in syn. 1973 [not P. obtusifolius (Steud.) Körn., 1863].

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 314, 378—379, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew.

Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 7, 171, 284, 290, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50--52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, 326, 327, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Fifth Summ. 1: 163 & 483 (1971) and 2: 585, 586, & 954. 1971; Moldenke, Phytologia 25: 241. 1973.

This variety, as well as the cheironymous P. obtusifolius of Martius, are based on an unnumbered Martius collection from "an hochgelegenen Standorten zwischen Ouro Preto und Tejuco", Minas Gerais, Brazil, collected in May of 1818 and deposited in the herbarium of the Botanische Staatssammlung in Munich, where it was photographed by Macbride as his type photograph number 18708.

The variety is thus far known only from the original collection, differing from the typical form of the species in its shorter, completely glabrous leaves, which are 1.5--2.5 cm. long and 3 mm. wide at the midpoint, and in its involucral bractlets being persistently villosulous.

Citations: BRAZIL: Minas Gerais: Martius s.n. [In altis inter Va. Ra. et Tejuco, Maio 1818; Macbride photos 18708] (Mu--type, N--photo of type, W--photo of type).

PAEPALANTHUS MACROCEPHALUS var. PACHYPHYLLUS (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 171 [as "pachyphylla"]. 1903.

Synonymy: Paepalanthus pachyphyllus Körn. in Mart., Fl. Bras. 3 (1): 378--379. 1863. Dupatya pachyphylla (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya pachyphylla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus macrocephalus var. pachyphylla Ruhl. in Engl., Pflanzenreich 13 (4-30): 171. 1903.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 378--379 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 171 & 290. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 43. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 50, & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, 326, 327, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 160 & 190. 1969; Moldenke, Fifth Summ. 1: 163 & 483 (1971) and 2: 585, 587, & 954. 1971.

This variety is based on an unnumbered Riedel collection from campos somewhere in Minas Gerais, Brazil, deposited in the Lenin-

grad herbarium. It differs from the typical form of the species in its leaves being glabrous except for the barbate apex, shorter, narrower, and very thick, 4—5.3 cm. long, 1.5—2 mm. wide at the midpoint, and the peduncles somewhat twisted and decidedly incanous. Ruhland (1903) notes that the "Rami fertiles in specimínibus nonnullis adeo breves, ut vix appareant".

PAEPALANTHUS MACROPODUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 212. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 212, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 237 & 409. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 53. 1930; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 954. 1971.

This species is based on W. Schwacke 9230, collected at Santa Rita, Minas Gerais, Brazil, in February of 1893 and deposited in the herbarium of the Botanisches Museum in Berlin. Silveira (1928) cites A. Silveira 363 from the Serra do Cipó in the same state, collected in 1905. Thus far, the species is known only from these two collections. Ruhland (1903) notes that the "Species huius subgeneris e maxima caule elongato, aequaliter folioso valde insignis".

Citations: BRAZIL: Minas Gerais: Schwacke 9230 (B—type).

PAEPALANTHUS MACRORRHIZUS (Bong.) Kunth, Enum. Pl. 3: 524. 1841.

Synonymy: Eriocaulon macrorrhizon Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831. Eriocaulon macrorhizon Bong., Ess. Monog. Erioc. 31. 1831. Eriocaulon macrorhizum Bong. apud Steud., Nom. Bot., ed. 2, 1: 585. 1840. Eriocaulon macrorrhizum Bong. apud Steud., Syn. Pl. Glum. 2: [Cyp.] 334. 1855. Paepalanthus macrorrhizus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 341. 1863. Dupatya macrorhiza (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya macrorhiza Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus macrorhizus Kunth ex Alv. Silv., Fl. Mont. 1: 409. 1928. Dupatya macrorrhiza Kuntze ex Moldenke, Known Geogr. Distrib. Erioc. 30, in syn. 1946. Dupatya macrorrhiza (Bong.) Kuntze ex Moldenke, Fifth Summ. 2: 482, in syn. 1971.

Bibliography: Bong., Ess. Monog. Erioc. 31. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630 (1831) and ser. 6, 2: [55]—58 & [219]—221, pl. 11. 1832; Bong., Ess. Monog. Erioc. [55]—58 & [219]—221, pl. 11. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 524, 577, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279—280 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 341—343 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402.

1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 2, 6, 8, 213, 214, 284, 286, & 290. 1903; Alv. Silv., Fl. Mont. 1: 409. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 42, 44, & 53. 1930; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 37, & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, 290, 326, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Résumé Suppl. 3: 34 (1962), 17: 10 (1968), and 18: 9. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148, 159, & 190. 1969; Moldenke, Fifth Summ. 1: 163 & 482 (1971) and 2: 505, 585, & 954. 1971; Moldenke, Phytologia 25: 238 (1973) and 26: 262. 1973.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: pl. 11. 1832; Bong., Ess. Monog. Erioc. pl. 11. 1832.

This species is based on L. Riedel 1045, collected "in glareosis Serra da Lapa", Minas Gerais, Brazil, flowering in November and probably deposited in the Leningrad herbarium. Ruhland (1903) provides the Riedel collection number and cites also Glaziou 19956 and Schwacke 8493 from the same Brazilian state, flowering in April.

Bongard (1831) comments that "In speciebus sub no. 48-51 [his Eriocaulon argenteum, E. elatum, E. macrorhizon, and E. piliferum] squammae capitulorum involucrantes reflexae". His original description is very short (because he illustrates the plant): "acaule; rhizomate crasso; foliis linearibus pilosis subtus canescentibus; pedunculis piloso-canis; vaginis pilosis". Ruhland (1903), classifying the species in Subgenus Xeractis Mart., comments that the "Specimina a cl. Glaziou collecta foliis obtusiusculis gaudent." He regards the species as closest related to P. dubius Körn., distinguishing the two as follows:

Leaves densely incanous-lanate; stems greatly incrassate at the base. . . . . P. macrorrhizus.

Leaves, especially the young ones, more or less silvery-(rarely villous-) lanate. . . . . P. dubius.

The assumption is that the stems of the latter are not greatly incrassate at the base.

Silveira (1928) cites Collector undetermined 255 from Serra da Mantiqueria, Minas Gerais.

The original Bongard publication in the Mémoires has not been available to me for examination, although I have seen what purports to be a reprint (or separate?) of the article in question, so I cannot vouch for the spelling ("macrorrhizon") of the specific epithet there. However, Kunth (1841), Steudel (1855), Jackson (1893), and Stapf (1930) quote the spelling adopted here. The Bongard "reprint" spells the epithet "macrorhizon".

Citations: BRAZIL: Minas Gerais: Glaziou 19956 (B, W—1194908, Z); Schwacke 8493 (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: pl. 11. 1832 (N, Z).

PAEPALANTHUS MACROTRICHUS Alv. Silv., Fl. Serr. Min. 43. 1908.

Synonymy: Paepalanthus nacrothrichus Alv. Silv., Fl. Mont. 1: 409, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Serr. Min. 43. 1908; Alv. Silv., Fl. Mont. 1: 69—70 & 409, pl. 40. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99, 326, & 488. 1959; Moldenke, Fifth Summ. 1: 163 (1971) and 2: 586 & 954. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 40. 1928.

This species is based on A. Löfgren s.n. [Herb. Com. Geogr. & Geol. S. Paulo 1485] from "In campis prope Corrego Fundo", São Paulo, Brazil, collected in November of 1889 and deposited as no. 416 in the Silveira herbarium. On page 409 of his work, Silveira (1928) cites the type collection as having been gathered by an unspecified collector.

It should be noted here again that the Angely (1972) work cited in the bibliography above is dated "1970" on its title-page but was not actually published until 1972.

Citations: BRAZIL: Rio de Janeiro: Mello Mattos s.n. [Herb. Mus. Nac. Rio Jan. 4834] (N, S). São Paulo: Löfgren s.n. [Herb. Inst. Com. Geogr. & Geol. S. Paulo 1485] (P—isotype, Z—isotype).

PAEPALANTHUS MACULATUS Alv. Silv., Fl. Mont. 1: 167—169, pl. 107. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 167—169 & 409, pl. 107. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 107. 1928.

This species is based on A. Silveira 816, collected "In campis, locis pedregosis et quartzosis, prope Itacambira", Minas Gerais, Brazil, in July of 1926 and is deposited in the Silveira herbarium. Silveira (1928) notes that the "Species ab omnibus sectionis mirabile distincta". It is known thus far only from the original collection.

PAEPALANTHUS MAGALHÃESII Alv. Silv., Fl. Serr. Min. 57. 1908.

Synonymy: Paepalanthus magalhaesii Alv. Silv. apud A. W. Hill,

Ind. Kew. Suppl. 8: 169. 1933. Paepalanthus magalhaesii Sellow ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus magalhaensis Alv. Silv. ex Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960. Paepalanthus magalhäesii Alv. Silv. ex Moldenke, Phytologia 25: 241, in syn. 1973.

Bibliography: Alv. Silv., Fl. Serr. Min. 57. 1908; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Résumé Suppl. 3: 34. 1962; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 585 & 954. 1971; Moldenke, Phytologia 25: 241. 1973.

The type of this species was collected by Henrique Carlos de Magalhães Gomes — in whose honor it is named — in Minas Gerais, Brazil, and is deposited as number 413 in the Silveira herbarium. An isotype in the Berlin herbarium was photographed by Macbride as his type photograph number 10625, but the handwritten label accompanying the photograph accredits the binomial to Sellow.

Irwin and his associates describe the plant as a "sessile herb in wet places among rocks near creek in creek valley", growing at 1175 meters altitude, flowering and fruiting in September. They describe the flower-heads as white.

Citations: BRAZIL: Distrito Federal: Irwin, Souza, & Reis dos Santos 8700 (N, Z). Minas Gerais: Magalhães Gomes s.n. [Herb. Silveira 413; Macbride photos 10625] (B--isotype, N--photo of isotype, N--photo of isotype, W--photo of isotype, Z--isotype).

PAEPALANTHUS MANICATUS V. A. Pouls. ex Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 28—29, pl. 2, fig. 3. 1901.

Synonymy: Paepalanthus arachnoides Ruhl. in Engl., Pflanzenreich 13 (4-30): 158, in syn. 1903. Paepalanthus manicatus f. typica Beauverd, Bull. Herb. Boiss., ser. 2, 8: 290, in textu. 1908. Paepalanthus tenellus Alv. Silv. ex Moldenke, Résumé Suppl. 2: 22, in syn. 1959. Paepalanthus manicatus var. typica Beauverd ex Moldenke, Fifth Summ. 2: 586, in syn. 1971.

Bibliography: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 28—29, pl. 2, fig. 3. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 158, 289, & 291, fig. 18. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 290 & [291], fig. 11 A 1—8. 1908; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 409. 1928; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1928; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 13, 44, & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Phytologia 4: 149. 1952; Dawson, Los Angeles Co. Mus. Contrib. Sci. 7: 6. 1957; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; Moldenke, Résumé 99, 323, & 488. 1959; Moldenke, Résumé Suppl. 1: 22. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 69 & 70. 1960; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 577, 586, 591, & 954. 1971. [to be continued]

BOOK REVIEWS

Alma L. Moldenke

"A NATURALIST BUYS AN OLD FARM" by Edwin Way Teale, x & 306 pp., illus., Dodd, Mead & Co., New York, N. Y. 10016. 1974. $10.00.

"Trail Wood", in northern Connecticut, with its tender and appreciated crop of wildlife, is beautifully described herein in the manner of Thoreau's "Walden" and Burroughs' "Slabsides". Accompanying these word pictures are 42 black-and-white photographs also produced by the author.

"Given our outlook and our interests, it has been our closeness to nature, our daily existence on the edge of wilderness that has made the most profound impression. Here we bought sunrises and violets and whippoorwills as well as woods and pastures."

What a pleasurable book to read and reread in snatches or in its entirety time and again!

"SALT MARSHES AND SALT DESERTS OF THE WORLD" by V. J. Chapman, Second Supplemented Reprint Edition, 102 & 392 pp., illus., Verlag von J. Cramer, Lehre 3301, Germany & A. R. Gautner Verlag, Fürstentum Liechtenstein. 1974. DM 150.

This excellent work was first published in 1960, and since that time studies on salt marshes have been continued. The first 102 pages include a well illustrated survey of this additional scientific progress and additional modern bibliography. Such areas in our world tend to be used for refuse deposit and then land reclamation with their concomitant problems of pollution and urban sprawl. "Since marsh soil rapidly denatures oil it could be used for retaining oil spill and preventing pollution elsewhere."

The following 392 pages include a full offset reprinting of the original work. We are fortunate to have this material readily available again, and even more fortunate to have it combined with the capable author's modernization, keeping it as the only comprehensive account of this field.

"ECOLOGY AND BIOGEOGRAPHY IN INDIA" edited by M. S. Mani, xix & 773 pp. illus., Dr. W. Junk, Publishers, The Hague, Netherlands. [1973] 1974. DG 190.

This excellent work is published as Volume 23 of the Monographiae Biologicae series and culminates Dr. Mani's profession-

al career as an outstanding professional biologist and teacher in the field and classroom. "The central concept throughout this book is that biogeographical and geomorphological evolution of [greater] India constitutes an integral whole and the flora and fauna and distributional peculiarities that we observe today represent a dynamic phase of this complex evolution." Dr. Mani has written much of this study himself and has incorporated effectively contributions by other specialists as, for instance, on desert vertebrates, faunal regressions, termites, dipterons, etc.

Perhaps the most significant chapter is his own on the Peninsula which is considered "India vera", with the rest of the country being recent biogeographical appendages following the breakup and migrations of Gondwanaland. The Peninsula is therefore a relict and its original biota constitute true Indian elements.

There are fine photographs, charts, maps, bibliography, and index.

"WILDFLOWERS OF NORTH AMERICA: A Selected, Annotated Bibliography of Books in Print", compiled by Elsie Fish for the Library of the New York Botanical Garden, ii & 34 pp., Library, New York Botanical Garden, Bronx, New York 10458. 1974. $1.50 paperbound.

This is an annotated list of in-print books that should prove highly useful to school and public librarians, naturalists' clubs, and horticulturists, both professional and amateur. The books are arranged as general works and then as specific regional ones, and finally those that would appeal to younger readers.

The library hopes to keep this work up-to-date — certainly a worthwhile intention.

"HERBS: A Selected Annotated Bibliography" compiled by Diane Schwartz for the Library of the New York Botanical Garden, 16 pp., Library, New York Botanical Garden, Bronx, New York 10458. 1974. $ .50 paperbound.

Folks with horticultural and/or culinary interests involved with seasoning plants long associated with human cultural development will find this descriptive listing much more useful than just the bibliography in the last herb book at hand. This booklet will also prove of considerable use as a time-saver and information-director for the public librarian.

"DRAWINGS OF BRITISH PLANTS: INDEX" by Stella Ross-Craig, 39 pp., G. Bell & Sons Ltd., London WC2A 2HL. 1974. £3.50.

This useful index completes a useful and beautiful task started in 1947 "to provide a standard set of illustrations of all the thoroughly established [herbaceous] flowering plants growing wild in the British Isles".

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TWO NEW SPECIES OF HELICONIA (MUSACEAE) FROM THE CANAL ZONE AND PANAMA

ROBERT R. SMITH
Department of Biology
Hartwick College, Oneonta, New York

A recent revision of the genus Heliconia in Middle America was made with one of the results being two new species of Heliconia from the Canal Zone. These species also occur in the surrounding provinces of Panama.

1. Heliconia catheta R. R. Smith, sp. nov.

Planta musoidis, 3-5 m. alta. Folia longe petiolata, petioli 1/2-1 m. longi; lamina oblonga, 3/4-1 3/4 m. longa, 15-36 cm. lata, apice acuminata, basi obtuso-truncata; superne minora utrinque viridis, glabra. Inflorescentia pendula; rhachi flexuoso, puberuli, aureo-brunnei. Bracteae 10-20, basi scarlatina, apice aureo-viridi, area latere camesina ovato-lancoelatae, bono modo cymbiformibus profundus. Bracteae infernae 26-28 cm. longae. Bracteae internae florales translucidae, lanceolatae, puberulae, 4 cm. longae, 0.8 cm. latae. Flores in bractearum axillis ca. 6-8, lutei. Perianthium 4-5 cm. longum. Pedicellus 0.9-1.3 cm. longus, puberulissimo. Fructus subglobosus, caeruleus profundus, diametro 1.2-1.3 cm.

Moderately stout plant, 3-5 m. tall; musoid habit. Leaf-blade oblong, 3/4-1 3/4 m. long, 15-36 cm. wide, slightly acuminate-obtuse apex, obtuse-truncate base; upper and lower surfaces of leaves green; petiole 1/2-1 m. long, stout. Inflorescence pendent, elongated, 70-100 cm. long; peduncled; rachis moderately flexuose and spiraled, golden-brown puberulent, 0.4-0.5 cm. diameter. Branch-bracts 10-20, scarlet at base, yellow-green at apex, crimson patches on side, pubescent over outer surface of bract or just around base, ovate-lanceolate, moderately deep boat-shaped; lowest branch-bract ca. 40 cm. long, sterile; lowest fertile branch-bract 26-28 cm. long; middle branch-bracts gradating from 18-20 cm. long, upper branch-bracts 16-10 cm. long, all branch-bracts 2.0-3.5 cm. side-width; internodes between lower branch-bracts 5.6 cm. Floral-bracts lanceolate with translucent or thick border, puberulent, 4 cm. long, 0.8 cm. wide. Flowers 6-8 per branch-bract, yellow 6-7 cm. long; perianth 4-5 cm. long, lower 2/3 of calyx puberulent, upper 1/3 glabrous; ovary drying dark, puberulent or glabrous; pedicel 0.9-1.3 cm. long, strongly puberulent. Fruit dark blue, hairy, subglobose, 1.2-1.3 cm. diameter when dried.

Type: PANAMA. near old Fort Lorenzo, mouth of Rio Charges, 8 March 1923, C. V. Piper 6037 (US) (Fig. 1).

Distribution: In openings of moist forest at low altitudes. In Middle America, it appears to be restricted to Panama. It apparently extends southward into Columbia and Venezuela (Aristeguieta, 1961).

The specific epithet is taken from the Greek word, cathet, which means "hanging down."

This species has long been confused with H. platystachys Baker (Standley, 1928; Woodson and Shery, 1945; Aristeguieta, 1961). A study of the phototype clearly indicates that the Canal Zone and Panama species is definitely not H. platystachys Baker.

Representative Specimens:

PANAMA: CANAL ZONE: Barro Colorado Island, A. M. Chickering 16 (Mich); Barro Colorado Island, Croat 6387 (MO); Barro Colorado Island, Croat 5616 (MO); Summit Gardens, Croat 10790 (MO); Barro Colorado Island, D. Fairchild 17 (F); in openings in forest, Barro Colorado Island, L. A. Kenoyer 232 (US); vicinity Nuevo Emperador, S. McDaniel 2394 (FSU); near Frijoles, Rio Agua Salud, C. V. Piper 5856 (US); in thicket 4.7 mi. e. of Fort San Lorenzo, R. R. Smith 2166 (FLAS); in forest, Albrook Air Force Base Research Forest Site, W. R. Stimson 5068 (DUKE). PROV. CHIRIQUI: Puerto Armelles, M. E. Davidson 1179 (F); vicinity of San Bartolome, Peninsula de Burica, alt. 0-50 m., R. E. Woodson, Jr. and R. W. Shery 891 (MO). PROV. COLON: 1/4 mi. n. of Maria Chiquita, Croat 11353 (MO). PROV. DARIEN: Santa Fe, Duke 14269 (MO); vicinity of Paya, W. L. Stern, K. L. Chambers, J. D. Dwyer, J. E. Ebinger 427 (GH, MO, US). vicinity of Campamento Bueno Vista, Rio Chucunaque above confluence with Rio Tuquesa, W. L. Stern, K. L. Chambers, J. D. Dwyer, J. E. Ebinger 925 (GH, MO, US). PROV. PANAMA: Vacamonte Pt., Allen 2959 (MO); Rio Tapia, Bartlett and Lasser (MO); near big swamp e. of Rio Tecumen, P.C. Standley 26726 (US); w. of Chepo, Tyson 6701 (MO).

2. Heliconia irrasa R. R. Smith, sp. nov.

Planta musoidis, 1.5-2.0 m. alta. Folia petiolata, petioli ca. 48 cm. longi, lanati circum vaginam; lamina oblonga ad oblongo-ovata, 35-71 cm. longa, 7-15 cm. lata, apice acuminata, basi obtuso. Inflorescentia erecta, aliquando nutans, villosa, ca. 25 cm. longa; rhachi parum flexuoso, spirali, villoso-lanati. Bracteae 5-9, leutae, margine rubrae vel omnino rubrae, villoso-lanatae, ovato-lanceolatae, apice acuminata circinata, cymbiformibus non profundus. Bracteae internae florales lato-lanceolatae, 4 cm. longae, membranaceae, pubescentia. Flores in bractearum axillis ca. 6, lutei. Perianthium 4.0-5.2 cm. longum. Pedicellus ca. 0.5 cm. longus, tomentellus. Fructus subglobosus, diametro 0.7 cm., fuscatus.

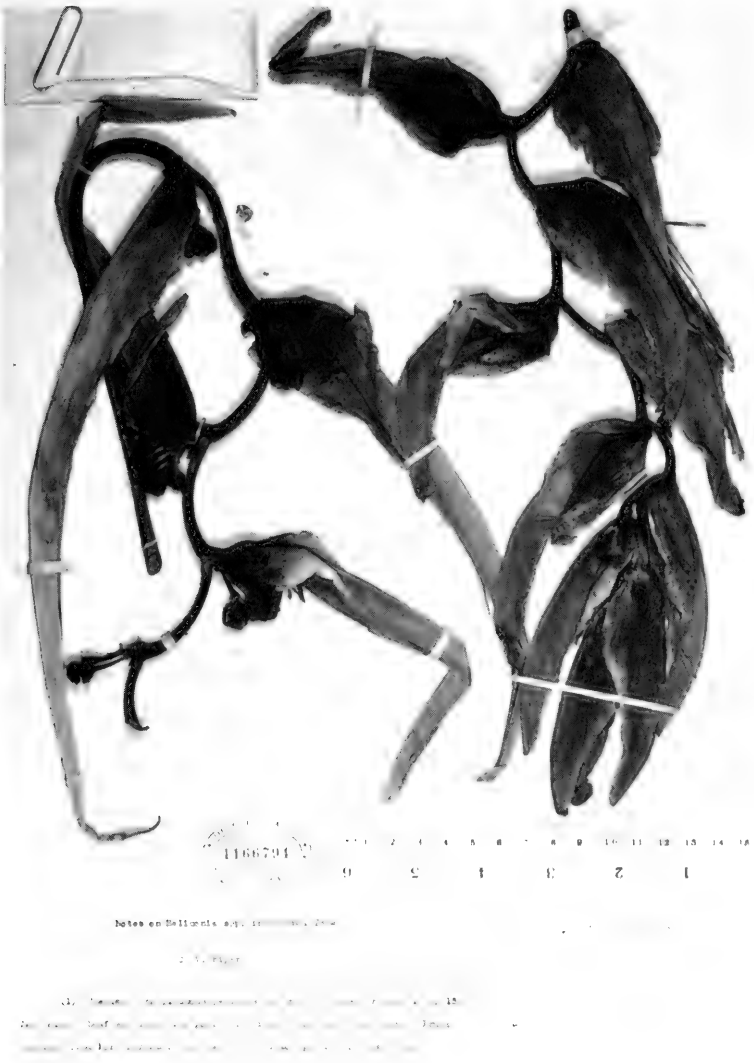

Fig. 1. Holotype of Heliconia catheta (US).

Moderately stout plant, 1.5-2.0 m. tall; musoid habit. Leaf-blade oblong to oblong-ovate, 35-71 cm. long, 7-15 cm. wide; acuminate apex, obtuse base; upper surface green, lower surface slightly paler; petiole prominent, ca. 48 cm. long, woolly around sheath. Inflorescence erect, sometimes nodding, villous, 25 cm. long; peduncle nearly woolly; rachis slightly flexouse and spiralled; villous-woolly, 0.4-0.5 cm. diameter. Branch-bracts 5-9, either dark red or yellow with red margin (the latter more common), moderately villous-wooly, ovate-lanceolate with acuminate apex circinately curved, shallow boat-shaped; lowest branch-bract often extends into leaf-blade, often sterile, total length 16-60 cm. long; lowest fertile branch-bract 10-17 cm. long; middle branch-bracts 8-12 cm. long; all branch-bracts 1.5-2.2 cm. side-width; lower branch-bracts separated by internodes of 2-3 cm. Floral-bracts wide-lanceolate, 4 cm. long, 0.8 cm. wide, membraneous, puberulent to slightly pubescent. Flowers ca. 6 per branch-bract, yellow, 5-6 cm. long; perianth 4.0-5.2 cm. long, nearly glabrous to slightly tomentose; pedicel 0.5 cm. long, slightly tomentose; ovary smooth. Fruit dark, subglobose, 0.7 cm. diameter. Seed not seen.

Type: PANAMA. PROV COCLE: El Valle de Anton, North Hills, June 29, 1946 P. H. Allen 3547 (MO). Isotypes (F, GH, US) (Fig. 2).

Distribution: Found in woods and forests, generally at lower altitudes. This species was though to be endemic to Panama. Recent verbal reports indicate that it may also occur in Costa Rica.

The specific epithet of H. irrasa comes from the Latin "inrasa" which means unshaved. This name was suggested by I. E. Lane in unpublished studies on the genus in the 1950's.

Heliconia irrasa has also been called H. tortuosa and H. villosa. Heliconia tortuosa is geographically distributed in northern Central America, and has red branch-bracts, which are not villous-woolly. It does possess scattered short hairs on the branch-bracts. Heliconia villosa may be confused with H. irrasa, since both are villous-woolly. However, H. villosa is of shorter stature, has more and shorter branch-bracts, sessile flowers, and is pendent. Heliconia villosa occurs in South America.

Representative specimens:
PANAMA: CANAL ZONE: Barro Colorado Island, S. Aviles 38 (F); vicinity of hill C-6, Fort Sherman, J. A. Duke 4426 (MO); Fort San Lorenzo, J. E. Ebinger 472 (MO); Barro Colorado Island, D. Fairchild 7 (F); in woods near Gatun Sta. P. R. R., G. Hager 363 (NY); Armour Trail, Barro Colorado Island, D. E. Starry 51 (F); Barro Colorado Island, R. E. Woodson, Jr. and R. W. Shery 983 (MO). PROV COCLE: hills n. of El Valle, alt. 1000 m., P. H. Allen 2167 (GH, MO, NY, US); hills n. of El Valle de Anton, vicinity of La Mesa, alt. 1000 m., P. H. Allen 2490 (US); North Hills, El Valle de Anton, P. H. Allen 3547 (F, GH, MO, US).

Fig. 2. Holotype of Heliconia irrasa (MO).

PROV. COLON: vicinity of Camp Pina, alt. 25 m., P. H. Allen 3582 (F, GH, US); Portobello, Las Cruces Trail, J. E. Ebinger 104 (MO); Gatun Lake, Goodyear, Allweather Estate, R. J. Seibert 1520 (MO). PROV. PANAMA: Cerro Campana, el. ca. 2300 ft., K. E. Blum, S. Olson, and R. R. Rasmussen 2377 (FSU, MO).

ACKNOWLEDGEMENTS

The author wishes to acknowledge Dr. W. W. Payne and Dr. D. B. Ward for access to The Herbarium, University of Florida, and for reading this manuscript. He would also like to thank Dr. Thomas B. Croat of the Missouri Botanical Garden for his valuable comments and additional representative specimens.

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Standley, P. C. 1928. Flora of the Panama Canal Zone. Contrib. U.S. Nat. Herb. 27: 116-117.

Woodson, R. E., Jr. and Shery, R. W. 1945. Flora of Panama. Ann. Missouri Bot. Gard. 32 (3): 48-57.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LIV

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional synonymy: Dichrolepideas Welw., Apont. Phyto-geogr. 542. 1858. Eriocaulaceas Welw., Apont. Phyto-geogr. 542. 1858. Dichrolepidaceae Welw. ex Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 357, in syn. 1973.

Additional & emended bibliography: J. Grah., Cat. Pl. Bomb. 230--231 & iv. 1839; Welw., Apont. Phyto-geogr. 542. 1858; Rand & Redfield, Fl. Mt. Desert 162 & 282. 1894; Woodr., Journ. Bomb. Nat. 13: 429. 1901; Collett, Fl. Siml. 549--550, fig. 180. 1902; Cooke, Fl. Presid. Bombay, ed. 1, 2: 841--851. 1908; Guillaum. & Beauvis., Ann. Soc. Bot. Lyon 38: 114. 1914; Guillaum. & Beauvis., Sp. Montrouz. 40. 1914; Cooke, Fl. Presid. Bombay, ed. 2, pr. 1, 3: 352--364 (1958) and ed. 2, pr. 2, 3: 352--364. 1967; Ehrendorfer, Taxon 19: 600. 1970; Anon., Assoc. Étud. Tax. Fl. Afr. Trop. Ind. 1972: 25. 1972; Anon., Ind. Bot. Guay. Highl. 8, 16, & 25. 1972; Knobloch, Taxon 21: 101. 1972; Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 849--854, fig. 5 & 6. 1972; Stafleu, Internat. Code Bot. Nomencl. 228. 1972; Heslop-Harrison, Ind. Kew. Suppl. 15: 29, 34, 51--52, 99, & 148. 1974; Mani, Ecol. & Biogeogr. India [Illies, Monog. Biolog. 23:] 183, 187, 209, 232, & 741. 1974; Moldenke, Phytologia 29: 281--330, 386--394, 477--502, & 506--512. 1974; Ross-Craig, Drawings Brit. Pl. Ind. 16. 1974.

Knobloch (1972) reports three named hybrids known to him in this family.

It should be noted here that numbers 5 and 6 of volume 29 of "Phytologia" were actually published and distributed to paid subscribers on December 24, 1974, and not "January 1975" as stated on the covers. Four papers dealing with plants in this family are therein included.

ERIOCAULON Gron.

Additional synonymy: Eriocailon Moldenke, Phytologia 29: 225, sphalm. 1974.

Additional bibliography: J. Grah., Cat. Pl. Bomb. 230--231 & iv. 1839; Rand & Redfield, Fl. Mt. Desert 162 & 282. 1894; Woodr., Journ. Bomb. Nat. 13: 429. 1901; Collett, Fl. Siml. 549--550, fig. 180. 1902; Cooke, Fl. Presid. Bombay, ed. 1, 2: 841--851. 1908; Guillaum. & Beauvis., Ann. Soc. Bot. Lyon 38: 114. 1914; Guillaum. & Beauvis., Sp. Montrouz. 40. 1914; Knoche, Fl. Balear., ed. 1, 3: 162 & 393. 1923; Cooke, Fl. Presid. Bombay, ed. 2, pr. 1, 3: 352--364 (1958) and ed. 2, pr. 2, 3: 352--364. 1967; Anon., Ind. Bot. Guay. Highl. 8. 1972; Heslop-Harrison, Ind. Kew. Suppl. 15: 29. 1974; Knoche, Fl. Balear., ed. 2, 3: 162 & 393. 1974; Mani, Ecol. & Biogeogr. India [Illies, Monog. Biolog. 23:] 183, 187, 209, & 741. 1974; Moldenke, Phytologia 29: 281--287, 289, 314, 389, 390, 393, & 507. 1974; Ross-Craig, Drawings Brit. Pl. Ind. 16.

1974.

PAEPALANTHUS ANDICOLA Körn.

Additional bibliography: Moldenke, Phytologia 29: 296. 1974.

Ruiz-Terán and his associates describe this plant as a "Hierba rosulada" or "acaulirosuleto. Roseta" or "rósula 7--15 cm. de alto, 20 cm. de diámetro. Hojas radicales, rosuladas, lanceolado-lineares o deltado-lineares, 12--35 cm. x 5--7 mm., verde obscuras por lo haz, apenas más claras por el envés, ciliadas, espinescentes" or "mucronado-subspinescentes en al ápice, glabras en el haz, laxipilosas en el envés, los pelos sobre los nervios longitudinales. Escapos axilares, ascendentes, exsertos, verdes, complanados, 8--20 cm., 1-céfalos, estriados, pubérulos" or "con escasos pelos largos, blancos, desde 2--3-emarginados hasta corta pero manifiesemente 2--3-furcados en el ápice. Capítulos compactos, hemisféricos a subglobosos o obconoides, escapíferos, 5--7 mm. de diámetro, que forman conjunto terminal de unos 12--15 mm. de diámetro. Involucro negro pardusco verdósulo. Flores pequeñas, blancas" or "blanquecinas." They encountered the plant on páramos and on "faldas deforestadas", at altitudes of 1500--2650 meters, flowering in May, and describe it as frequent or abundant.

The E. L. Core 997, García-Barriga 18034, and R. E. Schultes 18792, originally distributed and previously cited as P. andicola, are actually P. columbiensis Ruhl., while J. A. Steyermark 54409 is P. crassicaulis Körn. and J. A. Steyermark 54413 & 54414a are P. ensifolius (H.B.K.) Kunth.

Additional citations: VENEZUELA: Mérida: Ruiz-Terán & López-Figueiras 690 (Ld), 717 (Z); Ruiz-Terán & López-Palacios 1966 (Ac). Táchira: Ruiz-Terán & López-Figueiras 1252 (Mi).

PAEPALANTHUS COLUMBIENSIS Ruhl.

Additional bibliography: Moldenke, Phytologia 29: 306. 1974.

Ruiz-Terán and his associates describe this plant as an "Hierba rosulada" or "caudicirrosuleta" or "acaulirrosuleta herbáceo y escaposa. Cáudice robusto, 6 x 4 cm. Roseta de unos 10 cm. de alto x 16--18 cm. de diámetro" or "rósula de 5--6 cm. de alto. Escapos de 10--25 cm. de largo x 3,5--4 mm., estriados" or "estriadosulcados, 1-céfalos, axilares, exsertos, complanados, verde amarillentos, lucientes, glabros" or "albo-pilosos. Hojas lanceoladas o lanceolado-deltadas, deltado-lineares o deltado-sublanceoladas" or "lineari-triangulares, concoloras, sésiles, verde intensas, lucientes por la haz" or "blancas en la vaina, apenas más claras por el envés, verde amarillentas en la lámina, con venas longitudinales más obscuras y con pelos nlancos, suaves, en ambas caras, más abundantes hacia la mitad proximal del limbo, no espinescentes en el ápice, agudas, 8--15 cm. de largo x 15 mm. de ancho arriba de la vaina, finamente estriadas longitudinalmente, translucidas en los bordes; vaina blanca. Inflorescencia en conjuntos iregularmente subglobosos o hemisféricos, formada por 2--6 capítulos involucrados. Capítulos grandes, subglobosos, 15--20 mm. x

7—15 mm. Flores pequeñas, blancas" or "blanquecinas a blanco grisáveas" and state that the plant is "Muy escaso", "frecuente", or "abundante" on páramos at altitudes of 2900 to 3200 meters. They also note that the "Escapos casi siempre irregularmente ramificados hacia el tercio distal o cerce del ápice", but I have not seen such a condition in this species.

In Colombia the species has been found growing on "wet sabanas of frailejones" and on páramos at altitudes of 2700—3600 meters, growing as "tufts in wet soil", the flowers "gray" in color, flowering and fruiting in February and July.

The E. L. Core 997, García-Barriga 18034, and R. E. Schultes 18792, cited below, were previously erroneously cited by me as the very similar P. andicola Körn.

Additional citations: COLOMBIA: Cauca: E. L. Core 997 (N). Cundinamarca: García-Barriga 18034 (N, N, W—2569355A); R. E. Schultes 18792 (W—2172259, Z). VENEZUELA: Lara: Ruiz-Terán & López-Figueiras 2027 (Tu). Mérida: Ruiz-Terán & López-Palacios 6571 (Mi). Táchira: Ruíz-Teran & López-Figueiras 1313 (Ac). Trujillo: Ruiz-Terán & López-Figueiras 1019 (Ld).

PAEPALANTHUS DIFFISSUS Moldenke

Additional bibliography: Moldenke, Phytologia 26: 254 & 255. 1973.

Ruiz-Terán and his associates describe this plant as "Caudicirrosulato, 20—30 cm. de longitud total. Cáudice robusto, vertical, 10—12 cm. de largo. Hojas linear-lanceoladas o linear-triangulares" or "triangular-lineares, 9—15 cm. x 7—9 mm., subrígidas, agudas pero no espenescentes en el ápice, con limbo verde intenso, luciente, y vaina corta, blanca. Escapos 12—20 cm. de largo, complanados, verde intensos, cortamento ramificados distalmente, subtendidos en el tercio proximal por una 'bractea' o vaina cilíndrica, cerrada. Inflorescencia terminal, compacta, formada por grupos 4—6 capítulos involucrandos. Flores pequeñas, blanquecinas". They report the plant as frequent to abundant "cuenca de la quebrada" at altitudes of 2300—2800 meters.

Additional citations: VENEZUELA: Mérida: Ruiz-Terán & López-Figueiras 9338 (Ld, Z); Ruiz-Terán & López-Palacios 6604 (Mi).

PAEPALANTHUS MANICATUS V. A. Pouls.

Additional bibliography: Moldenke, Phytologia 25: 126 & 229 (1973) and 30: 35 & 62. 1975.

Illustrations: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: pl. 2, fig. 3. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 158, fig. 18. 1903.

This species is based on Regnell III.1267 and III.1267 1/2 from Caldas, Minas Gerais, Brazil, deposited in the herbarium of the Naturhistoriska Riksmuseum in Stockholm. In addition, Ruhland (1903) cites Glaziou 17847, Magalhães Gomes 1368, and Ule 2724 from the same state. Collectors describe the plant as an herb, to 5 cm. tall, with flower-heads grayish-white or yellow-

brown. They have found it growing on rocks, sandstone outcrops, and a cliff face, among rocks on rocky slopes, and in damp shaded places, at 1000--1800 m. altitude, flowering in January, March, April, and July, and fruiting in January and March. Irwin and his associates describe it as cespitose, forming large patches, to 3 cm. tall (with dried fruiting-heads), growing beneath overhanging outcrops on steep rocky iron-rich mountain slopes.

Silveira (1928) cites H. C. de Magalhães Gomes 345 from Ibitipoca, Minas Gerais; the same collector's 1368, in the Berlin herbarium, appears to be what was intended to be the type of both P. arachnoides Ruhl. and P. tenellus Alv. Silv.

Paepalanthus manicatus greatly resembles P. microcaulon Ruhl. and P. lamarckii Kunth.

The Irwin, Harley, & Smith 32510a, cited below, was originally a mixture with Syngonanthus nitens var. viviparus Moldenke, apparently indicating that these two taxa grow, at least in some localities, in close proximity to each other, while Irwin, Harley, & Onishi 28698 is a mixture with Selaginella sp.

Additional citations: BRAZIL: Bahia: Irwin, Harley, & Smith 32510a (N). Distrito Federal: Irwin, Grear, Souza, & Reis dos Santos 14058 (Ac, N). Goiás: E. Y. Dawson 14593 (Z); Irwin, Grear, Souza, & Reis dos Santos 13388 (Ac, N). Minas Gerais: Glaziou 17847 (B); Irwin, Harley, & Onishi 28698, in part (Ld, N); Macedo 2842 (N, S); Magalhães Gomes 1368 (B, B), 3102 [Herb. Com. Geogr. & Geol. Minas 1368; Herb. Jard. Bot. Belo Horiz. 26684] (N); Mello Barreto 8813 [Herb. Jard. Bot. Belo Horiz. 26465] (N); Mendes Magalhães 4343 [Herb. Jard. Bot. Belo Horiz. 45183] (N); Monteiro 57 [Herb. Cent. Pesq. Flor. & Conserv. Nat. 6227] (Ld); Regnell III.1267 (B--cotype, S--cotype, S--cotype, W--936265--cotype, Z--cotype), III.1267 1/2 (S--cotype, S--cotype, W--200764--cotype); Ule 2724 (B); Wainio s.n. [Carassa, IV.1885] (S).

PAEPALANTHUS MANICATUS var. PULCHELLUS Beauverd, Bull. Herb. Boiss., ser. 2, 8: 290 & [291], fig. 11 A 1--8. 1908.

Synonymy: Paepalanthus manicatus pulchellus Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291]. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 290 & [291], fig. 11 A 1--8. 1908; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 954. 1971.

Illustrations: Beauverd, Bull. Herb. Boiss., ser. 2, 8: [291], fig. 11 A 1--8. 1908.

This variety is based on Damazio 1843 from "Marco, Serra de Ouro Preto", Minas Gerais, Brazil, collected in March, 1907, and deposited in the Herbier Boissier at Genova. It is described by

Beauverd (1908) as "Caulis elongatus, 13--24 mm. altus, 1/3 -- 1/2 mm. crassus. Folia trinervia, mucronato-acuminata, 9--12 mm. longa, medio 3/4 -- 1 basi 1/4 -- 1/3 mm. modo lata; caulinaria breviora. Pedunculi circ. 20--35 fasciculato-umbellati, 4--6 cm. longi, pilis albis numerosis longe hirsuti; vaginae 5--6 mm. longae, glabrae vel parum hirsutae, ore sub lente obscure ciliatae. Caetera ut in forma typica." He also gives the following critical notes: "Il résulte d'une comparaison entre la description princeps de Poulsen (1901) et la diagnose de Ruhland (1903) que le Paepalanthus manicatus Pouls. est une espèce polymorphe jusqu'à présent spéciale à la flore du Minas Geraës. -- La planche publiée par Poulson et Malme conformement au texte de ces auteurs, représente cette espèce comme très pauciflore, avec des pédoncules beaucoup moins hirsutes que les feuilles, et à gaînes longuement ciliées à l'orifice. La figure de Ruhland considère comme forme typique une plante différant sensiblement d'aspect de celle de Poulsen par ses pédoncules beaucoup plus nombreux (11 au lieu de 4) et plus flexueux; en outre cet auteur décrit les feuilles typiques comme uninerviées, contrairement au texte de Poulsen qui les dir manifestement trinerviées: cette dernière conformation est réservée par Ruhland à une forme 'robusta Ruhl.' qui se distingue en outre du type par ses tiges plus épaisses, ses feuilles plus longues, ses pédoncules beaucoup plus nombreux (jusqu'à 50) et ses capitules plus grands. Ayant eu l'occasion de vérifier le point de vue de Ruhland par l'examen de l'un des échantillons de la forme typique (No. 17847 de Glaziou, déposé à l'Herbier Delessert), nous avons pu nous convaincre que la plante de M. Damazio différait notablement des deux formes décrites par les caractères suivants: 1° Feuilles un peu moins longues, plus larges et plus rétrécies à la base que celles du type; pédoncules beaucoup plus nombreux et plus hirsutes, à poils blancs plus abondants que chez les feuilles, et à orifice de la gaîne glabre à l'oeil nu, ou à peine cilié-denticulé sous la loupe, à un grossissement de 15 diametres! 2° Pédoncules beaucoup moins nombreux et capitules aussi grands que chez la forme 'robusta Ruhl.' bien que le port soit moins robuste que cellui de la forme 'typica', exception faite de la largeur des feuilles et du nombre des capitules. La figure que nous publions est destinée à cpmplèter notre description et à démontrer la valeur variétale saillante que nous attribuons à la plante de M. Damazio: elle n'apparait nullement à notre sens comme une simple forme de transition entre les deux autres formes décrites."

PAEPALANTHUS MANICATUS var. PULVINATUS Herzog in Fedde, Repert. Spec. Nov. 20: 86. 1924.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 20: 86. 1924; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1928; Moldenke, Known Geogr. Distrib. Erioc. 19 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 97 & 210. 1949; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; Moldenke, Résumé 114 & 488. 1959; Moldenke, Fifth Summ. 1: 183 (1971) and 2: 954.

1971; Moldenke, Phytologia 25: 126. 1973.

This variety is based on Herzog 142, collected "In dichten Polstern an dem feuchten südexponierten Sandsteinwanden des Cerro de Santiago", Chiquitos, Bolivia, at about 700 meters altitude, in May, 1907. Herzog (1924) says of it "Differt a typo caulo altiore, 10--12 cm. longo iterum diviso, ramis pulvinatim congestis. Congruit optime foliis angustissime linearibus ut et vaginae pedunculique pilis longis patentibus molliter cano-villosis petalisque floris ♀ dense longeque ciliatis."

Cutler describes it as "small and Eleocharis-like", and found it growing among grass in dry places, at 700 meters altitude, flowering and fruiting in September.

Material of this variety has been misidentified and distributed in some herbaria as Eriocaulon microcephalum H.B.K.

Citations: BOLIVIA: Chiquitos: Cutler 7038 (N).

PAEPALANTHUS MANICATUS f. ROBUSTUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 158 [as "robusta"]. 1903.

Synonymy: Paepalanthus manicatus f. robusta Ruhl. in Engl., Pflanzenreich 13 (4-30): 158. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 158 & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 290. 1908; Moldenke, Known Geogr. Distrib. Erioc. 13 & 50. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 954. 1971.

The type of this form was collected by Ernst Heinrich Georg Ule (no. 2715) "auf Felsen der Serra de Caraça", Minas Gerais, in March of 1892 and is probably deposited in the Berlin herbarium. Ruhland (1903) says of it "Differt a forma typica habitu robustiore; caule crassiore; foliis paullo longioribus, plerumque 3-nerviis, linearibus; pedunculis numerosissimis (ca. 50); capitulis paullo majoribus". Thus far it is known only from the original collection.

PAEPALANTHUS MARTIANUS Körn. in Mart., Fl. Bras. 3 (1): 325--326. 1863.

Synonymy: Dupatya martiana (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya martiana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 325--326 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 189, 192, 284, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, & 488. 1959; Jacks. in Hook.

f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 164 & 482 (1971) and 2: 954. 1971.

This species is based on an unnumbered collection by Carl Friedrich Philipp von Martius from Serro Frio, Minas Gerais, Brazil, and another unnumbered collection by Johann Emanuel Pohl from an undesignated locality in the same state; the former was photographed by Macbride in the Munich herbarium as his type photograph number 18709. Ruhland (1903) cites only these two original collections and the species does not appear to have been collected since.

Citations: BRAZIL: Minas Gerais: Martius s.n. [Serro Frio; Macbride photos 18709] (B--cotype, Mu--cotype, N--photo of cotype, W--photo of cotype, Z--cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS MELALEUCUS (Bong.) Kunth, Enum. Pl. 3: 510. 1841.

Synonymy: Eriocaulon melaleucum Bong., Mém. Acad. Imp. Sci. St. Pétersb., set. 6, 1: 629. 1831 [not E. melaleucum Mart., 1832]. Paepalanthus melaleucus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 396. 1863. Eriocaulon melaleucus (Bong.) Kunth apud Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 S. 1888. Dupatya melaleuca (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya melaleuca Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 629. 1831; Bong., Ess. Monog. Erioc. 29, pl. 23. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 3 (2): pl. 23. 1835; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 509, 510, 575, 576, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 272, 278, & 334. 1855; C. Müll. in Walp., Ann. 5: 926 & 940. 1860; Körn. in Mart., Fl. Bras. 3 (1): 396, 397, 499, & 507, pl. 51 I. 1863; F. V. Hayden, Rep. U. S. Geol. Surv. Terr. 7: 106. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 S. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 203, 284, 286, & 291, fig. 29. 1903; Stapf, Ind. Lond. 3: 91 (1930) and 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 13, 30, 37, & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 281, 290, & 488. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 18: 11. 1969; Moldenke, Phytologia 18: 264 & 396. 1969; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 505, 586, & 954. 1971; Moldenke, Phytologia 26: 240 (1973) and 30: 37

& 40. 1975.

Illustrations: Bong., Ess. Monog. Erioc. 29, pl. 23. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 3 (2): pl. 23. 1835; Körn. in Mart., Fl. Bras. 3 (1): pl. 51 I. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 S. 1888; Ruhl. in Engl., Pflanzenreich 13 (4-30: 203, fig. 29. 1903.

This species is based on an unnumbered Riedel collection from Minas Gerais, Brazil, deposited in the Leningrad herbarium. Bongard (1831) and Kunth (1841) say of it "P. corymboso valde affinis, a quo optime distinguendus praesentia caulis 1--2-pollicarias; foliis acutioribus, pilis longis parcis inferne ciliatis, qui in P. corymboso breviores, densiores, torum folii marginem occupant; pedunculis angustioribus et apice pluries divisis." Kunth also states that the species is related to P. tuberosus (Bong.) Kunth, which may be distinguished by its "rhizomate crasso, tuberoso; foliis basi glabris (nec lanatis), pubescentibus (nec pilosis, nec ciliatis); pedunculis apice canescentibus et vaginis bifidis."

The Eriocaulon melaleucum Mart., referred to in the synonymy above, is a synonym of E. leucomelas Steud.

Hayden (1878) compares the leaves of P. melaleucus with those of the supposed fossil species, Eriocaulon porosum Lesq.

The Martius s.n. collection in the Meisner Herbarium, cited below, also bears a Martius 874 label on the sheet, but this is surely due to an error in mounting, because Martius 874 represents a cotype collection of P. vellozioides Körn. Certainly P. melaleucus is very similar in habit to and is probably closely related to P. vellozioides Körn., as well as to P. bromelioides Alv. Silv., P. lanceolatus Körn., and P. rigidulus Mart.

Herbarium material has been misidentified and distributed in some herbaria under the names, P. rigidulus Mart. and Eriocaulon fasciculatum Lam.

Ruhland (1903) cites Riedel s.n. from Bahia and Ackermann s.n., Glaziou 15522, Lhotzky 37, Martius s.n., Riedel s.n., and Schüch s.n. from Minas Gerais.

Citations: BRAZIL: Bahia: L. Riedel s.n. [Camamú] (B, N, S). Minas Gerais: Ackermann s.n. [1832] (B), s.n. (C); Lhotzky 37 (B); Martius s.n. (M). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 51 I (B, N, Z); drawings & notes by Körnicke (B).

PAEPALANTHUS MELANOLEPIS Alv. Silv., Fl. Serr. Min. 35. 1908.

Bibliography: Alv. Silv., Fl. Serr. Min. 35. 1908; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Moldenke, Known Geogr. Distrib. Erioc. 13 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 99 & 288. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

PAEPALANTHUS MELANTHUS Alv. Silv., Fl. Mont. 1: 74--76, pl. 43. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 74—76 & 409, pl. 43. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 43. 1928.

This species is based on A. Silveira 690 frim "In campis inter Serro et Datas, in Serra do Geral", Minas Gerais, Brazil, collected in June, 1925, and deposited in the Silveira herbarium.

Citations: BRAZIL: Minas Gerais: Mendes Magalhães 2093 [Herb. Jard. Bot. Belo Horiz. 42466] (N).

PAEPALANTHUS MELLII Moldenke, N. Am. Fl. 19: 41. 1937.

Bibliography: Moldenke, N. Am. Fl. 19: 41. 1937; Moldenke, Phytologia 1: 333, 350, & 359. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 51. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 158. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 31 & 210. 1949; Moldenke, Alph. List Cit. 3: 725. 1949; Moldenke, Résumé 37 & 488. 1959; Moldenke, Fifth Summ. 1: 72 (1971) and 2: 954. 1971.

PAEPALANTHUS MENDONCIANUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 129. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 123, 129, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Moldenke, Phytologia 25: 145. 1973.

This species is based on R. Mendonça 320 from somewhere in Minas Gerais, Brazil, deposited in the herbarium of the Botanisches Museum in Berlin, where it was photographed by Macbride as his type photograph number 10626. Ruhland (1903) says of it "Species cum P. blepharocnemidi Mart., praecipue vaginis brevibus, valde affinis, differt autem ab illo statim foliis glabris et bractearum involucrantium forma atque colore". It is known thus far only from the original collection.

Citations: BRAZIL: Minas Gerais: Mendonça 320 [Macbride photos 10626] (B—type, N—photo of type, W—photo of type, Z—isotype).

PAEPALANTHUS MERIDENSIS Klotzsch ex Körn. in Mart., Fl. Bras. 3 (1): 407—408. 1863.

Synonymy: Dupatya meridensis (Klotzsch) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya meridensis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 277, 282, 407—408, 502, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand &

Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 206, 284, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 6, 30, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64 & 210. 1949; Moldenke, Alph. List Cit. 3: 974. 1949; Moldenke, Phytologia 4: 150. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 72 & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 2 & 3. 1965; Moldenke, Fifth Summ. 1: 118, 125, & 483 (1971) and 2: 954. 1971; Moldenke, Phytologia 25: 228. 1973.

This species is based on Linden 1415 and Moritz 1212, the former from the upper half of the páramo of Mérida, at 3700 meters altitude, and the latter from marshy places in the "Hochgebirge" of Mérida, Venezuela, both deposited in the herbarium of the Botanisches Museum in Berlin, where Macbride photographed the Moritz collection as his type photograph number 10627. Recent collectors describe the plant as 8--12 inches tall, very common on open páramo among grasses, herbs, and undershrubs in an area of high humidity, at altitudes of 2000--3700 meters. Lehmann found it "in dichten Wäldern neben Wegen" and describes it as a "Runde Blattrosetten bildende Pflanze mit grünen Blättern und weiszen Blüten".

Ruiz-Terán and his associates describe the plant as a "Hierba rosulada. Rósula de 10--12 cm. de alto. Hojas deltado-lanceoladas o deltado-sublanceoladas, 8--11 cm. x 10--15 mm., virtualmente glabras en ambas caras, laxiciliadas en los bordes, mucronuladas. Escapos de 15--30 cm. de largo. Capítulos hemisféricos, ± 12 mm. de diámetro. Frecuente."

The plant has been collected in flower in January, July, and August. Ruhland (1903) cites from Mérida, Venezuela, only Linden 1415 and Moritz 1212 in the Berlin herbarium, and from Tolima, Colombia, C. F. Lehmann 2375 in the Boissier Herbarium.

Additional citations: COLOMBIA: Tolima: F. C. Lehmann 2375 (W--936269). VENEZUELA: Mérida: Bernardi 1007 (Ad); Hanbury-Tracy 49 (K), 65 (K); Linden 1415 (B--cotype); Moritz 1212 [Macbride photos 10627] (B--cotype, B--cotype, N--photo of cotype, W--photo of cotype, Z--cotype). Táchira: Ruiz-Terán, López-Figueiras, Wurdack, Wurdack, & Tillett 8147 (Z). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS MEXIAE Moldenke, Phytologia 7: 89--90. 1959.

Bibliography: Moldenke, Phytologia 7: 89--90. 1959; Moldenke, Résumé Suppl. 1: 6 & 26. 1959; Moldenke, Biol. Abstr. 35: 1688. 1960; Hocking, Excerpt. Bot. A.4: 592. 1962; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966; Moldenke, Phytologia 18: 254. 1969; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Moldenke, Phytologia 26: 142. 1973.

Miss Mexia describes this plant as a perennial herb with whit-

ish-gray flowers, and found it "frequent" at the type locality. Recent collectors have found it growing on damp clay banks and in crevices among and at the base of rocks on mountain summits, at altitudes of 1160--1400 meters, flowering in May and December.

Material has been misidentified and distributed in some herbaria under the names Eriocaulon kunthii Körn., Paepalanthus calvus Körn., P. planifolius (Bong.) Körn., and P. undulatus Ruhl.

Citations: BRAZIL: Minas Gerais: M. A. Chase 10342 (W--1495686); Mexia 5833 (Ba--isotype, Go--isotype, Mi--isotype, N--type, Ut--502462--isotype, W--1571894--isotype).

PAEPALANTHUS MICHAELII Alv. Silv., Fl. Mont. 1: 39--40, pl. 19. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 39--40 & 409, pl. 19. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 19. 1928.

The type of this species is A. Silveira 605, collected "In campis montis ferruginosi Mascate, prope Congonhas do Campo, altitudine 1,400 m", Minas Gerais, Brazil, in December of 1912 and is deposited in the Silveira herbarium. According to Silveira (1928) the "Species cl J. Michaeli, diligente Eriocaulacearum collectore, dicata". In his description he fails to refer to his illustrative plate, and on page 409 of the same work he gives the type locality as "Serra do Mascate".

Citations: BRAZIL: São Paulo: Pickel 1365 (N, Sf).

PAEPALANTHUS MICROCAULON Ruhl. in Engl., Pflanzenreich 13 (4-30): 159. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 159, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Moldenke, Phytologia 30: 35. 1975.

This species is based on Glaziou 22325, collected between Paranana and Corrego do Brejo, Goiás, Brazil, flowering in February, and deposited in the Berlin herbarium. An isotype in the Copenhagen herbarium was photographed there by Macbride as his type photograph number 22288. The species has also been collected in flower in March and October. Ruhland (1903) says of it: "Species gracilis P. Lamarckii Kunth proxima, a quo pilorum forma, foliis etc. satis differt". It appears to me also to resemble closely P. manicatus V. A. Poulsen.

Irwin and his associates describe P. microcaulon as a tufted

herb with inflorescence 5--6 cm. tall and the flower-heads white. They found it growing on campos in an area of cerrado on outcrops with adjacent wet campo (brejo), in open positions near a brook on cerrado slopes, and on wet sand in "campo sujo" in an area of cerrado with sandstone outcrops and adjacent "campo sujo", at 1000--1250 meters altitude, flowering in January. Hill encountered it in wet sedge meadows.

Citations: BRAZIL: Goiás: Glaziou 22325 [Macbride photos 22288] (B--type, N--photo of isotype, W--photo of isotype, Z--isotype); S. R. Hill 1040 (Hl); Irwin, Anderson, Stieber, & Lee 34310 (Ac, N), 34466 (Ld, N, W--2709843); Irwin, Harley, & Smith 33091 (N, W--2709816, Z); Smith & Macedo 4813 (W--2248314).

PAEPALANTHUS MICROPHORUS Alv. Silv., Fl. Mont. 1: 149--151, pl. 94. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 149--151 & 409, pl. 94. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 94. 1928.

This species is based on A. Silveira 762, collected "In campis prope Milho Verde, in Serra Geral", Minas Gerais, Brazil, in June of 1925 and deposited in the Silveira herbarium. It is known thus far only from the original collection, and Silveira (1928) says of it: "Specie [sic] ob flores dimeros in sectione Aphorocaulonidae distinctissima".

PAEPALANTHUS MICROPHYLLUS (Guill.) Kunth, Enum. Pl. 3: 519. 1841.

Synonymy: Eriocaulon microphyllum Guill. in Deless., Icon. Sel. 3: 58--59, pl. 96. 1837. Paepalanthus microphyllus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 296 & 373. 1863. Dupatya microphylla (Guill.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya microphylla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus microphyllus (Guill.) Ruhl. ex Moldenke, Résumé 326, in syn. 1959.

Bibliography: Guill. in Deless., Icon. Sel. 3: 58--59 & 67, pl. 96. 1837; Kunth, Enum. Pl. 3: 519, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 278, 282, 294, 296, 373, 499, & 507, pl. 48, fig. 2. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 2, 173, 284, 286, & 291. 1903; Alv. Silv., Fl. Mont. 1: 163 & 409. 1928; Stapf, Ind. Lond. 3: 91 (1930) and 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Durand &

Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, 37, & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 150. 1952; Mendes Magalhaes, Anais V Reun. Anual Soc. Bot. Bras. 242--243. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, 290, 326, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Phytologia 20: 423. 1970; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 506, 586, & 954. 1971.

Illustrations: Guill. in Deless., Icon. Pl. 3: pl. 96. 1837; Körn. in Mart., Fl. Bras. 3 (1): pl. 48, fig. 2. 1863.

The type of this very distinctive species was collected by Vauthier in the neighborhood of Serro Frio [Serra do Frio], Minas Gerais, Brazil, between 1831 and 1837. Kunth (1841) says of it: "Accedit ad Eriocaulon repens Bong.: differt pedunculis multo minoribus, aequalibus, glabris, crebrioribus, foliis brevioribus, magis recurvatis. (Guill.) P. bryoidi et congesto affinior?" He also notes that the "Stamina 3 et pistilla abortiva ut in P. Vauthieriano". The P. vauthierianus to which he here refers is now known as P. riedelianus (Bong.) Körn., Eriocaulon repens is P. bongardi Kunth, and P. congestus is P. fasciculatus (Rottb.) Körn.

Ruhland (1903) cites Glaziou 20015, Schwacke 8478, and Vauthier s.n. from Minas Gerais and comments that the "Pedunculi et vaginae certissime juventute, saepe etiam persistenter puberula, non ut ex Kunth et Koernicke glabra. Species habitu valde insignis." He classifies it in his Subsection Polyactis, Group Effusi Ruhl., along with P. bongardi Kunth, P. camptophyllus Ruhl., P. gardnerianus Walp., P. intermedius Körn., P. brachyphyllus Ruhl., P. stuebelianus Ruhl., P. scandens Ruhl., and P. repens (Lam.) Körn. It is said to bloom from April to August and to grow between rocks and boulders.

Silveira (1928) cites A. Silveira 256 from the Serra do Cipó, Minas Gerais, collected in 1905.

Citations: BRAZIL: Minas Gerais: Archer & Mello Barreto 4941 [Herb. U. S. Nat. Arb. 177453] (W--2121751); A. P. Duarte 6463 (Bd--22968); Evangelista de Oliveira s.n. [Serra do Cipó, 13-VII-1940] (Be--15075, W--2123955); Hatschbach 30062 (N, Z); Mello Barreto 1044 [Brade 14481; Herb. Jard. Bot. Rio Jan. 28460] (B), 8251 (N); L. B. Smith 6841 (N, Z). MOUNTED ILLUSTRATIONS: notes & drawings by Körnicke (B).

PAEPALANTHUS MILHO-VERDENSIS Alv. Silv., Fl. Mont. 1: 131--132, pl. 82. 1928.

Synonymy: Paepalanthus milho-verdeusis Alv. Silv., Fl. Mont.

1: pl. 82, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 131--132 & 409, pl. 82. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Moldenke, Phytologia 25: 241. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 82. 1928.

This species is based on A. Silveira 755, collected "In humidis prope Milho Verde, in Serra Geral", Minas Gerais, Brazil, in June, 1925, and is deposited in the Silveira herbarium. Silveira (1928) says of it: "Species ob caulem elongatum ramosumque et alios caracteres bene distincta". It is known thus far only from the original collection.

PAEPALANTHUS MINASENSIS Moldenke, Phytolohia 3: 420--421. 1951.

Bibliography: Moldenke, Phytologia 3: 420--421. 1951; G. Taylor, Ind. Kew. Suppl. 12: 101. 1959; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

The Clausen collection cited below was collected at Caxoeira do Campo, which may also prove to be the type locality of the species.

Citations: BRAZIL: Minas Gerais: P. Clausen 208 (Br, N); M. Martens s.n. (Br--type, N--photo of type, Z--photo of type).

PAEPALANTHUS MINIMUS Alv. Silv., Fl. Mont. 1: 107--108, pl. 66. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 107--108 & 409, pl. 66. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 66. 1928.

This species is based on A. Silveira 697, collected "In campis prope Itambé, sub rupibus, locis umbrosis, ad altitudinem fere 2.000 m", Minas Gerais, Brazil, in April of 1918, and is deposited in the Silveira herbarium. Silveira (1928), on page 409 of his work, gives the type locality as "Baraunas", apparently as an amplification of his statement under the original description. He also comments that the species "A P. pullo Koern. pilis perigoniorum bractearumque acutis longisque facile distinguenda. Planta tota 6--20 mm. alta. Certe species minima in genero Paepalantho". Thus far it is known only from the original collection.

PAEPALANTHUS MINUTULUS Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 359--360. 1863.

Synonymy: Eupaepalanthus minutulus Mart. ex V. A. Pouls., Vi-

ensk. Meddel. Kjøbenh. 1888: 341. 1888. Dupatya minutula (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya minutula Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 359—360 & 507. 1863; V. A. Poulsen, Vidensk. Meddel. Kjøbenh. 1888: 341. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 157—158, 284, & 291. 1903; Alv. Silv., Arch. Jard. Bot. Rio Jan. 2: 8. 1918; Alv. Silv., Fl. Mont. 1: 111 & 410. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Alph. List Cit. 3: 731. 1949; Moldenke, Phytologia 4: 150. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, 294, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 2: 5. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 159, 166, 167, 174, & 189. 1969; Moldenke, Phytologia 20: 418. 1970; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 518 & 954. 1971.

This species is apparently based on several collections made by Carl Friedrich Philipp von Martius at Sabará [no. 920], at Congonhas do Campo, and elsewhere in Minas Gerais, Brazil, in March, 1818, deposited in the herbarium of the Botanische Staatssammlung in Munich, flowering in March and May -- one of these was photographed by Macbride as his type photograph number 18710.

The original description by Körnicke (1863) actually bases the species on more collections: "Crescit in Brasilia orientali: Princ. Neovid., Pohl et alii; in prov. Minarum prope Sabará, Congonhas do Campo et alibi, Martio et Majo: M.[artius]", but since the binomial is attributed to Martius, it seems obvious that only the Martius collections should be considered cotypes.

Other collectors have found the species flowering in January and April. Ruhland (1903) cites, in addition to the Martius collections, Glaziou 17311 & 17846 and Silveira Herb. Com. Geogr. & Geol. Minas 948, all from Minas Gerais. He credits the species to page "368" of Körnicke's work (1863), but the name does not appear on that page. Silveira (1928) cites A. Silveira 254 from the same locality as his Ruhland-cited collection.

The Mexia 5780, cited by me in 1952 and so distributed in some herbaria, is actually not P. minutulus, but is Blastocaulon rupestre (G. Gardn.) Ruhl.

Collectors have encountered Paepalanthus minutulus growing in in damp sandy places, among boulders, and on campos. Material has been misidentified and distributed in some herbaria under the names Eriocaulon bifidum Schrad. and E. tenue Kunth.

Citations: BRAZIL: Minas Gerais: Glaziou 17311 (Br); Martius 920 [Macbride photos 18710] (Mu--cotype, N--photo of cotype, W—

photo of cotype, Z--cotype), s.n. [Maio] (B--cotype); Mendes Magalhães 4347 [Herb. Jard. Bot. Belo Horiz. 45156] (N); L. B. Smith 6847 (Z). Paraíba: Coêlho de Moraes 2213 (Z), 2215a (Z). State undetermined: Herb. Braun s.n. [1834] (B, Z); J. E. Pohl s.n. (Mu).

PAEPALANTHUS MINUTUS Moldenke in Gleason & Killip, Brittonia 3: 158. 1939.

Bibliography: Moldenke in Gleason & Killip, Brittonia 3: 158. 1939; Moldenke, Known Geogr. Distrib. Erioc. 6 & 51. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 158. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64 & 210. 1949; Moldenke, Résumé 72 & 488. 1959; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 954. 1971.

Citations: VENEZUELA: Bolívar: Pannier & Schwabe s.n. [Auyantepui] (Ve); G. H. H. Tate 1328 (N--type).

PAEPALANTHUS MISER Ruhl. in Engl., Pflanzenreich 13 (4-30): 133. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 124, 133, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 410. 1928; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Renné, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Moldenke, Phytologia 29: 311. 1974.

This species is based on H. de Magalhães Gomes 1370, collected in the Serra de Ibitipoca, Minas Gerais, Brazil, in June, 1896, and deposited in the herbarium of the Botanisches Museum in Berlin. Silveira (1928) cites also an H. Gomes 232, collected at the same locality and in the same year. This may possibly be part of the type collection, as the Herb. Jard. Bot. Belo Horiz. specimen cited below may also be. The collector's full name apparently was Henrique Carlos de Magalhães Gomes and his collections are sometimes cited under one or the other of his surnames.

Ruhland (1903) says of the species: "Species cum P. Schuechiano Koern. affinis esse videtur, sed pedunculis hirtis et statura humilior diversa".

Anderson and his associates encountered P. miser in wet shady places beneath a sandstone ledge, growing with P. exiguus (Bong.) Körn., at 1000--1050 meters altitude, flowering in February, in an area of steep rocky hillsides below sandstone cliffs, a stream at the base of the hills, and recently burned cerrado between the hills.

Citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35650 (N, Z); Magalhães Gomes 1370 (B--type, Z--isotype), s.n. Herb. Jard. Bot. Belo Horiz. 29748] (N).

PAEPALANTHUS MOEDENSIS Alv. Silv., Fl. Mont. 1: 234--236, pl. 156. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 234--236 & 410, pl. 156. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W.

Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 156. 1928.

This species is based on A. Silveira 572, collected "In campis saxosis, locis siccis, in Serra do Cabral", Minas Gerais, Brazil, in May of 1910 and deposited in the Silveira herbarium. On page 410 of his work (1928), Silveira refers to the type locality as "Serra da Moeda" -- in view of the specific epithet chosen for the plant by him, this is obviously intended as a correction or, at least, amplification or emendation of the locality as given by him in the original description. Thus far the plant is known only from this original collection.

PAEPALANTHUS MOLDENKEANUS R. A. Schult., Bot. Mus. Leafl. Harvard Univ. 16: 187--188, pl. 23 & 24. 1954.

Bibliography: R. E. Schult., Bot. Mus. Leafl. Harvard Univ. 16: 187--188, pl. 23 & 24. 1954; G. Taylor, Ind. Kew. Suppl. 12: 101. 1959; Moldenke, Résumé 67 & 488. 1959; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 954. 1971.

Illustrations: R. E. Schult., Bot. Mus. Leafl. Harvard Univ. 16: pl. 23 & 24. 1954.

This species is based on Schultes & Cabrera 14351, collected on a quartzite savanna near the headwaters of the Río Kuduyarí (a tributary of Río Vaupés), Yapododá, Vaupés, Colombia, at an altitude of about 900--1000 feet, in the general location of Lat. 1°20' N., Long. 70°30' W., on October 4 or 5, 1951, and is deposited in the Gray Herbarium of Harvard University. The collectors describe the type plant as 4--6 feet tall, with white flowers. R. E. Schultes 22612 is said by the collector to be a topotype collection.

Dr. Schultes comments (1954) that "Paepalanthus Moldenkeanus is set apart from all other known species of the genus from Columbia and northern South America by its unusual size. It is a robust plant that normally reaches a height of five and a half or six feet. This extraordinary plant inhabits the immense sandstone savannahs to the north of the Colombian part of the Río Vaupés above Mitú. It has been collected at Yapobodá at the headwaters of the Río Kuduyarí and at Kañendá on the Río Kubiyú. An aeroplane reconnaissance has shown that these two savannahs are continuous. I have seen this plant, but was unable to collect it, on the great savannahs of Goo-rán-hoo-da on the Río Karurú in the upper Vaupés. The Karurú savannahs may possibly be continuous with Kañendá and Yapobodá. Paepalanthus Moldenkeanus undoubtedly represents another of the curious endemic plants which have turned up during our investigation of these ancient quartzite savannah formations in the Vaupés. Growing in close proximity to Vellozia lithophila, Bombax coriaceum, Hevea nitida var. toxicodendroides, Leitgebia colombiana and Styrax rigidifo-

lius forma yapobodensis, Paepalanthus Moldenkeanus is admirably adapted to the extreme conditions of xerophytism which obtain on these savannahs. It occurs in isolated colonies of from ten to fifty individuals in slight depressions or swales on the usually flat savannah. These swales are moist and highly acidic and are repositories of very interesting grasses and sedges, as well as xyridaceous, lentibulariaceous and eriocaulaceous species. There are a number of other species of Paepalanthus in the same localities, but all are diminutive plants." He cites also Garcia-Barriga 15088 and Schultes & Cabrera 14265, 18385, 19239, & 19975 from Vaupés. The flowers are described as "white" on Garcia-Barriga 15088, R. E. Schultes 24268, and Schultes & Cabrera 14351, but as "yellow-white" on Schultes & Cabrera 14265 & 19239.

The species has been collected at altitudes of about 265—380 meters, flowering in April and from October to December. Allen describes it as 1--1.5 meters tall.

Citations: COLOMBIA: Vaupés: P. H. Allen 3208 (E—2009962); Humbert & Schultes 27382 (P, P); R. E. Schultes 22612 (Oa), 24268 (Oa); Schultes & Cabrera 14351 (G--type, G--isotype, G--isotype), 18385 (W—2172145, W—2172146).

PAEPALANTHUS MONTANUS Alv. Silv., Fl. Mont. 1: 76—77, pl. 44. 1928 [not P. montanus (Britton) Moldenke, 1937].

Bibliography: Alv. Silv., Fl. Mont. 1: 76—77 & 410, pl. 44. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Moldenke, Phytologia 1: 333—334, 351, 354, & 361. 1939; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Moldenke, Phytologia 25: 156 & 157. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 44. 1928.

This species is based on A. Silveira 700, collected "In campis in Chapada do Couto, prope Diamantina", Minas Gerais, Brazil, in April of 1918 and is deposited in the Silveira herbarium. Thus far the species is known only from the original collection.

It should be noted that the P. montanus (Britton) Moldenke, referred to above, is a synonym of P. brittoni Moldenke.

PAEPALANTHUS MULTICOSTATUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 148--149, fig. 17. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 128, 148--149, & 291, fig. 17. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 410. 1928; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 954. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo,

ed. 1, 6: 1159 & Ind. 20. 1972.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 149, fig. 17. 1903.

This species is based on Glaziou 20532, collected on campos in the Serra da Piedade, Minas Gerais, Brazil, and deposited in the herbarium of the Botanisches Museum in Berlin. An isotype in the Copenhagen herbarium was photographed there by Macbride as his type photograph number 22289. The species has been collected in anthesis in November, and Ruhland (1903) says of it: "Species cum P. calvo adeo affinis, ut etiam varietas ejus esse possit".

Silveira (1928) cites Collector undetermined 414 from Francisco dos Campos, São Paulo, collected in 1897.

Citations: BRAZIL: Minas Gerais: Glaziou 20532 [Macbride photos 22289] (B--type, N--photo of isotype, W--photo of isotype, Z--isotype); Mello Barreto 2541 [Herb. Jard. Bot. Belo Horiz. 10680] (N).

PAEPALANTHUS MUSCOSUS Körn. in Mart., Fl. Bras. 3 (1): 348--349. 1863.

Synonymy: Dupatya muscosa (Körn.) Moldenke, Rev. Gen. Pl. 2: 746. 1891. Dupatya muscosa Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus muscosa Körn. ex Moldenke, Résumé Suppl. 3: 34, in syn. 1962. Paepalanthus muscosum Hocking, Excerpt. Bot. A.6: 455, sphalm. 1963.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 277, 348--349, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 180--181, 284, & 291. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40 & 52. 1930; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 490. 1936; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 5, 30, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Phytologia 2: 374. 1947; Moldenke, Alph. List Cit. 2: 580 (1971), 3: 664 (1949), and 4: 985, 1134, 1210, & 1215. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61, 64, 97, & 210. 1949; Moldenke, Phytologia 4: 150. 1952; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 67, 72, 114, 281, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 3: 34 (1962) and 4: 5. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Fifth Summ. 1: 118, 125, 183, & 483 (1971) and 2: 586 & 954. 1971; Moldenke, Phytologia 30: 26 & 28. 1975.

This species is based on Linden 1330, collected on the páramos near Chitayá, in the province of Pamplona, Norte de Santander, Colombia, at an altitude of 3000 meters, in March of 1843 and deposited in the herbarium of the Botanisches Museum in Berlin,

where it was photographed by Macbride as his type photograph number 10628. Ruhland (1903) says that the type was collected in April, but two labels on the specimen in the Brussels herbarium are plainly inscribed "fl. en mars".

The species has been collected at altitudes of 800--3800 meters in white sand on páramo slopes oozing water here and there, on brushy hillsides, rocky ridges, and ledges, flowering also in November. Fosberg reports the plant "densely pulvinate, with length of peduncle varying in different colonies".

Ruíz-Terán & López-Palacios describe the plant as an "Hierba psamófila y heliófila, 5--10 cm. de alto, repetidamente bifurcada. Capítulos hemisféricos, 4--5 mm. de diámetro, con escapo corto pero exserto. Flores pequeñas, blancas" and found it growing along the "orillas de la carretera", flowering in July. The report the vernacular name "avé-poh".

The Jahn 1034, distributed as P. muscosus, appears actually to be P. karstenii Ruhl., while G. H. H. Tate 382 and R. S. Williams 842 are P. karstenii var. corei Moldenke.

Citations: COLOMBIA: Norte de Santander: F. R. Fosberg 19183 (N); Linden 1330 [Macbride photos 10628] (B--type, Br--isotype, Mi--isotype, N--photo of type, N--photo of isotype, N--photo of type, W--photo of type, Z--isotype, Z--photo of isotype). VENEZUELA: Bolívar: Ruiz-Terán & López-Palacios 11217 (Z). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS MUSCOSUS var. TACHIRENSIS Moldenke, Résumé Suppl. 4: 5, nom. nud. (June 5, 1962), Phytologia 8: 392. December 10, 1962.

Synonymy: Paepalanthus muscosum var. tachirensis Moldenke ex Hocking, Excerpt. Bot. A.6: 455, sphalm. 1963.

Bibliography: Moldenke, Résumé Suppl. 4: 5. 1962; Moldenke, Phytologia 8: 392. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldebke, Biol. Abstr. 42: 1517. 1963; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 586 & 954. 1971.

López-Palacios describes this plant as "planta cespitosa ca. de 10 cm. de alto (sin tener en cuenta las flores), ramificada; hojas alternal lineales, 2--8 mm. de largo; flores blancas en cabezuelas umbeladas, axilares terminales. Pedúnculos 6--10 cm." He encountered it at 2350 meters altitude, flowering and fruiting in May.

Citations: VENEZUELA: Táchira: López-Palacios 2576 (Ft, Ld); Steyermark & Rabe 96954 (Z); Vareschi s.n. [3.10.1956] (Ve--type).

PAEPALANTHUS MYOCEPHALUS (Mart.) Körn. in Mart., Fl. Bras. 3 (1): 356--357, pl. 47, fig. 2. 1863.

Additional & emended synonymy: Eriocaulon myocephalon Mart., Flora 24, Beibl. 2: 60. 1841. Eriocaulon myocephalum Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 334. 1855. Paepalanthus myocephalus var. major Körn. in Mart., Fl. Bras. 3 (1): 357, pl. 47, fig. 2. 1863. Eriocaulon umbrosum Salzn. ex Körn. in Mart., Fl. Bras. 3 (1): 357, in syn. 1863. Eriocaulon (Paepalanthus)

myocephalum Mart. apud Körn. in Mart., Fl. Bras. 3 (1): 357, in syn. 1863. Paepalanthus myocephalus var. β Körn. in Mart., Fl. Bras. 3 (1): 499. 1863. Dupatya myocephala (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus myoccphalus Mart. ex Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya myocephala Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus myriocephalus Mart. ex Moldenke, Phytologia 4: 150, in syn. 1952. Paepalanthus myocephalus Körn. ex Moldenke, Fifth Summ. 2: 586, in syn. 1971. Eriocaulon myocephala Mart. ex Moldenke, Phytologia 25: 239, in syn. 1973.

Additional bibliography: Mart., Flora 24, Beibl. 2: 60. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 356--357, 499, & 506, pl. 47 II. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and pr. 1, 2: 402. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 29. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 132, 153, 162--163, 284, 286, 288, & 291. 1903; Alv. Silv., Fl. Mont. 1: 410. 1928; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, 37, 41, 49, & 51. 1946; Moldenke, Phytologia 2: 374 & 380. 1947; Moldenke, Alph. List Cit. 2: 355 (1948) and 3: 814 & 815. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 150. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, 290, 293, 326, & 488. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1960) and pr. 3, 2: 402. 1960; D. de A. Lima, Anais XV Congr. Soc. Bot. Bras. 353. 1964; Moldenke, Résumé Suppl. 12: 4 (1965) and 16: 6. 1968; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 507, 515, 586, & 954. 1971; Moldenke, Phytologia 25: 239 (1973) and 29: 319 & 489. 1974.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 47 II. 1863.

The original description of this species by Martius (1841) is "Affine E[riocaulon] fasciculato Lam., sed foliis latioribus, evidentius striatis, capitulis majoribus, coloris murini facile distinctu cum prioribus". Körnicke's var. major was described by him (1863) as "var. β. major: capitulis cylindraceo-ovatis; pedunculis per plures fasciculatis" and he cites as cotypes Martius 559 and J. E. Pohl 5070 from Minas Gerais, Brazil, and Luschnath 34 and Salzmann s.n. from Bahia. The Martius collection doubtless is to be regarded as the type of the species.

Recent collectors have found this plant growing in forests, on sand in cultivated fields of manioc, and on wet rocks, at 100--500 meters altitude, flowering in August and October (in addition to the months previously reported by me) and fruiting in August. Lima

(1964) refers to it as "rare". Silveira (1928) cites A. Silveira 604 from "secus margines Jequitinhonha", Minas Gerais, collected in 1912.

Material of this species has been misidentified and distributed in some herbaria under the names P. fasciculatus (Rottb.) Kunth, P. myocephalus var. minor Körn., P. myocephalus var. α Körn., and P. nigroniveus Kunth. On the other hand, the G. Gardner s.n. [1837.III], distributed as P. myocephalus, is actually best referred to var. minor Körn., while Pickel 135 seems to be a mixture of P. myocephalus and var. minor.

Ruhland (1903) ignores Körnicke's varieties and cites for the species only Blanchet s.n., Luschnath 34 & 35, Martius s.n. [in Sümpfen bei der Stadt Cachoeira], and Salzmann s.n. from Bahia, as well as Martius 559 and J. E. Pohl 5070 from Minas Gerais.

Additional & emended citations: BRAZIL: Bahia: Bierens de Haan 127 (Ut—10333); H. M. Curran 188 (W—704597); Herb. Heldreich s. n. (B); Luschnath 34 (B, E, C, S, Ut—370), 37 (Br, E); Lützelburg 188a (Mu), 188b (Mu); Murça Pires 1792 (N); Salzmann s.n. (E). Minas Gerais: Martius 559 (E--isotype, C--isotype, Mu--type). Paraíba: Coelho de Moraes 1934 (Z); J. M. Vasconcelos 428 [Herb. Esc. Agron. Nordest. 12] (Sf). Pernambuco: Pickel 135, in part (S); Tavares 822 (W--2403778), 834 (W--2403791). State undetermined: Herb. A. Gray s.n. (T). MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 47 II. 1863 (B, N, Z); notes & drawings by Körnicke (B).

PAEPALANTHUS MYOCEPHALUS var. MINOR Körn. in Mart., Fl. Bras. 3 (1): 357. 1863.

Synonymy: Paepalanthus helodes Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 357, in syn. 1863. Paepalanthus myocephalus var. α Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus myocephalus α helodes Mart. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus myocephalus var. helodes Mart. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 357. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 162 & 290. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 204. 1946; Moldenke, Known Geogr. Distrib. Erioc. 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 325, & 488. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 4 (1965) and 16: 6. 1968; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 954. 1971.

The typical form of this species has its flower-heads ovate and the peduncles usually more numerous, while in this variety the heads are mostly subglobose and the peduncles are few in number or may even be solitary per plant. The original description by Körn-

icke (1863) is "var. α. minor: capitulis semiglobosis, pedunculis paucis saepius solitariis". It is based on Blanchet s.n. and Luschnath 35 from Bahia, Brazil, deposited in the Berlin herbarium.

Paepalanthus helodes is based on Martius s.n. from "Prope oppid. Cachoeira, Oct. 1818" in the herbarium of the Botanische Staatssammlung in Munich, where it was photographed by Macbride as his type photograph number 18711.

Recent collectors have found this plant growing on wet rocks, in soaking sand, on open ground, and on riverbanks near the water's edge.

Material has been misidentified and distributed in some herbaria as typical P. myocephalus (Mart.) Körn. and as P. tortilis Mart. On the other hand, the Herb. A. Gray s.n., Luschnath 34, and Murça Pires 1792, distributed as this variety, seem better placed as typical P. myocephalus. Pickel 135 seems to be a mixture of P. myocephalus and var. minor.

Citations: BRAZIL: Amazônas: Prance, Pena, & Ramos 3367 (N, Z). Bahia: Luschnath 34 (Mu), 35 (B--cotype); Martius 333 (Mu), s.n. [X.1818] (B), s.n. [Prope oppid. Cachoeira, Oct. 1818; Macbride photos 18711] (B, Mu, N--photo, W--photo); Spruce 931 (Mu). Pernambuco: G. Gardner s.n. [III.1837] (M); Pickel 135, in part (Mi, N). Piauí: Eiten & Eiten 4524 (N).

PAEPALANTHUS MYRIOPHYLLUS Alv. Silv., Fl. Mont. 1: 147--148, pl. 93. 1928.

Synonymy: Paepalanthus myriophylus Alv. Silv., Fl. Mont. 1: pl. 93 ["XCIII"], sphalm. 1928. Paepalanthus myophyllus Alv. Silv. ex Moldenke, Known Geogr. Distrib. Erioc. 14, sphalm. 1946.

Bibliography: Alv. Silv., Fl. Mont. 1: 147--148 & 410, pl. 92 ["XCIII"]. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 326, & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 954. 1971; Moldenke, Phytologia 25: 229 & 241. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 92 ["XCIII"]. 1928.

This species is based on A. Silveira 760 from "In campis inter Serro et Datas, in Serra do Geral", Minas Gerais, Brazil, collected in June of 1925 and deposited in the Silveira herbarium. On page 410 of his work (1928), Silveira gives the type locality simply as "Serro 1925". He comments that the "Species ab affinibus foliis erectis vel ascendentibus densissimis distincta". In the text the illustration of this species is said to be on plate "XCII", but the plate so numbered is a representation of P. rhizomatosus Alv. Silv. Apparently the plate numbers have been reversed and what appears as plate "XCIII" was intended to be

"XCIII".

PAEPALANTHUS NANUS Alv. Silv., Fl. Mont. 1: 52--53, pl. 28, fig. 2. 1928.

Synonymy: Paepalanthus manus Moldenke ex Angely, Fl. Paran. 10: 12. 1957. Paepalanthus nanus Moldenke ex Angely, Fl. Paran. 10: 15. 1957.

Bibliography: Alv. Silv., Fl. Mont. 1: 52--53 & 410, pl. 28, fig. 2. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Angely, Fl. Paran. 10: 12 & 15. 1957; Moldenke, Résumé 100 & 488. 1959; Moldenke, Résumé Suppl. 6: 10. 1963; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 28, fig. 2. 1928.

This species is based on A. Silveira 699, collected "In campis in Chapada do Couto", Minas Gerais, Brazil, in April, 1918, and is deposited in the Silveira herbarium. It is known thus far only from the original collection.

PAEPALANTHUS NEGLECTUS Körn. in Mart., Fl. Bras. 3 (1): 368--369. 1863.

Synonymy: Dupatya neglecta (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya neglecta Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 368--369 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 30. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 124, 134, 222, 284, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew.., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 281, & 488. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 174 & 189. 1969; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 954. 1971; Moldenke, Phytologia 26: 194 & 255. 1973.

This species is based on an unnumbered collection by Ludwig Riedel from Bahia and one by G. H. von Langsdorff from Minas Gerais, Brazil; the latter, at least, deposited in the Berlin herbarium, the former probably in the Munich herbarium. The Langsdorff cotype was photographed at Berlin by Macbride as his type photograph number 10629.

The Ule 86, distributed as P. neglectus, is actually P. catharinae Ruhl.

Citations: BRAZIL: Bahia: Blanchet 463 (P). Minas Gerais: Langsdorff s.n. [Macbride photos 10629] (B--cotype, N--photo of

cotype, N--photo of cotype, W--photo of cotype, Z--cotype).

PAEPALANTHUS NEOCALDENSIS Moldenke, Known Geogr. Distrib. Erioc. 46, hyponym (February 9, 1946); Phytologia 2: 140. July 8, 1946.

Synonymy: Paepalanthus caldensis Alv. Silv., Fl. Mont. 1: 186--187, pl. 120. 1928 [not P. caldensis Malme, 1901].

Bibliography: Alv. Silv., Fl. Mont. 1: 186--187 & 403, pl. 120. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 475. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 46, & 51. 1946; Moldenke, Phytologia 2: 140. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 150--151. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 100, 323, & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 578 & 954. 1971; Moldenke, Phytologia 25: 165. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 120. 1928.

This species is apparently based on two collections: (1) A. Silveira 729 from "In humidis prope Poços de Caldas", Minas Gerais, collected in April of 1922, and (2) Toledo s.n. from somewhere in São Paulo, Brazil, collected in 1913 and deposited as number 727 in the Silveira herbarium.

Silveira (1928) comments that the "Species a P. stricto Koern. bracteis involucrantibus lanceolatis glabrisque praecipue differt".

Worsdell (1941) equates P. caldensis Alv. Silv. with P. caldensis Malme, but from the published description and illustration this disposition is manifestly impossible.

Citations: BRAZIL: Minas Gerais: Schwacke 7246 (N, S).

PAEPALANTHUS NEOPULVINATUS Moldenke, Known Geogr. Distrib. Erioc. 53, hyponym (February 9, 1946); Phytologia 2: 140. July 8, 1946.

Synonymy: Paepalanthus pulvinatus Alv. Silv., Fl. Mont. 1: 37--39, pl. 18. 1928 [not P. pulvinatus N. E. Br., 1902].

Bibliography: Alv. Silv., Fl. Mont. 1: 37--39 & 412, pl. 18. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15, 51, 53, & 61. 1946; Moldenke, Phytologia 2: 140 (1946) and 2: 374. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 151. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 100, 327, & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 589 & 954. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 18. 1928.

This species is based on A. Silveira 501 from "In campis arenosis prope urbem Diamantina", Minas Gerais, Brazil, collected in April, 1908, and deposited in the Silveira herbarium. Silveira (1928) says of it: "Species ad P. dichromolepidum Alv. Silv.

proxime accedit; perigoniorum bractearumque pilis et bractearum involucrantium colore bene distincta".

It is known thus far only from the original collection.

PAEPALANTHUS NIGRESCENS Alv. Silv., Fl. Serr. Min. 62, pl. 23. 1908.

Synonymy: Paepalanthus nigregens Alv. Silv., Fl. Mont. 1: 266, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Serr. Min. 62, pl. 23. 1908; Alv. Silv., Fl. Mont. 1: 266--268 & 410, pl. 177. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 151. 1952; Moldenke, Résumé 100, 326, & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 954. 1971; Moldenke, Phytologia 25: 241. 1973.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 23. 1908; Alv. Silv., Fl. Mont. 1: pl. 177. 1928.

This species is based on A. Silveira 355, collected "In pratis humidis prope Capão Redondo in Serra do Cipó", Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. The species is known thus far only from the original collection.

Citations: BRAZIL: Minas Gerais: A. Silveira 355 (B--isotype, Z--isotype).

PAEPALANTHUS NIGRESCENS var. PILOSUS Alv. Silv., Fl. Serr. Min. 63 [as "pilosa"]. 1908.

Synonymy: Paepalanthus nigrescens var. pilosa Alv. Silv., Fl. Serr. Min. 63. 1908. Paepalanthus nigregens var. pilosa Alv. Silv., Fl. Mont. 1: 268. 1928.

Bibliography: Alv. Silv., Fl. Serr. Min. 63. 1908; Alv. Silv., Fl. Mont. 1: 268 & 410. 1928; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 326, & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 586 & 955. 1971; Moldenke, Phytologia 25: 241. 1973.

This variety is based on A. Silveira 356, collected "In campis humidis in Serra do Cipó", Minas Gerais, Brazil, in April, 1905, and deposited in the Silveira herbarium. The author differentiates it as follows: "Folia minora utrinque plus minusve pilosa, margine pilis brevibus cum aliis longis intermixtis instructa. Pedunculi saepe teretes." It is thus far known only from the original collection.

PAEPALANTHUS NIGRICANS Alv. Silv., Fl. Mont. 1: 89--91, pl. 54, fig. 2. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 89--91 & 410, pl. 54, fig. 2. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond.

Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 54, fig. 2. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 698) "In campis sub rupibus prope Barauna", Minas Gerais, Brazil, in April, 1918, and is deposited in the Silveira herbarium. On page 410 of his work (1928) Silveira cites the type locality as "Baraunas". He comments that the species "A P. atro-vaginato Ruhl. differt pedunculis pubescentes, forma bractearum involucrantium et aliis characteribus."

The species is known thus far only from the original collection.

PAEPALANTHUS NIGRICAULIS Alv. Silv., Fl. Mont. 1: 88--89, pl. 53. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 88--89 & 410, pl. 53. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476--477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971; Moldenke, Phytologia 26: 250 (1973) and 29: 387. 1974.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 53. 1928.

This species is based on A. Silveira 764 from "In campis argillosis inter Sérro et Datas, et prope Baraunas, in Serra Geral", Minas Gerais, Brazil, collected in June, 1925, and deposited in the Silveira herbarium. On page 410 of his work (1928) Silveira cites only "Datas" as the type locality, but is seems clear that the species is actually based on two collections distributed under the same number.

Material of this species has been misidentified and distributed in some herbaria as P. desperado Ruhl. and P. foliosus Körn.

Citations: BRAZIL: Minas Gerais: Mello Barreto 5301 [Herb. Jard. Bot. Belo Horiz. 17587] (N).

PAEPALANTHUS NIGRIFLORUS Alv. Silv., Fl. Mont. 1: 25--27, pl. 10. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 25--27 & 410. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 10. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 808) "In campis siccis arenosisque inter Itacambira et Juramento", Minas Gerais, Brazil, in July, 1926, and is depos-

ited in the Silveira herbarium. On page 410 of his work (1928) Silveira cites "Itacambira" as the type locality. He comments that the "Capitula in speciminibus suppetentibus valde vetera erant". The species is known thus far only from the original collection.

PAEPALANTHUS NIVEO-NIGER Alv. Silv., Fl. Mont. 1: 246--247, pl. 164. 1928.

Synonymy: Paepalanthus niveoniger Alv. Silv. apud Worsdell, Ind. Lond. Suppl. 2: 183. 1941.

Bibliography: Alv. Silv., Fl. Mont. 1: 246--247 & 410, pl. 164. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 164. 1928.

This species is based on A. Silveira 692 from "In campis arenosis prope Barauna", Minas Gerais, Brazil, collected in April, 1918, and deposited in the Silveira herbarium. On a later page in his original work (1928) Silveira cites the type locality as "Barraunas". The species is known thus far only from the original collection.

PAEPALANTHUS NODIFER Alv. Silv., Fl. Mont. 1: 212--213, pl. 141. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 212--213 & 410, pl. 141. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 141. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 684) "In campis arenosis in Chapada do Couto", Minas Gerais, Brazil, in April, 1918, and is deposited in the herbarium of the collector. Thus far the species is known only from the original collection.

PAEPALANTHUS NUDUS Alv. Silv., Fl. Mont. 1: 215--217, pl. 143. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 215--217 & 410, pl. 143. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Mendes Magalhaes, Anais V Reun. Anual Soc. Bot. Bras. 276--277. 1956; Moldenke, Résumé 100 & 488. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Summ. 1: 164

(1971) and 2: 955. 1971; Moldenke, Phytologia 25: 162 (1973) and 26: 249 & 259. 1973.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 143. 1928.

This species is based on A. Silveira 487, collected "In campis prope Diamantina", Minas Gerais, Brazil, in April of 1908 and is deposited in the Silveira herbarium. Silveira (1928) comments that "A speciebus caule perbreve et ramis simplicibus pedunculiferisque (non sterilibus) instructis differt praecipue foliis ramorum deciduis et ramis rigidioribus". It is certainly very closely similar to P. denudatus Körn. and P. divaricatus (Bong.) Kunth.

Irwin and his associates describe P. nudus as a "shrub to 1.5 m. tall, fruit green, pendent", but this must surely be a case of mislabeling or mixed labels. The plant has been found growing at altitudes of 900--1200 meters, flowering in January and September.

Citations: BRAZIL: Goiás: Irwin, Onishi, Fonsêca, Souza, Reis dos Santos, & Ramos 25356 (Z). Minas Gerais: Hatschbach 27383 (Ft, S); Mello Barreto 9371 [Herb. Jard. Bot. Belo Horiz. 25231] (N), 9474 (N).

PAEPALANTHUS OBCONICUS Alv. Silv., Fl. Mont. 1: 111--112, pl. 69. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 111--112 & 410, pl. 69. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 69. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 693) "In campis secus margines fluminis Jaquitinhonha", Minas Gerais, Brazil, in July of 1918 and is deposited in the Silveira herbarium. Thus far the species is known only from the original collection.

PAEPALANTHUS OBTUSIFOLIUS (Steud.) Körn. in Mart., Fl. Bras. 3 (1): 353--354. 1863.

Synonymy: Eriocaulon obtusifolium Steud., Syn. Pl. Glum. 2: [Cyp.] 277--278. 1855. Paepalanthus obtusifolius Körn. in Mart., Fl. Bras. 3 (1): 353. 1863. Dupatya obtusifolia (Steud.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya obtusifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 277--278 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 298, 353--354, & 507. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 26. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and pr. 1, 2: 402. 1894; Huber, Bol. Mus. Para. 2: 500. 1898; Durand & Jacks., Ind.

Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 223, 284, 286, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, 38, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 281, 290, & 488. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 508, 587, & 955. 1971.

This species is apparently based on a specimen collected by Moïse Etienne Moricand somewhere in Bahia, Brazil. Ruhland (1903) comments that the "Specimen originarium nec a me nec a cl. Koernicke visum. Hic plantam a Blanchet in Bahia sub numero 3584 collectam huc ducit. quam ego quidem P. tortilem esse censeo. Dubium restat, utrum planta Blanchetiana revera ad speciem Steudelianam pertineat et utrum P. obtusifolius omnino a P. tortilis saepe in provincia Bahia collecta est. Structura validior et folia laticra, quibus cl. Koernicke a P. tortili differre eam dicit, nota variabilissima etiam P. tortilis sunt." He cites only a Herb. Moricand s.n. from Bahia, which is also what Steudel (1855) cites as the type of the species. Blanchet 3584 in the Brussels herbarium was annotated as P. tortilis by Ruhland and the same collection was photographed in the Copenhagen herbarium by Macbride as his type photograph number 22292, but it appears not to be the type collection of P. obtusifolius nor of anything else.

Paepalanthus obtusifolius appears to be known thus far only from the original collection.

PAEPALANTHUS OCHROCEPHALUS Körn. in Mart., Fl. Bras. 3 (1): 329—330. 1863.

Synonymy: Dupatya ochrocephala (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya ochrocephala Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 299, 329—330, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 190, 194--195, 284, & 291. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 52. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158. 1969; Moldenke, Fifth Summ.

1: 164 & 483 (1971) and 2: 955. 1971.

This species seems to be based on Blanchet 959, although Körnicke was in doubt as to whether or not Blanchet really was the collector ["Crescit in Serra Jacobina: hb. Zuccarini sub n. 959., an Blanchet?"] and the label for Macbride's type photograph number 18712 of an isotype in the Munich herbarium is inscribed "Pohl 959". His photograph number 29993, of an isotype in the Vienna herbarium, is inscribed "Blanchet 959". Ruhland (1903) cites the type as follows: "Brasilien: Prov. Bahia; Serra Jacobina (Blanchet ? in Herb. Zuccarini, sub n. 959 u im Herb. Wien Coll. Reichenb. f. no. 270108). Nota. Specimen modo unum Vindobonianum vidi. Propterea hic diagnosis Koernickeana cum adjumentis nonnullis reiterata. Radices, caulis, folia caulina in specimine manco originario deerant."

Citations: BRAZIL: Bahia: Blanchet [or J. E. Pohl] 959 [Macbride photos 18712 & 29993] (B--isotype, Mu--isotype, N--photo of isotype, N--photo of isotype, N--photo of isotype, W--photo of isotype, W--photo of isotype, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS OCREATUS Alv. Silv., Fl. Mont. 1: 165--166, pl. 105. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 165--167 & 410, pl. 105. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 164 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 105. 1928.

This species is based on A. Silveira 829, collected "In campis prope Itacambira", Minas Gerais, Brazil, in July, 1926, and is deposited in the Silveira herbarium. Silveira (1928) comments that the "Species propter ocreas certe notabilis". It is known thus far only from the type collection.

PAEPALANTHUS OERSTEDIANUS Körn. in Mart., Fl. Bras. 3 (1): 374--375. 1863.

Synonymy: Paepalanthus oerstedtianus Körn. in Mart., Fl. Bras. 3 (1): 506. 1863. Eupaepalanthus oerstedianus Körn. ex V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 327. 1888. Dupatya oerstediana (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya oerstediana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 374--375 & 506. 1863; V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 327. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 125, 137, 233, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 82.

1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Alph. List Cit. 4: 1301. 1949; Moldenke, Phytologia 4: 151. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, 294, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 163, 174, & 189. 1969; Moldenke, Fifth Summ. 1: 164 & 483 (1971) and 2: 518, 587, & 955. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

This species is based on Lund s.n. from wet places in the Serra do Mar, Rio de Janeiro, and L. Riedel 1777 from damp places between Santos and São Paulo in the Serra de Cubatão, São Paulo, Brazil, the latter deposited in the Berlin herbarium. Macbride photographed the Riedel collection in the Munich herbarium as his type photograph number 18713. Ruhland (1903) adds Burchell 1777 to his citations with the comment that it is from "an einem nicht näher bezeichneten Standort", but this collection was actually also made in the Serra de Cubatão in São Paulo.

Ruhland (1903) comments that the "Capitulis ochraceis magnitudine intermedia statim dignoscitur. Sequenti [P. schomburgkii Klotzsch] haud dissimilis". The species has been collected in anthesis in December.

Additional citations: BRAZIL: São Paulo: Burchell 3711 (T); Pabst 5795 [E. Pereira 5968] (Bd--21963); L. Riedel 1777 [Macbride photos 18713] (B--cotype, Mu--cotype, N--photo of cotype, S--cotype, Ut--371--cotype, W--photo of cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS OLIGOCEPHALUS Körn. in Mart., Fl. Bras. 3 (1): 402--403. 1863.

Synonymy: Dupatya oligocephala (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya oligocephala Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 402--403, 405, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 205, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 240. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 5, 30, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 68, 281, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Phytologia 20: 414. 1970; Moldenke, Fifth Summ. 1: 118 & 483 (1971) and 2: 955. 1971.

This species is based on Linden 1314 from rocky places at Lui-

tama, at an altitude of 2200 meters, in Tunja province, Boyacá, Colombia, deposited in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva, where it was photographed by Macbride as his type photograph number 25172. More recent collectors have found the plant growing with Hypericum and Espeletia glandulosa on slopes at 3250 meters altitude, flowering in May.

Citations: COLOMBIA: Boyacá: Barclay & Juajibioy 7670 (N); Linden 1314 [Macbride photos 25172] (B--isotype, N--photo of type, N--photo of type, W--photo of type). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS OLIVEIRAE Ruhl. in Engl., Pflanzenreich 13 (4-30): 196--197. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 190, 196--197, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

The type of this species was collected by Pedro Luis de Oliveira -- in whose honor it was named -- in the Serra do Cipó, Minas Gerais, Brazil, in September of 1896 and is number 12556 in the Schwacke herbarium, deposited in the herbarium of the Botanisches Museum in Berlin.

The species is known thus far only from the original collection and Ruhland (1903) says of it: "Species pedunculorum et praesertim foliorum indumento valde insignis, ex affinitate P. foliosi et ithyphylli."

Citations: BRAZIL: Minas Gerais: P. J. Oliveira s.n. [Herb. Schwacke 12556] (B--type).

PAEPALANTHUS ORTHOBLEPHARUS Alv. Silv., Fl. Mont. 1: 62--63, pl. 35. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 62--63 & 410, pl. 35. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 35. 1928.

The type of this species was collected by Henrique Carlos de Magalhães Gomes "In campis arenosis" in the Serra de Ibitipoca, Minas Gerais, Brazil, in June of 1896, and is number 559 in the Silveira herbarium. The species is known thus far only from the original collection and Silveira (1928) comments that it is "Ab affinibus P. eriophaeo Ruhl., P. Henriquei Ruhl. et alteribus indumento foliorum facile distinguitur".

PAEPALANTHUS ORTHOGONALIS Alv. Silv., Fl. Mont. 1: 85--86, pl. 51. 1928.

Synonymy: Paepalanthus orthogonolis Alv. Silv., Fl. Mont. 1: pl. 51, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 85--86 & 410, pl. 51. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 51. 1946; Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 327, & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 587 & 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 51. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 765) "In campis arenosis prope Baraunas, in Serra Geral", Minas Gerais, Brazil, in June of 1925 and is deposited in the Silveira herbarium. On page 410 of his work (1928) Silveira cites an A. Silveira 735 from the same locality and also collected in 1925; whether this is a second collection or is a misprint or even a correction of the number given on page 86 is not clear.

PAEPALANTHUS OVATUS Körn. in Mart., Fl. Bras. 3 (1): 367--368. 1863.

Synonymy: Paepalanthus macaheensis Körn., Vidensk. Meddel. Kjøbenh. 1871: 311. 1871. Dupatya ovata (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya ovata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus macahensis Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 367--368 & 506. 1863; Körn., Vidensk. Meddel. Kjøbenh. 1871: 311. 1871; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 124, 125, 131, 139, 140, 284, 290, & 291. 1903; Lützelburg, Estud. Bot. Nordést. 3: 148 & 150. 1923; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 46. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 13, 14, 30, 50, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 85, 86, & 210. 1949; Moldenke, Phytologia 4: 149 & 151. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 99, 100, 281, & 488. 1959; Moldenke, Résumé Suppl. 1: 6, 21, & 26. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 165 & 483 (1971) and 2: 585 & 955. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159, map 1779, & Ind. 20. 1972.

The type of this species was collected by George Gardner (no. 5901) in the Serra dos Orgãos, Rio de Janeiro, Brazil, while the type of P. macaheensis is Glaziou 4284 from "im Urwald", Alto Macahé, Rio de Janeiro, flowering in March. Ruhland (1903) also

cites Glaziou 4282 from Rio de Janeiro for P. macaheensis For P. ovatus he cites Glaziou 4281 from Rio de Janeiro and 17336 from Minas Gerais. Ruhland furthermore states that P. ovatus is closely related to P. elongatulus Ruhl., differing from it in leaf size and indumentum.

Paepalanthus ovatus has flowers described as "white" and has been found growing on moist granite rocks, in soil in shallow cracks and pockets on bareface rocks, and (by my wife and myself) in shade under huge rocks on a windswept mountain summit. It has been collected at altitudes of 2000 to 2150 meters, flowering in January, March, April, September, October, and December.

The Glaziou 4282 collection cited below bears a label inscribed "N. sp.", but is actually not the type collection of either name involved here, even though Macbride photographed the Berlin sheet as his type photograph number 10624. He also photographed the Berlin sheet of Glaziou 4281 as his type photograph number 10630, but it is not a type collection either.

Material of P. ovatus has been misidentified and distributed in some herbaria under the names P. jahnii Ruhl. and P. uleanus Ruhl. The latter is, indeed, quite similar in habit but may be distinguished at once by its long-acuminate bractlets.

Additional citations: BRAZIL: Minas Gerais: Castellanos 22776 [Herb. Cent. Pesq. Florest. 663] (Z); Glaziou 17836 (B). Rio de Janeiro: Brade 9938 (Ja--22406), 11484 (Ja--26713), 11485 (Ja--26714); Eiten & Eiten 7150 (Ld, W--2688310); G. Gardner 5901 (B--isotype, S--isotype); Glaziou 4281 [Macbride photos 10630] (B, N--photo, N--photo, W--photo), 4282 [Macbride photos 10624] (B, N, N, N--photo, N--photo, W--photo), 16394 (P, P); Lützelburg 6584 (N), 6606 (Mu); Moldenke & Moldenke 19613 (Mg, N, No, Ot, Pn, Sm, Vi). São Paulo: Lutz & Lutz 225, in part [Herb. Lutz 1217, in part] (Ja). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS OXYPHYLLUS Körn. in Mart., Fl. Bras. 3 (1): 313. 1863.

Synonymy: Dupatya oxyphylla (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya oxyphylla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 313, 314, & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 166, 284, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, & 488. 1959; Jacks.

in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 165 & 483 (1971) and 2: 955. 1971.

The type of this species was collected by Hugh Algernon Weddell (no. 1919) somewhere in Minas Gerais, Brazil, and is probably deposited in the Munich herbarium. Macbride photographed Weddell 1910 in the Delessert Herbarium at Geneva as his type photograph number 25173, but this number does not appear to be the type collection of anything unless one assumes that both Körnicke (1863) and Ruhland (1903) were in error in citing the type number as "1919".

Citations: BRAZIL: Minas Gerais: Weddell 1910 [Macbride photos 25173] (N--photo, W--photo).

PAEPALANTHUS OYAPOCKENSIS Herzog in Fedde, Repert. Spec. Nov. 29: 206--208, pl. 12, fig. f--k. 1931.

Synonymy: Paepalanthus (Eupaepalanthus) oyapockensis Herzog apud Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 20. 1939.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 206--208, pl. 12, fig. f--k. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 20. 1939; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 455. 1941; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 151. 1952; Moldenke, Résumé 100 & 488. 1959; Moldenke, Résumé Suppl. 12: 3 & 4. 1965; Moldenke, Fifth Summ. 1: 132 & 165 (1971) and 2: 955. 1971; Moldenke, Phytologia 25: 241 (1973) and 30: 37. 1975.

Illustrations: Herzog in Fedde, Repert. Spec. Nov. 29: pl. 12, fig. f--k. 1931.

This species is based on Lützelburg 20225 [erroneously cited as "21225" by Herzog], collected on moist or wet gneiss at Roche Monpere, on the Rio Oyapock, Pará, Brazil, and deposited in the Munich herbarium where it was photographed by Macbride as his type photograph number 18714.

The plant has been described by recent collectors as an herb with black involucres and white flowers, and has been collected on moist open granite in sunlight, on granite rock on forested hillsides, and among loose rocks in soil-filled depressions on large granitic outcrops where it is said to be "locally common", at altitudes of 450--500 meters, flowering in May, August, and September.

The W. A. Egler 47650, cited below, is a mixture with Syngonanthus glandulosus Gleason, while Irwin, Prance, Soderstrom, & Holmgren 55312 is a mixture with S. caulescens (Poir.) Ruhl.

Herzog (1931) comments that "Unsere neue Art dürfte mit P. subcaulescens N. E. Br. zunächst verwandt sein, unterscheidet sich aber neben den Massen (längere Schäfte schmälere Blätter) durch die Stachelspitzigen Blätter, die 3-rippigen Schäfte, spitze Hüllbrakteen, lineare Stützbrakteen and schmälere Sepala.

Die Köpfchen enthalten neben den weit überwiegenden ♂ Blüten nur wenige ♀ Blüten, daneben zuweilen sterile Bl. missbildungen. Die Anordnung der Haare auf den Brakteenspitzen ist schöpfig bis fast horizontal-strahlig; die Haarkränze legen sich schirmförmig in die Lücken zwischen den Blüten und kreuzen sich mit den Haarschöpfen der Kelchblätter. Der Hüllblattdiskus ist an seiner Ansatzstelle am Stiel behaart. Verwandschaftliche Beziehungen dürften noch bestehen zu P. densifolius Alv. Silv."

Material of this species has been misidentified and distributed in some herbaria as P. lamarckii Kunth and P. subtilis Miq.

Citations: SURINAM: Irwin, Prance, Soderstrom, & Holmgren 55312, in part (N, N, N, N); Wessels Boer 1460 (N). BRAZIL: Amapá: W. A. Egler 47650 (N). Pará: Lützelburg 20225 [Macbride photos 18714] (Mu--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype), 21249 (Mu).

PAEPALANTHUS PALLIDUS Alv. Silv., Fl. Serr. Min. 44, pl. 15. 1908.

Bibliography: Alv. Silv., Fl. Serr. Min. 44, pl. 15. 1908; Alv. Silv., Fl. Mont. 1: 100--102 & 410, pl. 33. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Alph. List Cit. 1: 127 (1946) and 2: 412 & 490. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 151. 1952; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 15. 1908; Alv. Silv., Fl. Mont. 1: pl. 33. 1928.

The type of this species was collected by Dr. J. C. da Costa Sena (no. 458) "In aridis saxi ferruginosi 'canga manganezifera' dicta, locid abruptis, prope Manso in vicinia urbis Ouro Preto", Minas Gerais, Brazil, in December, 1906, and is deposited in the Silveira herbarium. In his 1928 work, Silveira gives the type locality as "Rio Manso" and comments that the "Species P. decipienti Ruhl, proxima esse videctur [sic], sed caules non perbrevibus, foliis basi longissime ciliatis, vaginis quam folia brevioribus, bracteis flores stipantibus valde latis et petalis florum femineorum angustis sub-spathulatisque differt".

Recent collectors describe the plant as a delicate herb, with white flower-heads, and have found it growing in shaded crevices behind small waterfalls, on creek margins and adjacent rocky campo with sandstone and quartz outcrops, in soil-filled cracks of outcrops in areas of high campo slopes, outcrops, and creek margins, and in sandy soil on top of rocks in areas of sandstone and adjacent meadows with both sandy soil and overlying humus, at altitudes of 1200--1700 meters, flowering and fruiting in February.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber,

& Kirkbride 35819 (Ld, N); Costa Serra 458 [Herb. Marie-Victorin 15840] (B--isotype, N--photo of isotype, Z--isotype); Irwin, Maxwell & Wasshausen 20247 (Ld), 20747 (Z); Mello Barreto 4783 [Herb. U. S. Nat. Arb. 236400; Herb. Jard. Bot. Belo Horiz. 17505] (W--2121721).

PAEPALANTHUS PARALLELINERVIUS Alv. Silv., Fl. Mont. 1: 65--66, pl. 37. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 65--66 & 410, pl. 37. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl, 37. 1928.

The type of this species was collected by Alvaro Adolpho da Silveira (no. 702) "In campis in Chapada do Couto, prope Diamantina", Minas Gerais, Brazil, in April of 1918 and is deposited in the Silveira herbarium. Thus far the species is known only from the original collection.

"PAEPALANTHUS PARAMENSIS Körn." in Mart., Fl. Bras. 3 (1): 299, in textu, nom. nud. 1863.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 299. 1863; Moldenke, Fifth Summ, 1: 375 (1971) and 2: 955 & 966. 1971.

Nothing is known about what taxon Körnicke had in mind when he said "Denique Paepalanthi Paramensis Kcke. et dendroides Kth. pili, quamquam tuberculati". The binomial is obviously a nomen nudum, not listed in the index to Körnicke's work nor in the "Index Kewensis" or any of its supplements. It therefore cannot invalidate the use of the same binomial for the following taxon.

PAEPALANTHUS PARAMENSIS Moldenke, Bull. Torrey Bot. Club 68: 69. 1940 [not P. paramensis Körn., 1863, nom. nud.].

Bibliography: Moldenke, Bull. Torrey Bot. Club 68: 69. 1940; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Known Geogr. Distrib. Erioc. 5 & 52. 1946; Moldenke, Alph. List Cit. 1: 94 & 133 (1946), 2: 611 (1948), and 4: 1060 & 1078. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 210. 1949; Moldenke, Phytologia 4: 151--152. 1952; Anon., U. S. Dept. Agr. Bot. Subj. Ind. 5: 4227. 1958; Moldenke, Résumé 68 & 488. 1959; Moldenke, Résumé Suppl. 7: 4 & 5. 1963; Moldenke, Fifth Summ. 1: 118 & 142 (1971) and 2: 955. 1971.

This species is based on Killip & Smith 20622 from the Páramo del Hatico, at an altitude of 2900 meters, en route from Toledo to Pamplona, Norte de Santander, Colombia, collected on March 12 or 13, 1927, and deposited in the United States National Herbarium at Washington.

The use of the accepted specific epithet for this taxon is not

precluded by the "Paepalanthus paramensis" of Körnicke (1863), see above, because the latter is a simple nomen nudum, but had I known of Körnicke's name in 1940 I would certainly not have adopted the same one for the present species.

It should also be noted here that the original publication of this binomial was on December 31, 1940, in spite of the fact that the cover of the issue of the Bulletin of the Torrey Botanical Club in which it appears is dated "1941".

Recent collectors have encountered P. paramensis "in bogs with deep humic soil", on páramos, and in seepages, at altitudes of 2900--3600 meters, flowering and fruiting in July and August. Wurdack describes it as "occasional, heads white".

The Cuatrecasas collection cited below is from Alto del Páramo de la Rusia and this could place it in either the departments of Boyacá or Cundinamarca, Colombia.

Additional citations: Boyacá: Langenheim 3408 (W--2266620). Cundinamarca: Cuatrecasas 10417 (N). Santander: Barkley & Mullen 38C144 (Z). PERU: Amazonas: Wurdack 1296 (N, W--2403681).

PAEPALANTHUS PARVIFOLIUS Alv. Silv., Fl. Mont. 1: 91--92, pl. 55 (1). 1928.

Synonymy: Paepalanthus paucifolius Alv. Silv., Fl. Mont. 1: pl. 54 (1). 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 91—92 & 410, pl. 54 (1) & 55 (1). 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Phytologia 2: 374 & 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 327, & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 587 & 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 54 (1) & 55 (1). 1928.

The type of this species was collected by Dr. Pedro Luiz de Oliveira "In campis arenosis in serra do Cipó", Minas Gerais, Brazil, in August, 1916, and is deposited as no. 640 in the Silveira herbarium. Thus far the species is known only from the original collection.

PAEPALANTHUS PARVUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 154. 1903.

Synonymy: Eriocaulon arenarium Mart. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 154, in syn. 1903 [not E. arenarium Gardn., 1842, nor Gardn. & Hook., 1855, nor Hook., 1855, nor Salzm., 1850].

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 154, 284, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 411. 1928; Moldenke, Known Geogr. Distrib Erioc. 14, 32, & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100, 285, &

488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

The type of this species was collected by Philipp Salzmann somewhere in Bahia, Brazil, and is deposited in the herbarium of the Botanisches Museum in Berlin. This specimen is also the type of Eriocaulon arenarium Mart., a binomial which was never validly published. The type specimen does not bear the name of the collector, but from evidence in the Missouri Botanical Garden herbarium it seems plain that Salzmann was indeed the collector. Ruhland (1903) says simply "Brasilien: Bahia, ohne Angabe von Standort oder Sammler (Herb. Th. Bernhardi s.n. in herb. Berol. unter der Bezeichnung 'Eriocaulon arenarium Mart.')....Species proxime ad P. bifidum Kunth accedit, sed primo intuitu jam forma et colore bractearum involucrantium et stipantium, nec non perigoniis floris ♀ differt".

Silveira (1928) cites a Collector undetermined 833 from Pernambuco, collected in 1906.

The Eriocaulon arenarium credited to Gardner, to Gardner & Hooker, and to Hooker is the name-bringing synonym of Syngonanthus arenarius (G. Gardn.) Ruhl., while that of Salzmann is said to be P. subtilis Miq., but I wonder if it does not actually belong here instead as a synonym of P. parvus.

Citations: BRAZIL: Bahia: Salzmann s.n. [Herb. Bernhardi] (B--type, E--isotype, E--photo of isotype, F--photo of isotype, N--isotype, N--photo of isotype, Z--photo of isotype). Pernambuco: Ridley, Lea, & Ramage s.n. [1887] (S).

PAEPALANTHUS PAUCIFLORUS Körn. in Mart., Fl. Bras. 3 (1): 398--399. 1863.

Synonymy: Dupatya pauciflora (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya pauciflora Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 377, 398--399, 402, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 3 (1): 201, 202, 205, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 411. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 100, 281, & 488. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 165, 483, & 484 (1971) and 2: 955. 1971; Moldenke, Phytologia 26: 138 & 239. 1973.

The type of this species was collected by Peter Clausen somewhere in Minas Gerais, Brazil, in 1840, and is deposited in the herbarium of the Botanisches Museum in Berlin. Ruhland (1903) suggests that P. corymboides Ruhl. may actually be only a subspecies of P. pauciflorus.

Silveira (1928) cites A. Silveira 410 from the Serra da Piedade, Minas Gerais, collected in 1906.

The original Clausen collection has been misidentified and distributed in some herbaria under the name Eriocaulon tuberosum Bong.

Recent collectors describe P. pauciflorus as an acaulescent herb, the inflorescences to 25 cm. tall, and the flower-heads light-gray, and have found it growing on steep rocky slopes at 1750 meters altitude, flowering and fruiting in February.

The collection by Irwin and his associates, cited below, seems to represent this species since it matches the type collection very well, but there are numerous closely related species which even Ruhland, in his fine monograph, was not able to key out satisfactorily. Paepalanthus villosulus Mart. has much shorter scapes, P. laxifolius Körn. has a greatly elongated and uniformly spreading-foliose stem, P. spixianus Mart., P. corymbosus (Bong.) Kunth, P. corymboides Ruhl., P. hydra Ruhl., and P. melaleucus (Bong.) Kunth all seem to be much more diminutive plants, P. trichopetalus Körn. has very densely villous involucral bracts, P. cacuminis Ruhl. has very much shorter leaves, P. vellozioides Körn. has very decidedly cuspidate-subspinulose-tipped bracts, and P. lanceolatus Körn. has long-acuminate bracts and lanceolate leaves, P. tuberosus (Bong.) Kunth is said to grow from tubers, while of P. rigidulus Mart. I have seen no material.

Citations: BRAZIL: Minas Gerais: P. Clausen s.n. [Aug.-April 1840] (Br--isotype, N--isotype); Irwin, Maxwell, & Wasshausen 19619 (Ld, N, W--2598330).

PAEPALANTHUS PAUCIFLORUS var. GLAZIOVII Ruhl. in Mart., Fl. Bras. 3 (1): 202. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 202 & 291. 1903; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

This variety is said by Ruhland (1903) "Differt a forma typica sepalis et petalis floris feminei multo latioribus, sepalis floris masculi atque bracteis involucrantibus fuscis" and is based on Glaziou 20533 and Schwacke 9744, both collected in the Serra da Piedade, Minas Gerais, Brazil, flowering in November, and deposited in the Berlin herbarium, where the Schwacke cotype was photographed by Macbride as his type photograph number 10631.

The variety is known thus far only from the original collections.

Citations: BRAZIL: Minas Gerais: Schwacke 9744 [Macbride photos 10631] (N--cotype, N--photo of cotype, W--photo of cotype).

PAEPALANTHUS PAULENSIS Ruhl. in Engl., Pflanzenreich 13 (4-30): 211. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 211, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 20. 1972.

The type of this species was collected by Carl August Wilhelm Schwacke (no. 1936) in the Serra da Bocayna, São Paulo, Brazil, in September, 1879, and is deposited in the Berlin herbarium where it was photographed by Macbride as his type photograph number 10632.

Ruhland (1903) notes that the "Species cum P. consanguineo, planifolio, puberulo, batocephalo valde affinis, sed foliis basi fere non tenui-marginatis vaginis laxis, pedunculis planis non tortis insignis. Tamen valde dubium, anne melius varietas P. planifolii habenda sit".

Thus far it is known only from the original collection.

Citations: BRAZIL: São Paulo: Schwacke 1936 [Macbride photos 10632] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS PAULINUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 215--216. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 213, 215--216, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 263. 1928; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971; Moldenke, Phytologia 26: 232. 1973.

This species is based on Sena s.n. [Herb. Schwacke 14550] from the Serra do Cipó, Minas Gerais, Brazil, flowering in June, deposited in the herbarium of the Botanisches Museum in Berlin, where it was photographed by Macbride as his type photograph number 10633. Ruhland (1903) comments that the "Species, cl. Dr. Paul dedicata, bracteis longissime pilosis optime distincta". The label accompanying Macbride's photograph is inscribed "Schwacke 14550", but the collection was made by Sena, not by Schwacke. The species is known to date only from the original collection.

Citations: BRAZIL: Minas Gerais: Sena s.n. [Herb. Schwacke 14550; Macbride photos 10633] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS PAUPER Moldenke, Phytologia 2: 380, nom. nud. (1947); in Maguire & al., Bull. Torrey Bot. Club 75: 198--199. 1948.

Bibliography: Moldenke, Phytologia 2: 380. 1947; Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 198—199. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64, 66, & 210. 1949; Moldenke, Alph. List Cit. 3: 701 & 975. 1949; Moldenke, Phytologia

4: 152. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 176. 1953; Moldenke in J. A. Steyerm., Fieldiana Bot. 28: 824. 1957; Moldenke, Résumé 72, 75, & 488. 1959; J. A. Steyerm., Act. Bot. Venez. 1: 222. 1966; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 125 & 130 (1971) and 2: 955. 1971.

Steyermark encountered this plant on sandy dry savannas.

PAEPALANTHUS PAUPERRIMUS Herzog in Fedde, Repert. Spec. Nov. 29: 206, pl. 121, fig. a--e. 1931.

Synonymy: Paepalanthus (Leptocephali) pauperrimus Herzog apud Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 206, pl. 121, fig. a--e. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 19. 1939; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 455 [73]. 1941; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Moldenke, Phytologia 4: 152. 1952; Moldenke, Résumé 100 & 488. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971; Moldenke, Phytologia 25: 242. 1973.

Illustrations: Herzog in Fedde, Repert. Spec. Nov. 29: 206, pl. 121, fig. a--e. 1931.

The type of this species was collected by Freiherr Philipp von Lützelburg (no. 20757) on granite rocks, at an altitude of 700 meters, along the Rio Uraricuera, Serra do Murupu, Alto Amazônas, Amazônas, Brazil, flowering and fruiting in August, and deposited in the herbarium of the Botanische Staatssammlung in Munich, where it was photographed by Macbride as his type photograph number 18715.

Herzog (1931) says of this species: "Diese zehr zierliche, nur in wenigen Exemplaren gesammelte Art dürfte dem P. Capanemae Alv. Silv. nach Beschreibung und Abbildung nahe kommen. Als Unterschiede finde ich besonders die scharf abgesetzt despitzten ausseren Brakteen die betrachtlichere Breite und anders Form der bracteae stipantes (Die auffallend langen Haare an der Spitze werden aber auch für P. Capanemae angegeben) und die ander Spitze behaarten Sepalen der ♂ Blüte. Die ♀ Blüten, die vielleicht auch noch trennende Merkmale ergeben würden, sind weil noch unentwickelt, für P. Capanemae nicht beschreiben."

The Fromm 1385, cited below, is a mixture with P. perpusillus Kunth but has light-gray heads and is thus easily separated. Even so, P. pauperrimus bears striking resemblance to P. capanemae Alv. Silv., P. manicatus V. A. Pouls., P. microcaulon Ruhl., P. minutulus Mart., and P. subtilis Miq., as well as to P. perpusillus Kunth. It has been collected in anthesis and fruit in July and August.

Additional citations: BRAZIL: Amazônas: Fromm 1385, in part [Santos 1407, in part; Sacco 1642, in part; Trinta 311, in part; Herb. Brad. 25616, in part] (Lw); Lützelburg 20757 [Macbride pho-

tos 18715] (Mu--type, N--photo of type, W--photo of type, Z--isotype); Zerny s.n. [17 August 1927] (V--10784). Pará: Black 57-20076 (Bm); Egler & Raimundo s.n. [W. A. Egler 792; Herb. Mus. Goeldi 23631] (Bd--12294); Huber 1616 (Z). Roraima: Black 51-12485 (N), 51-12613 (N).

PAEPALANTHUS PEDUNCULATUS (Bong.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 146. 1903.

Synonymy: Eriocaulon falcatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831 [not E. falcatum Mart., 1863]. Eriocaulon pedunculatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831. Paepalanthus falcatus Körn. in Mart., Fl. Bras. 3 (1): 387--388. 1863 [not P. falcatus Gardn., 1973, nor Mart., 1959]. Dupatya pedunculata Kuntze, Rev. Gen. Pl. 2: 746. 1891. Leiothrix falcata Ruhl. in Engl., Pflanzenreich 13 (4-30): 223, in nota. 1903. Paepalanthus pedunculatus Ruhl. apud Prain, Ind. Kew. Suppl. 3: 126. 1908. Dupatya pedunculata (Bong.) Kuntze ex Moldenke, Fifth Summ. 1: 484, in syn. 1971.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831; Bong., Ess. Monog. Erioc. 13 & 30. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 575. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 387--388 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and pr. 1, 2: 401. 1894; N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 70. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 127, 146, 151, 223, 284, 286, 288, 290, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 411. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 7, 14, 30, 38, 43, 48, & 52. 1946; Moldenke, Alph. List Cit. 1: 223. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 401. 1946; Moldenke, Phytologia 2: 378. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 210. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 88, 100, 281, 288, 291, 309, 324, 480, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and pr. 3, 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Phytologia 20: 105, 106, & 108. 1970; Moldenke, Fifth Summ. 1: 165 & 484 (1971) and 2: 500, 508, 547, 582, & 955. 1971; Moldenke, Phytologia 25: 130, 131, & 241 (1973), 29: 314, 387--388, 477, & 478 (1974), and 30: 39. 1975.

The original description of Eriocaulon falcatum by Bongard (1831) is "Acaule; foliis caespitosis, vaginis brevioribus, linearilanceolatis, falcatis, pubescentibus; pedunculis caespitosis vaginisque pubescentibus. -- In humidis Serra da Lapa." The Eriocaulon falcatum Mart. and Paepalanthus falcatus Mart., referred to in the synonymy above, both are synonyms of Leiothrix flavescens (Bong.)

Ruhl., while P. falcatus Gardn. belongs in the synonymy of P. geniculatus (Bong.) Kunth.

Bongard cites a plate "57" for E. falcatum and a plate "37" for E. pedunculatum and these are also cited by Kunth and other later authors, but appear never to have been published; they are probably to be seen only in the Leningrad library or herbarium. They are not cited by Stapf.

The G. Gardner 5284 photographed in the Delessert Herbarium at Geneva by Macbride as his type photograph number 25167 is actually not the type of P. falcatus Körn. as he indicates on the label of his photograph and as I erroneously also stated in my 1952 publication. Körnicke's binomial is merely a new combination for Bongard's Eriocaulon falcatum and is typified by the Riedel specimen which served as Bongard's type.

In regard to the Leiothrix falcata Ruhl., included in the synonymy above, Ruhland's original note, in a comment under P. fraternus N. E. Br., reads: "Nota: Species mihi ignota, ex cl. descriptore cum P. falcato Koern. et P. flavescente Koern. (=Leiothrix falcata Ruhl. resp. L. flavescente Ruhl.) affinis".

Recent collectors have described P. pedunculatus as an herb, 40 cm. tall, with white flower-heads, "very common on sandstone outcrops" and at the edge of swamps, at altitudes of 1200—1350 meters, and have found it flowering in April and June, fruiting also in April. Silveira (1928) cites A. Silveira 496 from the Serra do Capanema, Minas Gerais, collected in 1906.

The J. E. Pohl s.n., distributed as P. pedunculatus, is actually P. falcifolius Körn., while M. A. Chase 10356 is P. geniculatus (Bong.) Kunth, Glaziou 19966 is P. lanatus Alv. Silv., and Martius 882 is Leiothrix flavescens (Bong.) Ruhl.

Citations: BRAZIL: Minas Gerais: Damazio 702 (B); G. Gardner 5284 [Macbride photos 25167] (B, N, N, W--photo); Mello Barreto 2535 [Herb. Jard. Bot. Belo Horiz. 7867] (N); J. B. Silva 591 [Herb. Set. Lag. 728] (Ba, Z); L. B. Smith 6782 (W--2120199), 6839 (Z); Williams & Assis 7360 (Ca--744439, W--1932975).

PAEPALANTHUS PENDULUS Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 280--281. 1957.

Bibliography: Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 280—281. 1957; Moldenke, Résumé 72 & 489. 1959; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 955. 1971.

This species is based on B. Maguire 33538a, found "hanging from the wet face of cliffs at 7800 ft. alt.", flowering in March, and deposited in the Britton Herbarium at the New York Botanical Garden.

Citations: VENEZUELA: Bolívar: B. Maguire 33538a (N—type).

PAEPALANTHUS PERBRACCHIATUS Alv. Silv., Fl. Mont. 1: 137--139, pl. 86. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 137--139 & 411, pl. 86. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Résumé 100 & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 86. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 757) "In campis arenosis inter Serro et Datas, in Serra Geral", Minas Gerais, Brazil, in June of 1925, and is deposited in the Silveira herbarium. Silveira (1928) comments that the "Species propter ramos numerosos elongatosque notabilis". It is known thus far only from the original collection.

PAEPALANTHUS PERCRASSUS Alv. Silv., Fl. Mont. 1: 214--215, pl. 152. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 214--215 & 411, pl. 152. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 152. 1928.

This species is based on A. Silveira 751 from "In campis in Serra da Canastra", Minas Gerais, Brazil, collected in April of 1925 and deposited in the Silveira herbarium. Silveira (1928) says of it: "Species ob sepala floris feminei flores masculos duplo superantia certe distinctissima". It is known thus far only from the original collection.

PAEPALANTHUS PERPLEXANS Moldenke, Phytologia 2: 380, nom. nud. 1947; Fieldiana Bot. 28: 120--121. 1951.

Synonymy: Paepalanthus perplexus Moldenke ex J. A. Steyerm., Act. Bot. Venez. 1: 68, sphalm. 1966.

Bibliography: Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 64 & 211. 1949; Moldenke, Alph. List Cit. 3: 975. 1949; Moldenke, Fieldiana Bot. 28: 120--121. 1951; Moldenke, Phytologia 4: 152. 1952; J. A. Steyerm., Fieldiana Bot. 28: 1157. 1957; G. Taylor, Ind. Kew. Suppl. 12: 101. 1959; Moldenke, Résumé 72, 75, & 489. 1959; J. A. Steyerm., Act. Bot. Venez. 1: 68 & 222. 1966; Moldenke, Résumé Suppl. 15: 21. 1967; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 125 & 130 (1971) and 2: 587 & 955. 1971.

This species is based on J. A. Steyermark 59748 from a Bonnetia roraimae forest on the southwest-facing shoulder of Ptari-tepuí, at 2000--2200 meters altitude, Bolívar, Venezuela, collected on November 2, 1944, and deposited in the Britton Herbarium at the

New York Botanical Garden. It resembles P. killipii Moldenke in general habit and appearance. The collector describes the plant as having "scapes pale green below, pale salmon above; bracts brownish; heads white with blackish".

This plant is most remarkable in exhibiting no pistillate florets in the several heads examined by me, but having apparently ywo types of morphologically staminate flowers instead, one type fertile and the other type anantherous. The species is probably either dioecious or polygamo-dioecious. Collectors report the stems to 1 meter tall, the leaves flexible, subcoriaceous, grass-green on both surfaces or bluish-green, and erect, and the involucres grayish-black or blackish. They have encountered it in moist stretches of sandy alluvium, in clumps along streams, in swampy depressions of wet savannas, in Bonnetia swales along creeks, and on the face of cliffs in waterfall spray and on banks below the spray, at altitudes of 500--2120 meters, flowering in February, August, and December, and fruiting in December. They refer to it as sometimes "rare", sometimes "frequent", "locally frequent", or "abundant".

Additional citations: VENEZUELA: Amazonas: Puig 3085 (Ld, N). Bolívar: J. A. Steyermark 59748 (S--isotype), 89580 (N, W--2407898, W--2430065, Z); Steyermark & Nilsson 352 (Mi, N), 440 (Mi, N), 722 (Mi, Ve); Steyermark & Wurdack 524 (Mu, N), 750 (N), 764 (N), 958 (N). GUYANA: Appun 1405 (K); Rob. Schomburgk 713 [Rich. Schomburgk 1026] (K).

PAEPALANTHUS PERPLEXANS var. **WURDACKI** Moldenke in Maguire, Mem. N. Y. Bot. Gard. 8: 98. 1953.

Bibliography: Moldenke in Maguire, Mem. N. Y. Bot. Gard. 8: 98. 1953; Moldenke, Résumé 72 & 489. 1959; Moldenke, Fifth Summ. 1: 125 (1971) and 2: 955. 1971.

This variety is based on R. S. Cowan & J. J. Wurdack 31141 from "on the cumbre, where it is very frequent", at 2000 meters altitude, Serranía Parú, on the Río Parú, Caño Asisa, Río Ventuari, Amazonas, Venezuela, collected on February 2, 1951, and deposited in the Britton Herbarium at the New York Botanical Garden. Isotypes are said to have been distributed to the herbaria at Caracas and Kew and to the United States National Herbarium in Washington, only one of which, however, has as yet been seen by me for verification.

Wurdack reports this plant as "locally abundant in bud and old fruit (in February) in large colonies along lower escarpment bases and talus cloud forest, at 2050 meters altitude".

Citations: VENEZUELA: Amazonas: Cowan & Wurdack 31141 (N--type, Ve--isotype). Bolívar: Wurdack 34275 (N).

PAEPALANTHUS PERPUSILLUS Kunth, Enum. Pl. 3: 503. 1841.

Synonymy: Eriocaulon perpusillum (Kunth) D. Dietr., Syn. Pl. 5: 259. 1852. Eriocaulon perpusillum Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855. Eriocaulon pusillum Poepp. ex

Körn. in Mart., Fl. Bras. 3 (1): 355, in syn. 1863 [not E. pusillum Bong., 1831, nor R. Br., 1810, nor Willd., 1841]. Dupatya perpusilla (Kunth) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon perpusillum Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893. Dupatya perpusilla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Kunth, Enum. Pl. 3: 503, 520, & 625. 1841; D. Dietr., Syn. Pl. 5: 259. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 298, 354--355, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 153, 162, 284, 286, 287, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 20, 30, 38, 39, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86, 101, & 211. 1949; Moldenke, Alph. List Cit. 3: 772. 1949; Moldenke, Phytologia 4: 152. 1952; Moldenke, Résumé 101, 112, 121, 281, 291, & 489. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Résumé Suppl. 3: 34. 1962; Moldenke, Phytologia 18: 303, 304, & 428. 1969; Moldenke, Fifth Summ. 1: 165, 180, 192, & 484 (1971) and 2: 508, 509, 587, & 955. 1971; Moldenke, Phytologia 25: 160 (1973) and 29: 317. 1974.

This species is based on Poeppig 2870, collected near Ega, ["am sandigen Gestade des Sees von Ega (Teffe)"], Amazônas, Brazil, deposited in the Berlin herbarium, where it was photographed by Macbride as his type photograph number 10634.

After a detailed description of the type collection, Kunth (1841) asks "An recte huc collocatus?" Elsewhere in his work he suggests its relationship to P. bryoides (Riedel) Kunth and to P. fasciculatus (Rottb.) Kunth.

It should be noted here that the Eriocaulon pusillum of Bongard, referred to in the synonymy above, is a synonym of Syngonanthus minutulus (Steud.) Moldenke, while that of Robert Brown is a valid species and that of Willdenow is Eriocaulon microcephalum H.B.K. It should also be noted here that Jackson (1893) regarded Eriocaulon pusillum Poepp. as a synonym of Paepalanthus tortilis (Bong.) Mart.

Paepalanthus perpusillus has been collected in flower and fruit in July and September.

The Fromm 1385 collection, cited below, is a mixture with P. pauperrimus Herzog, but is easily distinguished by its black heads.

Ruhland (1903) cites only Poeppig 2870 and Spruce s.n. [Barra do Rio Negro] from Amazônas, Brazil, and Bertero 1.620 from "an moorigen, sumpfigen Stellen bei Rancagua", Chile, collected in 1835.

The Huber collection cited below is numbered "MG 2743" on its original label, but a letter received by me from W. A. Egler, dated July 15, 1958, informs me that the number has "officially" been changed to 2734.

Additional citations: BRAZIL: Amazônas: J. T. Baldwin Jr. 3220 (W--1877981); Fromm 1385, in part [Sacco 1642, in part; Santos 1407, in part; Herb. Brad. 25616, in part] (Lw); Poeppig 2870 [Macbride photos 10634] (B--type, B--isotype, N--photo of type, N--photo of type, W--photo of type); Spruce s.n. [Prope Barra, prov. Rio Negro] (S, S). Minas Gerais: Mendes Magalhães 4346 [Herb. Jard. Bot. Belo Horiz. 45191] (N). Marajo Island: Guedes s.n. [Herb. Mus. Goeldi 1925] (Gl); Huber 1907 [Herb. Mus. Goeldi 2734] (Z).

PAEPALANTHUS PETRAEUS Körn. in Mart., Fl. Bras. 3 (1): 403. 1863.

Synonymy: Dupatya petraea (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya petraea Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 403, 405, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 205, 284, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 5, 30, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Alph. List Cit. 1: 132, 133, & 141 (1946), 2: 609 (1948), 3: 664 (1949), and 4: 1073, 1076, & 1078. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61 & 211. 1949; Moldenke, Phytologia 4: 152 (1952) and 4: 200. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 68, 281, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 118 & 484 (1971) and 2: 955. 1971; Moldenke, Phytologia 26: 243. 1973.

This species is based on Linden 1302, collected near Tocausipa, in rocky places, at an altitude of 2000 meters, in the vicinity of Bogotá, Cundinamarca, Colombia, flowering in March, and deposited in the Munich herbarium; an isotype in the Delessert Herbarium at Geneva was photographed there by Macbride as his type photograph number 25174.

The H. St. John 20805, distributed as P. petraeus, is actually P. andicola var. villosus Moldenke, while Fassett 25032 and Rusby & Pennell 1280 are P. crassicaulis Körn.

Additional & emended citations: COLOMBIA: Cundinamarca: Linden 1302 [Macbride photos 25174] (B--isotype, Br--isotype, N--isotype, N--photo of isotype, N--photo of isotype, W--1473226--isotype, W--photo of isotype, Z--photo of isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS PHAEOCEPHALUS Ruhl. in Engl., Pflanzenreich 14 (4-30): 169--170. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 168--170 & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971; Moldenke, Phytologia 21: 417. 1971; Anon., Biol. Abstr. 53 (10): B.A.S.I.C. S.178. 1972; Moldenke, Biol. Abstr. 53: 5252. 1972.

This species is based on Glaziou 22314 from a woodland at Cabeceira do Rio Santa Anna, Goiás, Brazil, flowering in January, and deposited in the Berlin herbarium, where it was photographed by Macbride as his type photograph number 10635. Ruhland (1903) cites only this type collection and says of the plant: "Species cum P. applanato et P. incano affinis, sed habitu tenuiore jam statim differt".

Irwin and his associates describe the plant as ascending, the inflorescences 25--60 cm. tall, and the flower-heads grayish or white. They encountered it on rocky slopes and wet campo in areas of gallery forest and adjacent wet campo ("brejo"), at altitudes of 1000--1250 meters, flowering from December to March and fruiting in February. They also found it growing in shallow water of creek margins in an area of rocky slopes, wet campo, and creek margins.

Harley and his associates found it in wet campos by a small stream, describing the flowers as white. Their material has been distributed erroneously as P. speciosus (Bong.) Körn.

Anderson encountered P. phaeocephalus in "mesophytic woods along stream, seeping sedge meadow just above stream, and cerrado on higher drier slopes", at 1200 m. altitude, flowering in March, and in wet grassy campo near a stream in a region of "grassy cerrado with Mimosa trees, sloping down to cerrado among blocky sandstone, then to mesophytic woods along stream, soil sandy".

The Irwin, Souza, & Reis dos Santos 11368, distributed as P. phaeocephalus, is actually the type collection of var. foliosus Moldenke.

Citations: BRAZIL: Distrito Federal: Belém & Barroso 3997 [no. I] (Ac), 3999 [no. II] (Ac). Goiás: W. R. Anderson 6610 (Ld), 7451 (Ld); Duarte 10709 [Herb. Brad. 48793] (Ld); Glaziou 22314 [Macbride photos 10635] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype); Graziela Barroso, Lima, & Lima 663 [no. III] (Ld); Irwin, Grear, Souza, & Reis dos Santos 12506 (Ld, N), 12596 (N, Z); Irwin, Harley, & Smith 32154 (Ld, N); E. Pereira 4820 [Rabst 5145] (Bd--7447). Mato Grosso: Harley, Barroso, & al. 11142 (Ld).

PAEPALANTHUS PHAEOCEPHALUS var. FOLIOSUS Moldenke, Phytologia 21: 417. 1971.

Bibliography: Moldenke, Phytologia 21: 417. 1971; Moldenke,

Fifth Summ. 2: 955 & 968. 1971; Anon., Biol. Abstr. 53 (10): B. A.S.I.C. S.178. 1972; Moldenke, Biol. Abstr. 52: 5252. 1972.

Material of this variety has been misidentified and distributed in some herbaria as typical P. phaeocephalus Ruhl.

Citations: BRAZIL: Distrito Federal: Irwin, Souza, & Reis dos Santos 11368 (N--isotype, Z--type).

PAEPALANTHUS PHELPSAE Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 852--854, fig. 6. 1972.

Bibliography: Anon., Ind. Bot. Guay. Highl. 16. 1972; Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 852--854, fig. 6. 1972; Hocking, Excerpt. Bot. A.23: 290. 1974.

Illustrations: Moldenke in Steyerm., Maguire, & al., Mem. N. Y. Bot. Gard. 23: 853, fig. 6. 1972.

This species is based on J. A. Steyermark 97932, collected on a savanna in the "Cerro Jáua, cumbre de la porción Central-Occidental de la Meseta, 4°45' Lat N, 64°26' Long Oeste, 36 millas nauticas o 60 km noroeste de la misión de Campamento Sanidad del Río Canaracuni, Meseta de Jáua", Bolívar, Venezuela, at an altitude of 1922--2100 meters, between March 22 and 27, 1967, and is deposited in my personal herbarium.

Steyermark and his associates describe the plant as having membranous leaves (but they certainly appear to be subcoriaceous on the dried specimens seen by me!), rich-green on both surfaces, the flower-heads sordid-white, and the involucre "gray-pale brown". They found it growing in solitary clumps in "sabana y bosque enano" at altitudes of 1800--2250 meters, in flower and fruit in February and March. They note that when it was in full anthesis at 2228--2250 m. it was already past blooming at 1800 m.

Citations: VENEZUELA: Bolívar: J. A. Steyermark 97932 (Z--type); Steyermark, Carreño Espinoza, & Brewer-Carias 109424 (Ac), 109609 (Ld).

PAEPALANTHUS PILIFER (Bong.) Kunth, Enum. Pl. 3: 524--525. 1841.

Synonymy: Eriocaulon piliferum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 631. 1831. Eriocaulon pilferum Bong. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 333, sphalm. 1855. Paepalanthus pilifer Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 341. 1863. Dupatya pilifera (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya pilifera Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus pilifera Kunth ex Moldenke, Résumé Suppl. 1: 25, in syn. 1959.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 631. 1831; Bong., Ess. Monog. Erioc. 31--32 (1831) and 58--59 & 221--222, pl. 12 [inf.], fig. 1--5. 1832; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: 221--222, pl. 12 [inf.], fig. 1--5. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 507, 524--525, 577, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 282 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 340, 341, 507, & 508. 1863;

Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 214, 217, 284, 286, & 291. 1903; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, 38, & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Phytologia 4: 152. 1952; Moldenke, Résumé 101, 281, 291, 419, & 489. 1959; Moldenke, Résumé Suppl. 1: 21 & 22. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Phytologia 20: 301. 1970; Moldenke, Fifth Summ. 1: 165 & 484 (1971) and 2: 508, 588, 776, & 955. 1971; Moldenke, Phytologia 30: 60. 1975.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: [Ess. Monog. Erioc.] pl. 12 [inf.], fig. 1--5. 1832.

Bongard's original (1831) description of this plant is "acaule; rhizomate crasso; foliis linearibus pubescentibus margine pilosis; pedunculis pubescentibus; vaginis pilosis apice obtusis et piloso-barbatis. Tab. XII. Habitat et floret cum praecedente [P. macrorrhizus (Bong.) Kunth]. Obs. Characteribus datis facile ab antecedente, cui affine, distinguitur. Squamae capituli involucrantes erectae."

The species is based on L. Riedel s.n. from "thonige Lokalitäten" in the Serra da Lapa, Minas Gerais, Brazil, flowering in November, and deposited in the Leningrad herbarium. An isotype in the Munich herbarium was photographed there by Macbride as his type photograph number 18716.

Ruhland (1903) cites only the original collection and comments that the species is "Cum sequente [P. acuminatus Ruhl.] valde affinis."

It is perhaps worth noting here that Steudel (1855) mistakenly on page 334 of his work refers this species to page "281" and calls the species number "195" -- actually this species is number 194 in his enumeration and occurs on page 282.

Additional citations: BRAZIL: Minas Gerais: Mello Barreto 9377 [Herb. Jard. Bot. Belo Horiz. 24673] (N), 9378 [Herb. Jard. Bot. Belo Horiz. 24675] (N); L. Riedel s.n. [Serra da Lapa; Macbride photos 18716] (B--isotype, Mu--isotype, N--photo of isotype, N--photo of isotype, S--isotype, Ut--372--isotype, W--photo of isotype). MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: pl. 12 [inf.]. 1832 (N, Z); drawings & notes by Körnicke (B).

PAEPALANTHUS PILOSUS (H.B.K.) Kunth, Enum. Pl. 3: 518. 1841.

Synonymy: Eriocaulon pilosum H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: [200]. 1816. Eriocaulon dendroides H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: [200]--201, pl. 69, fig. 2. 1816. Eriocaulon

dendroides Humb. & Bonpl. apud Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 862. 1817. Eriocaulon pilosum Humb. & Bonpl. apud Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 862. 1817. Eriocaulon pilosum Kunth apud Poir. in Cuvier, Dict. Sci. Nat. 24: 240. 1822. Eriocaulon dendroides Humb. & Kunth apud Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826. Eriocaulon pilosum Humb. apud Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826. Eriocaulon (Paepalanthus) selaginoides Benth., Pl. Hartw. 260. 1839. Eriocaulon pilosum Humb. & Kunth apud Kunth, Enum. Pl. 3: 518 & 613. 1841. Eriocaulon caulescens Willd. ex Kunth, Enum. Pl. 3: 507 & 612, in syn. 1841 [not E. caulescens Hook. f., 1903, nor Hook. f. & Thoms., 1864, nor Kunth, 1971, nor Poir., 1813, nor Salzm., 1959, nor Steud., 1919]. Paepalanthus dendroides (H.B.K.) Kunth, Enum. Pl. 3: 507. 1841. Eriocaulon selaginoides Benth. apud Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855. Paepalanthus dendroides Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 299 & 363. 1863. Paepalanthus selaginoides (Benth.) Körn. in Mart., Fl. Bras. 3 (1): 362. 1863. Paepalanthus selaginoides Körn. in Mart., Fl. Bras. 3 (1): 362. 1863. Dupatya dendrodes Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya selaginodes Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya pilosa (H.B.K.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus pilosus Kunth apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya dendroides Kuntze ex Moldenke, Known Geogr. Distrib. Erioc. 29, in syn. 1946. Dupatya selaginoides Kuntze ex Moldenke, Known Geogr. Distrib. Erioc. 31, in syn. 1946. Eriocaulon dendroides Humb. ex Moldenke, Phytologia 26: 372, in syn. 1973.

Bibliography: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: [200]--201, pl. 69, fig. 2 (1816) and ed. quarto, 1: [251]--252, pl. 69, fig. 2. 1816; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 862. 1817; Steud., Nom. Bot. Phan., ed. 1, 312 & 313. 1821; Poir. in Cuvier, Dict. Sci. Nat. 24: 240. 1822; P. F. J. Turpin in Cuvier, Dict. Sci. Nat. [63]: Planch. Bot. Monocot. 2, pl. [41]. 1822; Roem. & Schult., Mant. 2: 463. 1824; Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 507, 518, 612, 613, 624, & 625. 1841; Benth., Pl. Hartw. 260--261. 1846; Walp., Ann. 1: 390. 1849; D. Dietr., Syn. Pl. 5: 260 & 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276, 277, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 299, 362--364, 505, & 507. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1023. 1883; Kuntze, Rev. Gen. Pl. 2: 745 & 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877--879 (1893) and pr. 1, 2: 401 & 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 10, 152, 155, 156, 161, 284--287, 289, 291, & 292. 1903; Gleason, Bull. Torrey Bot. Club 52: 195. 1925; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930; Stapf, Ind.

Lond. 3: 90. 1930; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 490--493. 1936; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Herrera, Sinop. Fl. Cuzco 1: 170. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877--879 (1947) and pr. 2, 2: 401 & 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5, 7, 29--31, 33, 34, 38, 40, 47, 52, & 54. 1946; Moldenke, Alph. List Cit. 1: 131 & 133. 1946; Moldenke, Phytologia 2: 373. 1947; Moldenke, Alph. List Cit. 2: 449, 557, & 609 (1948), 3: 664, 805, 807, 808, 924, & 974 (1949), and 4: 1064, 1065, 1074, 1076, 1073, & 1208. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 60, 61, 64, 73, 209, & 211. 1949; Moldenke, Phytologia 3: 142 (1949), 4: 152 (1952), and 4: 200--201. 1953; Moldenke, Résumé 68, 72, 84, 279, 281, 282, 286, 287, 291, 292, 324, 328, & 489. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Soukup, Biota 5: 302. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877--879 (1960) and pr. 3, 2: 401 & 402. 1960; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Phytologia 17: 481. 1968; Moldenke, Résumé Suppl. 18: 9--11. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158 & 190. 1969; Moldenke, Phytologia 19: 490 & 491 (1970) and 20: 308. 1970; Moldenke, Fifth Summ. 1: 118, 125, 142, 479, 484, & 485 (1971) and 2: 496, 508, 511, 580, 588, 590, & 955. 1971; Moldenke, Phytologia 24: 343, 344, & 456 (1972), 26: 195 & 252 (1973), and 30: 26 & 37. 1975.

Illustrations: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: pl. 69, fig. 2 [in color] (1816) and ed. quarto, 1: pl. 69. 1816; P. F. J. Turpin in Cuvier, Dict. Sci. Nat. [63]: Planch. Bot. Monocot. 2, pl. [41] [in color]. 1822.

The Humboldt, Bonpland, & Kunth references in the bibliography above are dated "1815" by Stapf (1930), but according to Dr. J. H. Barnhart (in Bull. Torrey Bot. Club 29: 585--598. 1902) were not actually published until 1816. Stapf cites the Turpin work, also listed in the bibliography above, as "1816-29", but the portion of it involved here was issued in 1822.

The Eriocaulon caulescens binomials accredited to Hooker, to Hooker & Thomson, and to Steudel, referred to in the synonymy above, are synonyms of E. atratum var. major Thwaites, while those accredited to Kunth, to Poiret, and to Salzmann are synonyms of Syngonanthus caulescens (Poir.) Ruhl. The type of E. caulescens Willd. is Herb. Willdenow 2366.

In regard to the name Eriocaulon selaginoides Benth., it should be noted that the original publication (1846) reads: "1445. Eriocaulon (Paepalanthus) selaginoides sp. n.", so under the present edition of the International Code, as I understand it, the combination under Paepalanthus was not definitely accepted by Bentham and therefore was not validly published, Jackson in the "Index Kewensis" (1894) to the contrary notwithstanding. In fact, it is questionable if the combination in Eriocaulon is valid, since an alternative name is suggested. The type is from "Prope Laguna de Guanacas, prov. Popayan, altit. 12,000 ped." The date for this

publication is often given as "1843", while Ruhland (1903) cites it as "1839", but according to the printed dates in the publication itself pages 260 & 261 did not appear until May of 1846.

Recent collectors have encountered P. pilosus on páramos, in Sphagnum bogs or marshy places, in wet open places at the base of mountains, in woodland bogs, along wet roadsides at the foot of cliffs in canyons, and on Sphagnum banks. They describe it as forming large compact clumps mixed with saturated Sphagnum overlying sand or dense mats 30 cm. in diameter in the saturated sod of páramos, at altitudes of 1800--3800 meters, flowering in February, April, and June to December, fruiting in July, August, and October.

Ruit-Terán & López-Figueiras describe the plant as an "Hierba mínima, 3--5 cm. agrupada en almohadillas convexas, compactas, de contorno más o menos orbicular y de 5--25 cm. de diámetro. Escapos de 1--1,5 cm. de largo, 1-céfalos. Capítulos pequeños, compactos, 3--5 mm. de diámetro. Flores pequeñoisimas, blanco grisáceas. Abundante, heliófila."

The vernacular name, "joncinelle dendroïde", is recorded for it in French. Fassett 25629 is accompanied in at least some herbaria by a habitat photograph. Killip & Smith 16064 was pronounced "a good match for the type at Berlin" by E. P. Killip in 1932.

In his original description Kunth (1841) comments that the plant he calls P. pilosus is "P. dendroidi affinis?" although he places the two taxa far apart in his classification. Ruhland (1903) notes that the "Species 3, a cl. Koernicke pedunculorum longitudine et foliorum indumento distinctae mihi certissime conjengendae et ne varietatum quidem valorum propter formas multas intermedias habere videntur. Indumentum in uno specimine variat et flores omnino congruunt." He is here referring to Körnicke's retention, as separate and valid species, P. pilosus, P. dendroides, and P. selaginoides. Macbride (1936) also comments about P. pilosus that it is "Variable in size and habit".

The species is certainly closely related to P. karstenii Ruhl., but its involucral bractlets being pilose on the back (in P. karstenii they are smooth) readily distinguishes the two taxa.

Material of P. pilosus has been misidentified and distributed in some herbaria as P. karstenii Ruhl. On the other hand, the Ackermann s.n., distributed as P. pilosus, is actually the type collection of P. dianthoides Mart., while F. R. Fosberg 21462 & 21684, Fosberg & Valencia 21462, Garcia-Barriga 11681, M. L. Grant 9424, Killip & Ariste-Joseph 11957, Killip & Smith 15626, F. W. Pennell 20835a, R. E. Schultes 18780, and J. A. Steyermark 55727 are all P. karstenii, and Martius s.n. is P. lamarckii Kunth. The Pennell and the Steyermark collections were erroneously cited by me as P. pilosus in my 1953 paper.

Macbride (1936) cites F. W. Pennell 13866 from Cuzco, Peru.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"THE FUNGI: An Advanced Treatise" edited by G. C. Ainsworth, Frederick K. Sparrow & Alfred S. Sussman, Volume IV A, "A Taxonomic Review with Keys: Ascomycetes and Fungi Imperfecti", xviii & 621 pp., illus., Academic Press, Inc., London NW 1 & New York, N. Y. 10003. $29.00.

"Never before in modern times has such a distinguished group of world specialists on the taxonomy of fungi provided for the professional mycologist such a comprehensive survey of fungal classification at the generic level.....Although contributors to allied groups consulted with one another, a number of genera.... appear in the keys of more than one of the higher taxa....[offering] a reflection of currently unresolved taxonomic problems."

In these volumes fungi are treated taxonomically à la Ainsworth as a separate kingdom (or subkingdom of the plant kingdom for the more conservative systematists) with two divisions — Myxomycota for plasmodial forms and Eumycota for the non-plasmodial forms that are usually mycelial. Of the latter's five subdivisions nine workers treat sections of the Ascomycotina (Ascomycetes) and three workers treat sections of the Deuteromycotina which is mainly a convenient lumping place for the imperfect fungi. Most of the lichenized fungi await treatment in a promised separate book.

This book is essential for professional mycologists, advanced students, plant evolutionists, etc. In fact, the other volumes on the fungal cell, the fungal organism, and the fungal population are also of great value.

"FLORA BOREALI-AMERICANA" by André Michaux, Facsimile of the 1803 edition with Introduction by Joseph Ewan, Volume I, xlvi & 330 pp., illus., Volume II, 340 pp., illus., Hafner Press, London NW 7D8 & New York, N. Y. 10022. 1974. $42.50.

This reprinting in excellent form of one of the early basic floras of the eastern part of our continent is issued as Volume 3 of the Classica Botanica Americana series edited by Joseph Ewan. Because of his fascination with the subject matter and of his ability to ferret out and evaluate information, he makes an excellent choice as editor and he provides an historically interesting and carefully documented introduction. He virtually translates and explains the original preface by the 33 year old son-assistant, François André Michaux, who was left with the somewhat ready manuscript to be put into publishable form while André Michaux joined Baudin's Australasian expedition in 1800. In 1801 he collected in Mauritius, left the expedition for the greater lure of

Madagascar where he died somewhere near the end of 1802 in what was then at least a botanical paradise. The rest of the work is the Latin text and its 51 plates of beautiful line drawings by P. J. Redouté and its generic index.

A botanical treasure!

"BIOLOGY OF THE RHODOPHYTA" by Peter S. Dixon, xiii & 285 pp., illus., Oliver & Boyd, Edinburgh EH4 3TS & Hafner Press of Macmillan Publishing Co., New York, N. Y. 10022. 1973. $14.95.

This fourth publication in the "University Reviews in Botany" series edited by V. H. Heywood is the first broad survey of the red algae in terms of their geographic distribution, habitats, cell and body physiology, biochemistry, morphology, reproduction, life histories, economic importance as in agar and fodder, fossil record, systematics and phylogeny. There are fine modern bibliography, indexing and line drawing illustrations. Of course, they are red colored when phycoerythrin predominates, but other of their universal phycobilin pigments may make them blue-green, purple, black, or yellowish with a little photodestruction to a virtually colorless condition in the few facultative and obligative parasites in the group. They are more uniform in possessing "floridean starch" as a storage polysaccharide, in lacking cell centrioles and any motile stages (intra- and extracellular fungi get blamed for flagella "seen" in microscopes and drawn on plates and the unicellular flagellate Rhodomonas gets reclassified).

Systematically this author prefers Division Rhodophyta to Class Rhodophyceae because the distinctions among the algal groups are so great. In the former he mentions Class Bangiophyceae with 25 genera* in 8 families in 4 orders and Class Florideophyceae with 152 genera* and 40 families in 5 orders (*mentioned in the text). He makes only slight changes in Kylin's highly valued synoptical "Die Gattungen der Rhodophyceen" of 1956.

There are many ways in which this "Biology of the Rhodophyta" can prove very useful as a text and reference source, especially in terms of the way biology is taught and researched today.

"GREENHOUSE GARDENING" by Henry T. Northen & Rebecca T. Northen, 2nd edition, viii & 388 pp., illus., Ronald Press Company, New York, N. Y. 10016. 1973. $9.50.

Since the earlier edition of 1956 has been a source of joy and helpful direction for the always intending and for the real "under glass" gardeners who are/were professionals, amateurs, teachers, and specialized hobbyists, this new edition will be

even more satisfying because it adds to all the advantages of the earlier work new and better techniques, designs, biodegradable controlling agents, and beautiful photographic plates.

"Each plant is introduced with both its scientific name and its common name, if it possesses one." Clerodendrum is the modern corrected orthography for "Clerodendron" which now should be relegated to synonymy or lower-cased as a horticultural common name. "Fascinating bits of lore are added — plant history, the meaning of names, and peculiarities of habit.....We have included a great many more kinds in this edition — new varieties, miniatures, delightfully decorative things to add spice to the greenhouse collection."

The ever-increasing "under plastic" set is now augmenting the ever-increasing "under glass" protected and protracted gardeners. They have an excellent guide in this new "Greenhouse Gardening".

"CYTOGENETICS OF ANEUPLOIDS" by Gurdev S. Khush, xii & 301 pp., illus., Academic Press, London NW 1 & New York, N. Y. 10003. 1973. $17.50.

This book is welcomed as a needed "first" surveying this field. Aneuploids are plant or animal individuals with one or a few chromosomes more or less than in the normal diploid, polyploid, or haploid number. The dust jacket design with its 2n+2, 2n+1, 2n-1 effectively abbreviates the definition.

"The first chapter, in addition to dealing primarily with terminology, gives a brief history of the development of this field of enquiry. The next five chapters review the entire literature on trisomics.....cytology, transmission rates, genetics, and morphology.....Chapters 7, 8, and 9 are devoted to monosomics and nullisomics. The two chapters that follow deal with intervarietal substitutions and alien additions and substitutions [important in breeding for disease resistance] respectively. The last chapter was added to introduce plant science workers to the problems and progress made in studying the aneuploids of man [e.g., Down's, E., D. & Klinefelter's Syndromes] and [other] animals."

The author's considerable studies with C. M. Rick on tomato aneuploids, on rye and now at the International Rice Research Institute qualify him well for this first definitive survey of this topic that tends to lean towards economic plants reported in English-language sources. Even though the author treats of 33 types of aneuploidy his descriptive language is neat and clear — great assets in a text. Had a bit more editorial time and/or care been applied some scientific names (e.g. Fragaria) and foreign bibliographic entries might not have ended up misspelled.

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ADDITIONAL NOTES ON THE GENUS VERBENA. XXIII

Harold N. Moldenke

VERBENA [Dorst.] L.

Additional synonymy: Aubletia "Le Monn. ex Rozier mut. Dandy" ex Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 109, in syn. 1973.

Additional & emended bibliography: Anon., Breviary [mss. on vellum, Pierpont Morgan Lib.] 32 & 37. 15--; Piperno, De Magicis Affect. 1635; Breyn., Prod. Fasc. Rar. Pl., ed. 1, 2: 104. 1688; L., Sp. Pl., ed. 1, imp. 1, 1: 18--21 & 342 (1753) and ed. 1, imp. 1, 2: 601, 630, 660, 878, & 879. 1753; Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 115--117. 1755; L., Syst. Nat., ed. 10 [Stockh.], 2: 851--852 (1759) and ed. 10 [Halle], 2: 851--852. 1760; Sloane, Civil & Nat. Hist. Jamaic., ed. 2, 115--117. 1789; Ait., Hort. Kew. 3: 480. 1789; Batsch, Tabl. Aff. Reg. Veg. 190. 1802; Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 13--15 & 340. 1803; A. DC. in A. P. & A. DC., Pl. Rar. Jard. Genév. 5: 22. 1830; Cham., Linnaea 7: 252--271. 1832; J. Grah., Cat. Pl. Bomb. 154. 1839; Jenner, Fl. Turnbridge Wells 33. 1845; Firminger, Man. Gard., ed. 3, 86, 101, 103, 310, 326, 526, & 620. 1874; Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1043--1047 & 1252. 1879; J. Sm., Dict. Pop. Names Pl. 428. 1882; Woodr., Gard. in India, ed. 5, 421. 1889; G. Ricci, Lo Sperimant. 66: 483. 1890; Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 210--211. 1891; Dymock, Warden, & Hooper, Pharmacog. Ind. 3: [iii] & 58--60. 1893; Voss in Vilm., Blumengärtn., ed. 3, 1: 822 & 824--829, pl. 48 & 49. 1895; Rojas Acosta, Cat. Hist. Nat. Corr. 76, 173, 193, & 206. 1897; Woodr., Journ. Bomb. Nat. 12: 359. 1899; Chesnut, Contrib. U. S. Nat. Herb. 7: 383. 1902; Collett, Fl. Siml. 378 & 379. 1902; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 430. 1904; Cooke, Fl. Presid. Bombay, ed. 1, 3: 422 (1905) and ed. 1, 3: 436--437. 1906; Kirby, Brit. Flow. Pl. 116, pl. 74. 1906; L., Sp. Pl., ed. 1, imp. 2, 1: 18--21 & 342 (1907), ed. 1, imp. 2, 2: 601, 630, 660, 878, & 879 (1907), ed. 1, imp. 3, 1: 18--21 & 342 (1907), and ed. 1, imp. 3, 2: 601, 630, 660, 878, & 879. 1907; Woodr., Gard. Trop., ed. 6, 436, 442, & 445. 1910; F. Hermann, Fl. Deutschl. & Fennoskand. 387. 1912; Georgia, Man. Weeds 343--346, fig. 238. 1914; M. R. Gilmore, Bur. Am. Ethnol. Ann. Rep. 33: 111, 144, 146, & 147. 1919; R. M. Harper, Torreya 20: 72. 1920; Rohde, Old Engl. Herbals, imp. 1, 29, 30, 43, 44, 64, 72, 106, 107, & 113. 1922; Knoche, Fl. Balear., ed. 1, 252, 275, 293, 339, & 410. 1923; Parker, Forest Fl. Punj., ed. 2, 405. 1924; Kräusel in Just, Bot. Jahresber. 48 (1): 194 & 241. 1926; Parodi, Rev. Fac. Agron. & Vet. Buenos Aires 5: 138--139. 1926; F. E. Clements, Pl. Succ. & Indecat. 265, 302, 362, & 375. 1928; Wilder, Frag. Path 125, 174, 175, 203, 344, 367, 371, & 406. 1932; H. M. Fox, Gardening with Herbs, imp. 1, 172. 1933; L., Sp. Pl., ed. 1, imp. 4, 1: 18--21 & 342 (1934) and ed. 1, imp. 4, 2: 601, 630, 660, 878, & 879. 1934;

Joshi in Kashyap, Lahore Dist. Fl. 193 & 194. 1936; Madrid Moreno, Declar. Virt. Arb. & Pl. 74, 75, & 170. 1936; Zangheri, Fl. & Veg. Pinet. Raven. 189, 235, & 271. 1936; Kamm, Old Time Herbs, imp. 1, 118—121. 1938; González, Lombardo, & Vallarino, Pl. Med. Vulg. Uruy. 87. 1939; Demaree, Taxodium 1: 60—61 & 88. 1943; Joret, Valois Phytosoc. & Phytogéogr. 241, pl. 68. 1949; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177—1178. 1953; Blakelock in H. Field, Contrib. Fauna & Fl. S.W. Asia [7]. 1955; W. H. Camp in Camp, Boswell, & Magness, World in Your Gard., imp. 1, 82 & [83]. 1957; L., Sp. Pl., ed. 1, imp. 5, 1: 18—21 & 342 (1957) and ed. 1, imp. 5, 2: 601, 630, 660, 878, & 879. 1957; Steinmetz, Cod. Veget. 1189. 1957; Cooke, Fl. Presid. Bombay, ed. 2, imp. 1, 2: 501 & 517—518. 1958; W. H. Camp in Camp, Boswell, & Magness, World in Your Gard., imp. 2, 82 & [83]. 1959; V. J. Chapm., Salt Marshes & Salt Deserts, ed. 1, 225 & 389. 1960; Booth, Encycl. Ann. & Bien. Gard. Pl. 439—440. 1962; Font Quer, Pl. Medic. 635. 1962; A. P. Balf., Ann. & Bien. Fls. 85—86. 1963; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 430. 1963; Batten & Bokelm., Wild Fls. East. Cape Prov. 125, 172, & 182, pl. 99 (9). 1966; Engel, Fl. Magica 39. 1966; Cooke, Fl. Presid. Bombay, ed. 2, imp. 2, 2: 501 & 517—518. 1967; J. Graf, Pfl. Bestimm. 159. 1967; A. R. Moldenke, Host-plant Relations [12]. 1968; Fletcher & Henderson, Regn. Veg. 63: 172 & 188. 1969; J. Hutchinson, Evol. & Phylog. Flow. Pl. 467, 468, 470, & 715, fig. 414. 1969; Keng, Ord. & Fam. Malay. Seed Pl. 279. 1969; Ehrendorfer, Taxon 19: 599. 1970; H. M. Fox, Gardening with Herbs, imp. 2, 172. 1970; Krapovickas, Bol. Soc. Argent. Bot. 11: 261 & 269. 1970; H. R. & B. Mockel, Mockel's Desert Flow. Book 258—259. 1970; Abbayes, Claustres, Corillon, & Dupont, Fl. & Veg. Mass. Armor. 662. 1971; Kamm, Old Time Herbs, imp. 2, 118—121. 1971; Lind & Tallantire, Some Com. Flow. Pl. Uganda, ed. 2, 145 & 248. 1971; Perrot & Paris, Pl. Médic. 1: 103, fig. 8—13. 1971; Rohde, Old Engl. Herbals, imp. 2, 29, 30, 43, 44, 64, 72, 106, 107, & 113. 1971; Schnack in Meja & Moguil., Rec. Adal. Biol. 242—251. 1971; Wyman, Gard. Encycl., imp. 1, 35, 47, 49, 330, 336, 392, 396, 493, 522—526, 1003, & 1153—1154 (1971) and imp. 2, 35, 47, 49, 330, 336, 392, 396, 493, 522—526, 1003, & 1153—1154. 1972; Alemán Frías, Aurich, Ezcurra Ferrer, Gutiérrez Vázquez, Horstmann, López Rundueles, Rodríguez Graquitena, Roquel Casabella, & Schreiber, Die Kulturpfl. 19: 423. 1972; Dymock, Warden, & Hooper, Hamdard 15: 330 & 345. 1972; H. L. V. Fletcher, Herbs 134 & 135. 1972; Fogg, Dict. Ann. Pl. 164. 1972; Krapovickas, Mem. Cong. Latinoam. Bot. 1: 253. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 109, 139, 172, 491, 542, 805, 860, 1064, 1200, & 1206-1208. 1973; Anon., Assoc. Étud. Tax. Fl. Afr. Trop. Index 1972: 56. 1973; Bullington, Trans. Ill. Acad. Sci. 66: 73. 1973; Čvančara & Šourková, Preslia 45: 272. 1973; Ebinger, Trans. Ill. Acad. Sci. 66: 119. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 658, 659, 661, 663, 668, & 674—677. 1973; Hitchc. & Cronq., Fl. Pacif. Northw. 398 & 729. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 487 & 966. 1973; Khush, Cytogen. Aneupl. 15, 148, 149, & 301. 1973; Mahler, Fl. Taylor Co. 154—157, fig. 241 & 242. 1973; H. T.

& R. T. Northen, Greenhouse Gard., ed. 2, 362 & 387. 1973; Shetler & Read, Fl. N. Am. Rep. 71: 48. 1973; Solbrig, Arnoldia 33: 138 & 145. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 784 & 786—789. 1973; Ackerm. & Bamberg in Lieth, Phenol. & Season. Model. 243. 1974; Anon., Biol. Abstr. 57 (4): B.A.S.I.C. E.296. 1974; Barbour, Diaz, & Breidenbach, Ecology 55: 1210. 1974; Barrows, Biol. Abstr. 57: 5071. 1974; Beaugé, Chenopod. Alb. 351 & 429, fig. 60. 1974; D. Burpee, Burpee Seeds 1975: 48. 1974; Caswell Massey Co., Apothecary Cat. 1974-1975: 69. 1974; V. J. Chapm., Salt Marshes & Salt Deserts, ed. 2, 225 & 389. 1974; Dony, Perring, & Rob, English Names Wild Fls. 61 & 116. 1974; Fenaroli, Rivist. Ital. 56: 224. 1974; Fitter, Fitter, & Blamey, Wild Fls. Brit. & N. Eu. 192 & 193, fig. 7. 1974; Frederick, Ohio Journ. Sci. 74: 111. 1974; Harkness, Seedlist Handb. 181. 1974; Heslop-Harrison, Ind. Kew. Suppl. 15: 16, 142, & 151. 1974; Howes, Dict. Useful Pl. 124, 167, 207, 251, & 270. 1974; "H. R.", Biol. Abstr. 57: 1904. 1974; Hylton, Rodale Herb. Book 492—494 & 613—614. 1974; Jones & Bell, Trans. Ill. Acad. Sci. 67: 87. 1974; Knoche, Fl. Balear., ed. 2, 252, 275, 293, 339, & 410. 1974; Lieth, Phenol. & Season. Model. 444. 1974; Lust, Herb. Book, ed. 1, 126—137, 181—182, 402, 440, 490, 495, 502, 504, 517, 520, 521, 549, 561, & 588. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 13—15 & 340. 1974; Moldenke, Phytologia 28: 343—401, 403—404, 425—432, 435, 438, 440, 441, 443, 444, 446, 451, 457, 458, 460, 462, 464, 465, 508, & 510—512 (1974) and 29: 41, 45, 47, 50—52, 55, 56, 60, 62, 78, 193, & 512. 1974; E. J. Anderson, Gard. Journ. 24: 52. 1974; A. L. Moldenke, Phytologia 29: 182. 1974; J. P. Morgan Library, Fls. of the Centuries 60 & 68. 1974; Rogerson & Becker, Bull. Torrey Bot. Club 101: 170. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 376, 377, 465, 467, 473, 479, 480, 502, 504, 505, 510, 516, 644, & 788. 1974; Ross-Craig, Drawings Brit. Pl. Ind. 36. 1974; E. R. Spencer, All About Weeds [circular]. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974; Sunding, Garcia Ort. Bot. 2: 20. 1974; F. G. Taylor in Lieth, Phenol. & Season. Model. 243 & 444. 1974; Troncoso, Darwiniana 18: [295], 296, 300, 302, 304, 307—319, 342, 344. 352, 354, 360, & 409—412, fig. 2 & 3. 1974; Monod, Candollea 29: 412. 1974; Vogelenzang, Asher Guide Period. 2: 55. 1974; Wilder, Frag. Gard. 125, 174, 175, 203, 344, 367, 371, & 406. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [16]. 1975.

It is perhaps worth noting here that the "sweet verbena tree" of horticulturists and gardeners is Backhousia citriodora of Australia, while the "vervain sage" is Salvia verbenacea.

Airy Shaw (1973) still regards Burseria Loefl., as a synonym of Verbena, when actually, as I have pointed our several times over the past years, it is a synonym of Priva Adans.

Caswell Massey Company list a "yellow lemony bath soap" named "Verbena Vegesperma Bath Soap" but fail to identify the "verbena" scent contained in it — most probably from Aloysia triphylla

(L'Hér.) Britton.

The index in Firminger's work (1874) cites pages 76, 84, & 85, but I can find no reference to Verbena on any of these pages.

According to Fletcher & Henderson (1969) the biosystematics of section Glandularia are documented by Solbrig in the Michigan Botanical Garden of the University of Michigan at Ann Arbor.

Weiss & O'Brien (1953) record various pests and diseases as attacking Verbena, mostly referred to definite species of the genus on which they have been observed, but among those credited merely to "Other spp." of Verbena beyond those named are Cercospora septatissima Tracy & Earle (in Mississippi), C. truncatella Atk. (Alabama), C. verbenicola Ell. & Ev. (Texas, Alabama, Louisiana), Cuscuta arvensis Beyr. (Oklahoma), Erysiphe cichoracearum DC. (occasional), Meloidogyne sp. [Heterodera marioni (Cornu) Goodey], Phymatotrichum omnivorum (Shear) Dug. (Texas), Plasmopara halstedii (Farl.) Berl. & De Toni (New Mexico), Puccinia aristidae Tracy (Arizona), P. vilfae Arth. & Holw. (Kansas, Missouri), and Septoria verbenae Rob. (Vermont to Mississippi, Texas, South Dakota).

VERBENA ALBICANS Rojas, Cat. Hist. Nat. Corr. 76. 1897.

Bibliography: Rojas Acosta, Cat. Hist. Nat. Corr. 76. 1897; Krapovickas, Bol. Soc. Argent. Bot. 11: 261. 1970; Heslop-Harrison, Ind, Kew. Suppl. 15: 142. 1974.

Nothing is known to me of this species except what is given in the bibliography listed above. It was apparently described from Corrientes, Argentina.

VERBENA ALBIFLORA Rojas, Cat. Hist. Nat. Corr. 193, nom. nud. 1897.

Bibliography: Rojas Acosta, Cat. Hist. Nat. Corr. 193. 1897; Krapovickas, Bol. Soc. Argent. Bot. 11: 269. 1970.

Nothing is known to me about this species except what is stated about it in the bibliography above. It was apparently supposed to be native to Corrientes, Argentina.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Demaree, Taxodium 1: 60. 1943; Moldenke, Phytologia 28: 344, 345, 430, 431, & 451. 1974.

Reveal and his associates found this plant growing on steep mountain slopes associated with Yucca, Opuntia, and "other shrubs".

The W. H. Earle 52, distributed as V. ambrosifolia, is actually V. ciliata Benth.

Additional citations: MEXICO: Coahuila: Reveal, Hess, & Kiger 2574 (Mi).

VERBENA AMBROSIFOLIA f. EGLANDULOSA Perry

Additional bibliography: Moldenke, Phytologia 28: 241—242 & 430. 1974.

Additional citations: ARIZONA: Cochise Co.: Wentworth 1333/1333a (It).

VERBENA ARISTIGERA S. Moore

Additional synonymy: Glandularia aristigera (Briq.) Tronc., Darwiniana 18: 317, sphalm. 1974.

Additional bibliography: Moldenke, Phytologia 28: 344 & 457. 1974; Troncoso, Darwiniana 18: 317 & 409. 1974.

Troncoso (1974) cites Schinini 4028 from Paraguay in the Darwinion Herbarium at San Isidro, Argentina.

VERBENA BERTERII (Meisn.) Schau.

Additional bibliography: Moldenke, Phytologia 28: 345. 1974.

The Zöllner 7872, distributed as V. berterii, is actually V. cumingii Moldenke.

xVERBENA BINGENENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 215. 1972; A. L. Moldenke, Phytologia 29: 182. 1974.

VERBENA BIPINNATIFIDA Nutt.

Additional synonymy: Verbena bipinnalefida Nutt., in herb.

Additional bibliography: Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 210. 1891; Greene, Pittonia 5: 136. 1903; Demaree, Taxodium 1: 60. 1943; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; Wyman, Gard. Encycl., imp. 1, 1153 (1971) and imp. 2, 1153. 1972; Mahler, Fl. Taylor Co. 155 & 156. 1973; Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 345--346, 365, 395, 396, 429, 432, & 457. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Stewart (1972) says that this species is "Frequently found in gardens [in West Pakistan] and as an escape about Abbottabad and Mansera in Hazara", but it is most probable that he is referring to V. temuisecta Briq. or even perhaps to xV. monacensis Moldenke. I doubt very much whether V. bipinnatifida occurs, wild or cultivated, in Pakistan. Kral found it growing in "black earth of prairie remnant" in Alabama. King found it growing on "loam to clay loam over clay loam to light-clay" and in neutral to slightly acid fine sandy loam; Taylor reports it "frequent" along roadsides and in open woods; Eckhardt found it to be "locally infrequent" in alluvial limestone loam of dry ravines and "occasional" on sandy loam and limestone soils. Demaree reports it "common" on marl ridges in Arkansas.

The corollas are said to have been "blue" on Eckhardt 1571 & 1580. Harkness (1974) describes the corolla color as "lilac or purple".

Weiss & O'Brien (1953) list the following pests and diseases as attacking V. bipinnatifida in the United States: Cercospora verbenicola Ell. & Ev., a leaf-spot (in Texas), Phymatotrichum omni-

vorum (Shear) Dug., a root-rot (Texas), and Septoria verbenae Rob., a leaf-spot (Texas).

The R. Kral 25191, distributed as V. bipinnatifida, is actually V. elegans var. asperata Perry, while S. Y. Hu 9643 is V. tenuisecta Briq.

Additional citations: ALABAMA: Sumter Co.: R. Kral 38643 (W—2673933). ARKANSAS: Fannin Co.: Demaree 65418 (Ld). Hempstead Co.: Demaree 66371 (Ld). TEXAS: Coke Co.: W. King 242 (Ac), 243 (Ld). Edwards Co.: Demaree 63359 (Ld). Tom Greene Co.: Eckhardt 1571 (Kh), 1580 (Tu), 1756 (Mi). Travis Co.: L. C. Taylor 3034 (Mi).

VERBENA BONARIENSIS L.

Additional & emended bibliography: L., Sp. Pl., ed. 1, imp. 1, 1: 20. 1753; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Ruiz & Pav., Fl. Peruv. & Chil. 1: 21. 1798; A. P. Balf., Ann. & Bien. Fls. 85. 1863; Firminger, Man. Gard., ed. 3, 526 & 630. 1874; Voss in Vilm., Blumengärt., ed. 3, 1: 825 & 826. 1895; L., Sp. Pl., ed. 1, imp. 2, 1: 20 (1907) and ed. 1, imp. 3, 1: 20. 1907; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 201 & 202. 1912; Kloos, Nederl. Kruidk. Archief 1919: 96 & 97. 1919; L., Sp. Pl., ed. 1, imp. 4, 1: 20. 1934; Joshi in Kashyap, Lahore Dist. Fl. 193 & 194, fig. 166. 1936; Madrid Moreno, Declar. Virt. Arb. & Pl. 74, 75, & 170. 1936; Demaree, Taxodium 1: 60. 1943; Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 346, 354, 380, 396, 428, 440, 443, 451, & 464. 1974; Troncoso, Darwiniana 18: 308, 310, 311, & 409. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Additional illustrations: Joshi in Kashyap, Lahore Dist. Fl. 193, fig. 166. 1936.

Voss (1895) includes Verbena capensis Thunb. in the synonymy of V. bonariensis, but it seems, rather, to belong to the synonymy of Lippia javanica (Burm. f.) Spreng. He refers to V. bonariensis as the "Bonarisches Eisenkraut", remarking that in German gardens it blooms from June to October. He regards V. rigida Spreng. (which he calls V. bonariensis f. venosa) as being merely a lower-growing form.

Stewart (1972) says of this species as it occurs in Pakistan: "A weed from Brazil which seems to be spreading in Hazara. It has been found in Abb., Mansera and Thandiani". Cramer found it to be common along stream borders in Sri Lanka at 2100 meters altitude. Demaree found it on riverbottoms and in wet flat open woods and "very common" on levees in Arkansas. Joshi (1936) reports it as a " native of Brazil, but now naturalised in various parts of India".

The corollas are said to have been "lilac" in color on Hatschbach 54435 and "blue" and not scented on Cramer 3461. Madrid Moreno (1936) reports that the species possesses medicinal properties and records the vernacular names, "poleo", "poleo silvestre", and "locoloco". Balfour (1863) describes it as "A tall hardy perenni-

al growing 3—4 feet with rosy purple heads of flowers, rather a coarse plant but useful for massing in the semi-wild garden, and for cutting. Easily treated as a half-hardy annual."

The Moldenke & Moldenke 26836 specimen cited below is a transfer from the Bailey Hortorium herbarium.

Additional & emended citations: MISSISSIPPI: Perry Co.: Moldenke & Moldenke 26836 (Kh). ARKANSAS: Clark Co.: Demaree 62551 (Ac), 63969 (Ld), 66611 (Ld). Desha Co.: Demaree 65326 (Ac). BRAZIL: Santa Catarina: Hatschbach 54435 (W—2745063). MACARONESIA: Gomera: Andreas s.n. [Februar 1897] (Mu). SRI LANKA: L. H. Cramer 3461 (W—2721883).

VERBENA BRACTEATA Lag. & Rodr.

Additional & emended bibliography: Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 13. 1803; A. DC. in A. P. & A. DC., Pl. Rar. Jard. Genèv. 5: 22. 1830; Brannder & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 210. 1891; Georgia, Man. Weeds 345. 1914; Demaree, Taxodium 1: 60. 1943; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; Ebinger, Trans. Ill. Acad. Sci. 66: 119. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661. 1973; Hitchc. & Cronq., Fl. Pacif. Northw. 398, fig. 1a. 1973; Mahler, Fl. Taylor Co. 155 & 156. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786, 788, & 789. 1973; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 13. 1974; Moldenke, Phytologia 28: 346, 426, 427, & 429—431. 1974.

Additional illustrations: Hitchc. & Cronq., Fl. Pacif. Northw. 398, fig. 1a. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 789. 1973.

Kral has extended this species' range by finding it in sandy gravelly soil of a motel lot in Marion County, Alabama.

DeCandolle (1830) says: "Nous avons cultivé cette espèce [in the Jardin Botanique at Geneva, Switzerland], de graines envoyées du Chili par le docteur Bertero. Michaux, qui l'a décrite le premier, l'avait d'écouverte dans l'Amérique septentrionale." I have seen no material of this species from Chile, either wild or cultivated.

Fedde (1932) asserts in the volume index that this species is mentioned on page "841", but I fail to find any mention of it there.

Lehr found the plant "infrequent" at 5000 feet altitude in Arizona. The Jespersens refer to it as a "sprawling hispid herb to 18 inches tall, flowers small, bluish-purple" and found it growing on level grasslands associated with Lactuca, Evax, Buchloë, and Salsola at 3600 feet altitude. Eckhardt found the erect form as locally infrequent in alluvial limestone loam in a dry ravine, the flowers [corollas] "pale-blue". Demaree reports it as "very common" in old schoolyards in Arkansas.

Weiss & O'Brien (1953) record Puccinia vilfae Arth. & Holw., a rust, as attacking this species in Nevada and Septoria verbenae Rob., a leaf-spot, attacking it in Idaho, Kansas, South Dakota,

and Wisconsin.

Ebinger (1973) cites McClain 276 from Coles County, Illinois. Georgia (1914) recommends that, if this species becomes a "weed" "Only by a short rotation of cultivated crops is it practicable to rid the ground of the perennial roots and the dormant seeds of this species."

The O. B. Metcalfe 1008 specimen, cited below, is a transfer from the Pomona College herbarium from which it was previously cited by me.

Additional citations: ALABAMA: Marion Co.: R. Kral 39185 (W—2673932). KANSAS: Riley Co.: W. T. Swingle s.n. [June 23, 1887] (Mi); Varney s.n. [July 11, 1889] (Mi). ARKANSAS: Monroe Co.: Demaree 66906 (Ld). TEXAS: Moore Co.: Jespersen & Jespersen 2708 (Mi). Tom Green Co.: Eckhardt 1753 (Mi). NEW MEXICO: Sierra Co.: O. B. Metcalfe 1008 (N). ARIZONA: Yavapai Co.: Lehr 1035 (N).

VERBENA BRASILIENSIS Vell.

Additional bibliography: Demaree, Taxodium 1: 60. 1943; Moldenke, Phytologia 28: 346—347, 354, 362, 429, & 440. 1974.

Demaree refers to this plant as "common" in river bottoms, old war-trenches, waste areas, and disturbed woods in Arkansas, and found it on the coastal plain at altitudes of 120—380 feet.

The Moldenke & Moldenke 26819 specimen cited below is a transfer from the Bailey Hortorium herbarium. The Holm-Nielsen & Jeppesen 158, distributed as V. brasiliensis, is actually V. litoralis H.B.K.

Additional & emended citations: ALABAMA: Marion Co.: Moldenke & Moldenke 26819 (Kh). ARKANSAS: Arkansas Co.: Demaree 67575 (Ld). Ashley Co.: Demaree 67611 (Ld). Chicot Co.: Demaree 64751a (Ld), 67949 (Ld). Lafayette Co.: Demaree 69008 (Ld). Nevada Co.: Demaree 63389 (Ld), 63889 (Ld). Sevier Co.: Demaree 65277 (Ac), 68935 (Ld), 68936 (Ld). TEXAS: Hardin Co.: C. L. Lundell 14083 (Mi). Jefferson Co.: C. L. Lundell 14136 (Mi).

VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, Phytologia 28: 347, 385, & 440. 1974.

Krapovickas and his associates refer to this plant as "erect" and found it growing "in chacras", the corollas lilac in color; Hatschbach 17637 had "violet" corollas.

Additional citations: BRAZIL: Paraná: Hatschbach 17637 (Ld). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Carnevali, Quarín, González, & Isikawa 23981 (Ld).

VERBENA CANADENSIS (L.) Britton

Additional synonymy: Verbena aubletia var. drummondii Hort. ex Vilm., Illustr. Blumeng., ed. 2, 1043. 1879. Verbena obletia

Retz. ex Voss in Vilm., Blumengärt., ed. 3, 1: 825, in syn. 1895. Verbena aubletia f. lambertii (Sims) Voss in Vilm., Blumengärt., ed. 3, 1: 825. 1895. Verbena aubletia f. lambertii rosea Don ex Voss in Vilm., Blumengärt., ed. 3, 1: 825. 1895. Verbena aubletia f. drummondii Voss in Vilm., Blumengärt., ed. 3, 825. 1895. Verbena aubleti Woodrow, Gard. Trop., ed. 6, 445. 1910. Verbena aubletia compacta grandiflora Fogg, Dict. Ann. Pl. 164. 1972. Verbena canadensis (L.) Britton & Rose, in herb.

Additional bibliography: Ruíz & Pav., Fl. Peruv. & Chil. 1: 21. 1798; Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 13. 1803; Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1043. 1879; Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 210. 1891; Voss in Vilm., Blumengärt., ed. 3, 1: 825, pl. 48. 1895; Woodr., Gard. Trop., ed. 6, 445. 1910; Demaree, Taxodium 1: 60. 1943; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; Booth, Encycl. Ann. & Bien. Gard. Pl. 439. 1962; Wyman, Gard. Encycl., imp. 1, 1153 (1971) and imp. 2, 1153. 1972; Fogg, Dict. Ann. Pl. 164. 1972; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786, 788, & 789. 1973; Harkness, Seedlist Handb. 181. 1974; Howes, Dict. Useful Pl. 270. 1974; Jones & Bell, Trans. Ill. Acad. Sci. 67: 87. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 13. 1974; Moldenke, Phytologia 28: 347, 365, 369, 393, 428, 451, 457, 464, & 465. 1974; Troncoso, Darwiniana 18: 315 & 409. 1974.

Additional illustrations: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1043. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: pl. 48. 1895; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 789. 1973.

Voss (1895) calls this plant the "Aubletien-Eisenkraut", "verveine de Miquelon", and "verveine à bouquets". He distinguishes his named forms as follows: "Blätter.....oft mehr tief-3-spaltig [so bei f. Lambertii.....die Blätter schmäler und stark eingeschnitten, ebenso f. Lambertii rosea Don. mit grösser, hellrötlichpurpurn-gefärbter, wohlriechender Blumenkrone von fast 2 cm Breite].....f. Drummondii.....Blumenkrone 2 cm breit, mit weichhaariger Röhre, schwach wohlriechend, schön lilablau".

Fogg (1972) asserts that "V. aubletia (canadensis) is a valuable species [in cultivation] easily grown as a half-hardy annual. It produces heads of rosy-lilac flowers and there are several forms, including compacta grandiflora, with larger flowers and of a more compact habit of growth, and atroviolacea, rich violet flowers." Harkness (1974) describes the color of the corollas as "rosy-purple to white".

Vilmorin (1879) calls the species the "aubletia artiges Eisenkraut" and "aubletia-like vervain".

Busey encountered this species in clayey soil among grasses and Allium in Missouri. The corollas on Busey 87 are said to have been "bright-violet" when fresh. Demaree reports it as "common" on marl ridges, poor rocky ridges, and rocky wooded hill-

sides in Arkansas.

Weiss & O'Brien (1953) list Puccinia vilfae Arth. & Holw., a rust, as attacking this species in Oklahoma and Septoria verbenae Rob., a leaf-spot, in Louisiana and Oklahoma.

Jones & Bell (1974) record V. canadensis from Piatt County, Illinois. The Moldenke & Moldenke 26974 specimen cited below is a transfer from the Bailey Hortorium herbarium.

Additional & emended citations: GEORGIA: Baldwin Co.: Moldenke & Moldenke 26974 (Kh). FLORIDA: Duval Co.: G. H. M. Lawrence 193 (Ld). KANSAS: Riley Co.: Varney s.n. [May 28, 1889] (Mi). MISSOURI: Sainte Genevieve County: Busey 87 (N). ARKANSAS: Baxter Co.: Demaree 66284 (Ac). Howard Co.: Demaree 68200 (Ld). Marion Co.: Demaree 66270 (Ld). Sevier Co.: Demaree 68192 (Ld). Stone Co.: Demaree 67015 (Ld). TEXAS: Harris Co.: Tharp & Barkley 17T030 (Mi).

VERBENA CANESCENS H.B.K.

Additional bibliography: A. R. Moldenke, Host-plant Relations [12]. 1968; Moldenke, Phytologia 28: 348 & 464. 1974.

The Taylors encountered this plant in thin coarse well-drained soil in an area of mountainous ridges with oak-pine the major vegetation, while King encountered it in "weakly calcareous fine sandy loam with pebbles and sandstone on sandy conglomerate on strong slopes" and in "10--28-inch sand to loamy sand over sandy clay loam."

Andrew Moldenke (1968) reports from personal observation that this plant is visited by the phytophagous beetle, Calligrapha multipunctata, in Mexico.

Additional citations: TEXAS: Coke Co.: W. King 241 (Ld), 857 (Mi), 1720 (Ac). MEXICO: Zacatecas: Taylor & Taylor 5945 (N).

VERBENA CANESCENS f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 219. 1972; Harkness, Seedlist Handb. 181. 1974.

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: Moldenke, Phytologia 28: 348. 1974.

Recent collectors have found this plant growing in red clay loam and in rocky limestone loam and report the common name "hillside vervain". White reports it as "infrequent" in Tom Green County, Texas. The corollas on Eckhardt 380 are said to have been "blue", while those on M. F. White 258 were "purple".

The D. B. Dunn 16070, distributed as V. canescens var. roemeriana, is actually V. neomexicana var. hirtella Perry.

Additional citations: TEXAS: Irion Co.: Eckhardt 380 (Sl). Tom Green Co.: M. F. White 258 (Sl).

VERBENA CAROLINA L.

Additional bibliography: L., Syst. Nat., ed. 10 [Stockh.], 2:

852 (1759) and ed. 10 [Halle], 2: 852. 1760; Ruíz & Pav., Fl. Peruv. & Chil. 1: 21. 1798; Moldenke, Phytologia 28: 348, 377, 432, & 451. 1974.

The Taylors encountered this plant on a rocky hillside "with tropical deciduous vegetation, soil thin, sandy, with gravelly-peat in some places", flowering and fruiting in August.

Additional citations: MEXICO: Zacatecas: Taylor & Taylor 6056 (N).

VERBENA CILIATA Benth.

Additional bibliography: Booth, Encycl. Ann. & Bien. Gard. Pl. 439. 1962; Moldenke, Phytologia 28: 348, 398, 431, 457, & 464. 1974.

The Taylors found this plant growing in oak-pine grassland on rocky hills with thin gravelly soil in Zacatecas, while Demaree refers to it as "common" on rocky open mountainsides in New Mexico and Wentworth encountered it in pine-oak woodland in Arizona.

The leaf-lobes on Wentworth 1622, cited below, are unusually large and broad. The Wentworth 1333/1333a, distributed as V. ciliata, is actually V. ambrosifolia f. eglandulosa Perry.

Additional citations: NEW MEXICO: Lincoln Co.: Demaree 62604 (Ld). ARIZONA: Cochise Co.: Wentworth 1039 (N, N), 1622 (It), 2299 (N), 2840 (N). Navajo Co.: W. H. Earle 52 (N). MEXICO: Zacatecas: Taylor & Taylor 6231 (N).

VERBENA CILIATA var. PUBERA (Greene) Perry

Additional bibliography: Moldenke, Phytologia 28: 205. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974.

VERBENA CLOVERAE Moldenke

Additional bibliography: Moldenke, Phytologia 28: 205. 1974.

King found this plant growing in "10--28 inch sand to loamy sand over sandy clay loam on gentle slopes".

Additional citations: TEXAS: Coke Co.: W. King 1503 (Z). Frio Co.: C. L. Lundell 13618 (Mi).

VERBENA COMONDUENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 368. 1972; Heslop-Harrison, Ind. Kew. Suppl. 15: 142. 1974.

xVERBENA CORRUPTA Moldenke

Additional synonymy: Verbena phlogiflora x chamaedryfolia Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895; Moldenke, Phytologia 23: 193--194 & 276. 1972.

Voss (1895) says of this hybrid: "Aus einer Kreuzung V. phlogiflora x chamaedryfolia enstand in den Gärten vor langer Zeit eine Sorte, Verbena 'Défiance', die schön und dankbar blüht, scharlachrote, grosse Blütendolden trägt, zu Blumenteppichen und -gruppen allgemain beliebt ist und nebst ihren Stamm-Eltern als 'Scharlach-

Verbenen' bezeichnet wird. 'Défiance' ist seit ein paar Jahren durch den aus ihr hervorgegangenen Sämling 'Nordlicht' übertroffen, der eine 20—25 cm hohe Sorte von kräftigem, gedrungenem Wuchs ist. Die bis 7 und 8 cm breiten, regelmässig geformten Blütendolden erscheinen von Ende Mai bis Oktober, und die 2 — 2 1/2 cm breiten Einzelblüten sind feurigorangescharlachrot; eignet sich vortrefflich zu Einfassung, Gruppen und, in Töpfen kultiviert, als Marktpflanze!" It should be noted, however, that he is undoubtedly in error in his statement that V. phlogiflora is also known as one of the "Scarlet Verbenas" in gardens. Its corollas are never of any color that could possibly be termed scarlet!

VERBENA CORYMBOSA Ruíz & Pav.

Additional bibliography: Moldenke, Phytologia 28: 348. 1974; Troncoso, Darwiniana 18: 310, 311, & 411. 1974.

Troncoso (1974) cited "Wedermann" [=Werdermann] 1170 from Valdivia, Chile, in the Darwinion herbarium at San Isidro.

VERBENA CRITHMIFOLIA Gill. & Hook.

Additional bibliography: Moldenke, Phytologia 28: 205. 1974; Troncoso, Darwiniana 18: 315, 317, 318, & 409. 1974.

Troncoso (1974) cites Bacigalupi & Nicora s.n. [Paso Córdoba; BAA 11612] from Río Negro, Argentina.

VERBENA CUMINGII Moldenke

Additional bibliography: Moldenke, Phytologia 23: 221. 1972.

Zöllner found this plant in flower in September.

Additional citations: CHILE: Coquimbo: Zöllner 7872 (Ld).

xVERBENA DEAMII Moldenke

Additional bibliography: Heslop-Harrison, Ind. Kew. Suppl. 15: 142. 1974; Moldenke, Phytologia 28: 349 & 429. 1974.

xVERBENA DERMENI Moldenke

Additional bibliography: Moldenke, Phytologia 23: 222 (1972) and 24: 31. 1972.

VERBENA DOMINGENSIS Urb.

Additional bibliography: Moldenke, Phytologia 28: 206 & 362. 1974.

Liogier describes this plant as "herbácea erguida, de hasta 60 cm. de alto, poco ramificada, flores moradas".

Material has been misidentified and distributed in some herbaria as V. scabra Vahl.

Additional citations: HISPANIOLA: Dominican Republic: A. H. Liogier 20675 (N).

VERBENA ELEGANS var. ASPERATA Perry

Additional bibliography: Moldenke, Phytologia 28: 349. 1974.

Kral found this plant growing in sandy clay of old fields. The

corollas on R. Kral 25191 are said to have been "lavender" when fresh.

Additional citations: MEXICO: Michoacán: R. Kral 25191 (Mi).

xVERBENA ENGELMANNII Moldenke

Additional bibliography: Demaree, Taxodium 1: 60. 1943; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 788. 1973; Moldenke, Phytologia 28: 349--350, 390, 426, 427, 429, & 464. 1974.

Demaree has found this plant growing in rocky open woods at 600 feet altitude in Arkansas.

Additional citations: ARKANSAS: Baxter Co.: Demaree 67493 (Ld).

VERBENA EPHEDROIDES Cham.

Additional bibliography: Moldenke, Phytologia 28: 350. 1974; Troncoso, Darwiniana 18: 311 & 411. 1974.

VERBENA FILICAULIS Schau.

Additional synonymy: Verbena filicaudis Sch. ex Troncoso, Darwiniana 18: 311, sphalm. 1974.

Additional bibliography: Moldenke, Phytologia 28: 350 & 464. 1974; Troncoso, Darwiniana 18: 311, 411, & 412. 1974.

VERBENA FLAVA Gill. & Hook.

Additional bibliography: Moldenke, Phytologia 24: 217. 1972; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA GLABRATA H.B.K.

Additional bibliography: Moldenke, Phytologia 28: 210. 1974.

Additional citations: ECUADOR: Cotopaxi: Holm-Nielsen & Jeppesen 1147 (N).

VERBENA GLANDULIFERA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 233--234. 1972; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA GLUTINOSA Kuntze

Additional synonymy: Glandularia glutinosa (O. Ktze.) Schn. & Cov. ex Troncoso, Darwiniana 18: 318. 1974.

Additional bibliography: Moldenke, Phytologia 28: 210 & 457. 1974; Troncoso, Darwiniana 18: 318. 1974.

VERBENA GOODDINGII Briq.

Additional bibliography: H. R. & B. Mockel, Mockel's Desert Flow. Book 258--259. 1970; Moldenke, Phytologia 28: 350 & 431. 1974.

Additional illustrations: H. R. & B. Mockel, Mockel's Desert Flow. Book 259. 1970.

Thorne found this species growing on dry rocky slopes with Pinus monophylla, Juniperus osteosperma, Prunus fasciculata, Yucca schidigera, Echinocereus spp., Opuntia spp., Ephedra, etc. in pinyon-juniper woodland, while Thorne & Tilforth encountered

it on dry rocky slopes in pinyon-juniper woodland with Juniperus osteosperma, Yucca baccata, Prunus fasciculata, Brickellia incana, Haplopappus linearifolius, Ephedra spp., Salvia spp., etc. The corollas are said to have been "purple" on Thorne & Tilforth 43934.

The Mockels (1970) refer to this species as the "Goodding Verbena" and comment that "This is a true verbena [in contrast to Abronia, the sand-verbenas], which is confined to elevations of 4000 to 6500 ft. The perennial is found in the mountains of the eastern Mohave Desert. It grows in isolated clumps and blooms during May. The flowers are typically clustered at the top of the stems, not many opening at the same time. Due to the plain background formed by desert shrubs, not in their prime in this location, the vividly colored clumps of the verbenas are pleasantly surprising and surely cannot be missed or overlooked. This land is used to graze cattle for no more apparent reason than that it is outdoors. Feed is scant and it must take 5 years to grow a yearling. Whatever isn't chewed off is trampled down, so the development of native flora is hard to follow. We have found this plant blooming at 4800 ft. in late September in southern Arizona".

The F. R. Fosberg 7911 specimen cited below is a transfer from the Pomona College herbarium.

Additional citations: CALIFORNIA: San Bernardino Co.: Thorne 43322 (N); Thorne & Tilforth 43934 (N). MEXICO: Sonora: F. R. Fosberg 7911 [915] (N).

VERBENA GRACILESCENS (Cham.) Herter

Additional bibliography: Moldenke, Phytologia 28: 350—351. 1974; Troncoso, Darwiniana 18: 309, 311, & 412, fig. 2. 1974.

Additional illustrations: Troncoso, Darwiniana 18: 309, fig. 2. 1974.

VERBENA GRACILIS Desf.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895; Moldenke, Phytologia 28: 212 & 256. 1974.

VERBENA GUARANITICA (Troncoso) Moldenke

Additional bibliography: Moldenke, Phytologia 28: 351. 1974; Troncoso, Darwiniana 18: 319 & 409. 1974.

VERBENA HALEI Small

Additional bibliography: Mahler, Fl. Taylor Co. 155 & 156. 1973; Moldenke, Phytologia 28: 351, 362, & 432. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974.

According to Stuckey & Wentz (1974) there is an isotype of V. leucanthemifolia Greene in the herbarium of Ohio State University: it was collected at Abilene, Texas, on May 19, 1902.

Eckhardt reports V. halei "locally frequent in rocky limestone loam of disturbed areas", while King found it growing in "fine sandy loam to clay loam", "in brown calcareous sandy loam to clay loam", and in "neutral fine sandy loam to clay loam on gentle

slopes". The corollas are said to have been "blue" on Eckhardt 982.

Demaree reports the species as "common" on poor clay ridges and wide roadsides in Arkansas; he also found it growing on rocky ridges and in river bottoms at altitudes of 220—715 feet. Mahler (1973) records the common name. "candelabra vervain".

The Moldenke & Moldenke 26908 specimen cited below is a transfer from the Bailey Hortorium herbarium.

Additional & emended citations: GEORGIA: Dougherty Co.: Moldenke & Moldenke 26908 (Kh). FLORIDA: Walton Co.: Moldenke & Moldenke 26734 (Mi). MISSISSIPPI: Jackson Co.: Skehan s.n. [Seymour & Earle 109a] (N). ARKANSAS: Clark Co.: Demaree 67824 (Ld). Hempstead Co.: Demaree 61670 (Ac). Howard Co.: Demaree 67147 (Ac, Ld, Tu). Montgomery Co.: Demaree 66412 (Ld). TEXAS: Coke Co.: W. King 320 (Mi), 459 (Ld), 689 (Ac). Tom Green Co.: Eckhardt 982 (Sl).

VERBENA HASSLERANA Briq.

Additional synonymy: Glandularia hasslerana (Briq.) Tronc., Darwiniana 18: 317. 1974.

Additional bibliography: Moldenke, Phytologia 28: 351, 441, 457, & 464. 1974; Troncoso, Darwiniana 18: 317, 319, 409, & 412. 1974.

Troncoso (1974) cites Krapovickas & al. 21608 from Corrientes, Argentina, and Pedersen 5234 from Paraguay, both deposited in the Darwinion herbarium at San Isidro, Argentina.

VERBENA HASTATA L.

Additional synonymy: Verbena americana altiss. spica multipl. urticaefol. angustis, fl. caeruleis Herm. ex Kloos, Nederl. Kruidk. Archief 1919: 96, in syn. 1919.

Additional & emended bibliography: Breyn., Prod. Fasc. Rar. Pl., ed. 1, 2: 104. 1688; L., Sp. Pl., ed. 1, imp. 1, 1: 20. 1753; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Ruíz & Pav., Fl. Peruv. & Chil. 1: 21. 1798; Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 14. 1803; Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 210. 1891; L., Sp. Pl., ed. 1, imp. 2, 1: 20 (1907) and ed. 1, imp. 3, 1: 20. 1907; Georgia, Man. Weeds 344—345, fig. 238. 1914; M. R. Gilmore, Bur. Am. Ethnol. Ann. Rep. 33: 111, 144, 146, & 147. 1919; Kloos, Nederl. Kruidk. Archief 1919: 96—97. 1919; F. E. Clements, Pl. Succ. & Indicat. 375. 1928; Krause in Just, Bot. Jahresber. 48 (1): 635. 1929; L., Sp. Pl., ed. 1, imp. 4, 1: 20. 1934; Kamm, Old Time Herbs., imp. 1, 118. 1938; Demaree, Taxodium 1: 60. 1943; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; Kamm, Old Time Herbs, imp. 2, 118. 1971; Wyman, Gard. Encycl., imp. 1, 1153 (1971) and imp. 2, 1153. 1972; Ebinger, Trans. Ill. Acad. Sci. 66: 119. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661. 1973; Hitchc. & Cronq., Fl. Pacif. Northw. 398 & 730, fig. 2a. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786—788. 1973; Freder-

ick, Ohio Journ. Sci. 74: 111. 1974; Harkness, Seedlist Handb. 181. 1974; Howes, Dict. Useful Pl. 7 & 270. 1974; Jones & Bell, Trans. Ill. Acad. Sci. 67: 87. 1974; Lust, Herb Book, ed. 1, 126—127 & 440. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 14. 1974; Moldenke, Phytologia 28: 349, 351—352, 358, 359, 387, 401, 426, 427, 429, 430, 451, & 464. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 376, 473, 503, 550, 643, & 788. 1974; E. R. Spencer, All About Weeds [circular]. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Additional & emended illustrations: Georgia, Man. Weeds 345, fig. 238. 1914; Camp, Boswell, & Magness, World in Your Gard., imp. 1, [83] (in color) (1957) and imp. 2, [83] (in color). 1959; Hitchc. & Cronq., Pl. Pacif. Northw. 398, fig. 2a. 1973; Straughsbaugh & Core, Fl. W. Va., ed. 2, 3: 787. 1973; Lust, Herb Book, ed. 1, 126. 1974.

Howes (1974) records the common name, "American blue vervain", for this species. Gilmore (1919) calls it the "wild blue verbena" and records the Dakota Amerind name "cha^{n}háloga pezhuta" and the Omaha Amerind name "pezhe maka^{n}". He states that among the Teton Dakotas the leaves were boiled for a drink as a remedy for stomachache, while the Omahas steeped the leaves just to make a beverage like tea. Chesnut (1902) reports that in Mendocino County, California, this species [most probably its var. scabra Moldenke] "grows in the greatest profusion in the swampy bottom lands of Round Valley, and furnishes the Concow Indians, who alone seem to use the plant, with an abundance of small seeds which are used for pinole."

Another common name recorded for the species is "hastateleaf vervain". Kloos (1919)records it as adventive in the Netherlands. Frederick (1974) records it from Champaign County, Ohio, but comments that it is there "Frequent only in bog meadow", flowering there in late August. Jones & Bell (1974) encountered it in Piatt County, Illinois, while Ebinger (1973) cites Ebinger 5802 from Coles County.

Weiss & O'Brien (1953) record the following pests and diseases from V. hastata in the United States: Erysiphe cichoracearum DC., a powdery mildew (general), Phyllosticta verbenicola G. Martin, a leaf-spot (in New Jersey), Puccinia vilfae Arth. & Holw., a rust (Indiana to Oklahoma and South Dakota), and Septoria verbenae Rob., a leaf-spot (Vermont to Mississippi, Texas, and South Dakota).

Harkness (1974) describes the corollas as "violet". Georgia (1914) tells us that if this species should become a "weed" "Small areas may be grubbed out or hand-pulled when the ground is soft; but land badly infested with this weed should be put under cultivation for a short rotation, in order that its perennial roots and dormant seeds may be cleaned from the soil."

The "E. W. Hart 4", cited in a previous installment of these notes, should have been cited as H. H. Marshall 4.

As stated previously, it is most probable that many, if not all, of the specimens cited as typical V. hastata from the western portions of North America, and the west-central portions as well, are actually var. scabra Moldenke, The following collections, previously cited by me as typical V. hastata, have been re-examined recently and prove to represent var. scabra instead: R. Adams s.n. [Sept. 8, 1871], Ballard s.n. [Swan Lake, July 1892], Beattie & Chapman 2188, Benke 368, H. F. Bergman 2335, Brenckle 42-532 & 4608, B. T. Butler 4292, Chesnut 584, J. H. Christ 5962, 6881, & 12958, Christ & Ward 8386, J. A. Clark 253, F. Clements 2719, J. H. Cowan 405, J. M. Cowan s.n. [July 11, 1893], Cronquist 1095, Degener & Degener 26129, Eastwood 41, English 477, Ferris & Duncan 3513, Gessel s.n. [July 29, 1939], M. L. Grant 3073, Grassl 2610, V. L. Harms 1107, B. F. Harrison 9217 & 11865, J. B. Hatcher s.n. [July 1886], Herb. State Agric. Coll. 2015, Hitchcock & Muhlick 21937, Holzinger s.n. [July 1901], W. H. Horr 4228, Jepson s.n. [Lower Sacramento, Sept. 1891], P. Johnson 545, E. L. Johnston 507a & 507b, M. E. Jones 523, T. S. Kellogg s.n. [August 1, 1888], Kreager 469, F. E. Lloyd s.n. [11 July 1894], Lunell s.n. [Butte, August 4, 1907], s.n. [August 28, 1911], & s.n. [August 5, 1914], J. F. Macbride 304, D. T. MacDougal 566, Macoun s.n. [Aug. 12th 1887], M. Maguire 20098, H. H. Marshall 4, W. F. Marshall 2016, McCosh s.n. [July-Aug. 1878], McCosh & Greene s.n. [Denver, Aug. 22, 1877], E. D. McDonald s.n. [July 11, 1940], R. L. McGregor 12699, Mearns 526, s.n. [August 31, 1891], F. P. Metcalf 427, Mulford s.n. [Boise, July '92], A. Nelson 2208, 2258, Osterhout s.n. [July 22, 1901], Over 14384, Edw. Palmer s.n. [1869], Parry, Bigelow, Wright, & Schott s.n. [near the Copper Mines], E. L. Reed 4034, Richardson & Robertson 1256, C. M. Rogers 4981, Rust 209, Rydberg 933 & 1515, Rydberg & Imler 1080, E. P. Sheldon S. 11167, Shunk & Manning 132, H. G. Smith s.n. [Denver, Aug. 1888], O. A. Stevens s.n. [Aug. 20, 1946], Suksdorf s.n. [prope Bingen, VII. 1904], Swallen s.n. [Douglas Lake, July 1924], Swingle s.n. [Three Forks, July 21, 1933], Terrell 1777, R. Thomson 158 & 302, Tidestrom 1718, Tweedy 2664, Van Bruggan 1365, Waterfall 2462, S. Watson 822, Wilkes s.n. [Lower Sacramento], R. S. Williams 692, T. A. Williams s.n. [Weeping Water], Wooton s.n. [Crain's Ranch, July 14, 1900], and Wright 553.

The Swingle s.n. [Manhattan, Aug. 3, 1887], distributed as V. hastata, is actually xV. rydbergii Moldenke.

Additional citations: MASSACHUSETTS: Franklin Co.: Poland s.n. [3 Aug. 1951] (N). NEW YORK: Chemung Co.: Moldenke & Moldenke 28840 (Gz, Kh, Tu). NEW JERSEY: Somerset Co.: Moldenke & Moldenke 28690 (Gz, Kh, Ld). PENNSYLVANIA: Susquehanna Co.: Moldenke & Moldenke 28788 (Ld). INDIANA: Greene Co.: Friesner 22294 (Mi).

VERBENA HASTATA var. SCABRA Moldenke

Additional bibliography: Chesnut, Contrib. U. S. Nat. Herb. 7: 383. 1902; Moldenke, Phytologia 28: 216, 218, & 429. 1974.

Chesnut (1902) speaks of this plant from Mendocino County, California, as V. hastata and reports that it "grows in the greatest profusion in the swampy bottom lands of Round Valley, and furnishes the Concow Indians, who alone seem to use the plant, with an abundance of small seeds which are used for pinole."

Collectors have found the plant growing in moist meadows, pastures, ditch banks, open woods, riverbeds, wet swamplands, marshes, riverbanks, fields in low ground, the edges of old channels, fencerows, and the edges of marshes and sloughs, on hills and sand hills, rocky riverbanks, in sandy soil of lake margins, weedy open areas by lakes, and sandy loam on creek banks, at altitudes of 440 to 7000 feet, flowering and fruiting from June to September. Maguire refers to it as a "common weed in wet places throughout [the] Cache Valley [Utah] along canal banks"; Marshall found it "not common in bottom of small ravine" in Manitoba. Hitchcock & Muhlick describe it as "several-stemmed, erect....calyx turning to greenish-purple".

Mearns asserts that it is "common in wet places" in Minnesota; Richardson & Robertson refer to it as "common in moist soil around lakes" in Nebraska; and Waterfall found it growing "near creek in old fields with Cephalanthus-Diospyros succession". Tidestrom refers to it as abundant along roadsides in Utah and Williams as common along roadsides in Nebraska. Harrison encountered it in boggy seeps associated with Salix amygdaloides, Juncus, Carex, and grasses; Beattie & Chapman found it to be "common" on hills in Washington, Rogers as "scattered in dampish soil" in Colorado, and McGregor as "scattered in moist ravines in sandy bluestem prairie pastures".

The corollas are said to have been "purple" on Hitchcock & Muhlick 21937 and "bluish-purple" on Mearns 526. Pollen samples were taken by M. Strick on January 20, 1972, from the V. L. Harms 1107 specimen in the Britton Herbarium. Common names for the plant reported are "American vervain" and "blue vervain".

Material of this variety has been almost uniformly identified in the past as V. hastata L., but occasionally a V. urticifolia L. because of the roughness of the leaves.

Additional citations: QUEBEC: Jacques Cartier Co.: Degener & Degener 26129 (N). MANITOBA: Lisgar Co.: H. H. Marshall 4 (N). VANCOUVER ISLAND: Macoun s.n. [Aug. 12th 1887] (C). IOWA: Jasper Co.: Van Bruggan 1365 (N). MICHIGAN: Cheboygan Co.: Swallen s.n. [Douglas Lake, July 1924] (W--1631173). Menominee Co.: Grassl 2610 (Mi, N). WISCONSIN: Brown Co.: T. S. Kellogg s.n. [De Pere, August 1, 1888] (W--259280). Calumet Co.: Benke 386 (W--1521469). MINNESOTA: Becker Co.: M. L. Grant 3073, in part (W--1487037); Terrell 1777 (W--2388680). Douglas Co.: E. D. McDonald s.n. [July 11, 1940] (W--1888485). Hennepin Co.: Mearns 526, in part (C). Le Sue-

ur Co.: Shunk & Manning 132 (W--1623243). Nicollet Co.: Ballard s.n. [Swan Lake, July 1892] (S, W--77393). Ottertail Co.: P. Johnson 545 (Bt--63945, Ky, N). Ramsey Co.: Mearns 526, in part (W--649507, W--649508), s.n. [Fort Snelling, July 11, 1891] (W--670316). Winona Co.: Holzinger s.n. [July 1901] (N). Yellow Medicine Co.: Brenckle 4608 (N). NORTH DAKOTA: Benson Co.: Lunell s.n. [Butte, August 4, 1907] (Du--75591, N, N), s.n. [Butte, August 28, 1911] (W--893168), s.n. [Pleasant Lake, August 5, 1914] (W--893169). McLean Co.: F. P. Metcalf 427 (W--1070875). Richland Co.: H. F. Bergman 2335 (N); O. A. Stevens s.n. [Kindred, Aug. 20, 1946] (W--1973378). Rolette Co.: Wright 553 (N). SOUTH DAKOTA: Fall River Co.: Rydberg 933 (W--210965). Roberts Co.: Over 14384 (W--1242262). Spink Co.: Brenckle 47-532 (N). Washabaugh Co.: Over 7079 (Se--14935). KANSAS: Franklin Co.: McGregor 12699 (W--2230403). Jefferson Co.: W. H. Horr 4228 (N). Scott Co.: V. L. Harms 1107 (N); Rydberg & Imler 1080, in part (N). MONTANA: Cascade Co.: R. S. Williams 692 (N). Gallatin Co.: D. B. Swingle s.n. [Three Forks, July 21, 1933] (Mi). Jefferson Co.: B. T. Butler 4292 (N). Ravalli Co.: Hitchcock & Muhlick 21937 (N). Wheatland Co.: R. Adams s.n. [Fish Creek, Sept. 8, 1871] (W--2359141). IDAHO: Ada Co.: Christ & Ward 8386 (N); J. A. Clark 253 (W--543438); Mulford s.n. [Boise, July '92] (C). Canyon Co.: J. F. Macbride 304 (W--542255). Kootenai Co.: Rust 209 (W--870175). Latah Co.: J. H. Christ 6881 (N). Lemhi Co.: J. H. Christ 5962 (N). Nez Perce Co.: J. H. Christ 12958 (N). WYOMING: Sheridan Co.: A. Nelson 2208 (N), 2258 (W--284732); Tweedy 2664 (N). County undetermined: McCosh s.n. [July-Aug. 1878] (Pr). UTAH: Cache Co.: Cronquist 1095 (N, Ua--47396); Gessel s.n. [July 29, 1939] (N, Ua--47394); C. B. Maguire 20098 (N, N, Ua--47395). Salt Lake Co.: S. Watson 822 (W--77395). Utah Co.: B. F. Harrison 9217 (W--1825701), 11865 (W--2098708); M. E. Jones 1487 (Br, Go, Po--70993, Sg--16089, Ua--11383); Tidestrom 1718 (S, W--507241). COLORADO: Denver Co.: Eastwood 41, in part (Bl--42319, Gg--31325, St--22946, W--582287); McCosh & Greene s.n. [Denver, Aug. 22, 1877] (Pr); H. G. Smith s.n. [Denver, Aug. 1888] (W--77396). Jefferson Co.: M. E. Jones 523 (Br, Du--151783, N, Po--70994, Ua--11382). Larimer Co.: J. H. Cowen 405 (W--254915); J. M. Cowan s.n. [July 11, 1893] (N); Herb. State Agric. Coll. 2015 (Fc, N, Vt, W--489491); W. F. Marshall 2016 (W--489492); Osterhout s.n. [July 22, 1901] (N, Po--63893). Las Animas Co.: C. M. Rogers 4981 (W--2053370). Weld Co.: E. L. Johnston 507a (N), 507b (W--768891). NEBRASKA: Cass Co.: T. A. Williams s.n. [Weeping Water] (W--750408). Dundy Co.: Richardson & Robertson 1256 (N). Hooker Co.: Rydberg 1515 (N, W--210370). Knox Co.: F. E. Clements 2719 (Ka, W--77394). Garden

Co.: R. Thomson 302 (N, W--789095). Sheridan Co.: J. B. Hatcher s.n. [July 1886] (Pr). County undetermined: R. Thomson 158 [Rat Lake] (W--788961). OKLAHOMA: Oklahoma Co.: Waterfall 2462 (N). TEXAS: Hemphill Co.: E. L. Reed 4034 (W--1697865). Oldham Co.: Ferris & Duncan 3513 (N). NEW MEXICO: Dona Ana Co.: Parry, Bigelow, Wright, & Schott s.n. [Valley of the Rio Grande] (W--77399). Socorro Co.: Wooton s.n. [Crain's Ranch, July 14, 1900] (N). ARIZONA: Coconino Co.: D. T. MacDougal 566 (N). County undetermined: Edw. Palmer s.n. [Arizona, 1869] (W--77400). WASHINGTON: Clark Co.: English 477 (W--1620266). Klickitat Co.: Suksdorf s.n. [prope Bingen, VII.1904] (N). Okanogan Co.: Dillon 842 (Ca--739564, Pl--151100, Se--94450). Stevens Co.: Beattie & Chapman 2188 (W--1871410); Kreager 469 (N, Pl--22577, Se--68697, Um--225, W--441285). Yakima Co.: L. F. Henderson s.n. [June 19, '92] (Se-14943). OREGON: Linn Co.: F. E. Lloyd s.n. [11 July 1894] (N). Multnomah Co.: E. P. Sheldon 11167 (Du--96562, Du--104990, Pl--22573), S.11167 (N, Po--70995). CALIFORNIA: Mendocino Co.: Chesnut 584 (W--430636). Sacramento Co.: Jepson s.n. [Lower Sacramento, Sept. 1891] (C); Wilkes s.n. [Lower Sacramento] (W--77398).

VERBENA HISPIDA Ruíz & Pav., Fl. Peruv. & Chil. 1: 22--23, pl. 34a, fig. 1--5. 1798.

Additional & emended bibliography: Ruíz & Pav., Fl. Peruv. & Chil. 1: 22--23, pl. 34a, fig. 1--5. 1798; Moldenke, Phytologia 28: 352--353, 362, 380, 446, & 451. 1974; Troncoso, Darwiniana 18: 310, 311, & 412. 1974.

Emended illustrations: Ruíz & Pav., Fl. Peruv. & Chil. 1: pl. 34a, fig. 1--5. 1798.

Troncoso (1974) cites Pedersen 4018 from Paraguay, Hicken 16 from Valparaiso, Chile, Buchtien s.n. [Cotaña am Ihmani; Herb. Inst. Darwinion 3387] from Bolivia, and Venturi 825 from Tucumán, Argentina, all in the Darwinion herbarium at San Isidro.

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, Phytologia 28: 353. 1974; Troncoso, Darwiniana 18: 315, 317, 318, & 409. 1974.

Troncoso (1974) cites Cabrera & al. 16760 from Catamarca, Argentina, in the Darwinion herbarium at San Isidro, Argentina.

xVERBENA HYBRIDA Voss

Additional synonymy: Verbena hybrida Hort. ex Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1045. 1879. Verbena hybrida var. auriculaeflora Hort. ex Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1046. 1879. Verbena hybrida var. striata Hort. ex Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1046--1047. 1879. Verbena teucriodes x phlogiflora Voss in Vilm., Blumengärt., ed. 3, 1:

827. 1895. Verbena hybrida unicolor Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. atropurpurea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. atrosanguinea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. atroviolacea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. candidissima Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. coccinea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. coerulea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. compacta Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. cupreata Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. erecta Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida unicolor f. foliis aureis Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora Boss ex Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. carminea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. cinnabarina Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. coccinea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. coerulea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. nigroviolacea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. oculata Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida auriculaeflora f. violacea Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida striata Voss in Vilm., Blumengärt., ed. 3, 1: 828. 1895. Verbena hybrida oculata Hort. ex Voss in Vilm., Blumengärt., ed. 3, 1: 828, in syn. 1895. Verbena hybrida auriculaeflora f. stellata carminea Hort. ex Voss in Vilm., Blumengärt., ed. 3, 1: 828, in syn. 1895. Verbena hybrida auriculaeflora f. stellata violacea Voss in Vilm., Blumengärt., ed. 3, 1: 828, in syn. 1895. Verbena hybrida Vossler, in herb.

Additional bibliography: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1045--1047. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 825 & 827--829, pl. 49. 1895; Kamm, Old Time Herbs, imp. 1, 121. 1938; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; W. H. Camp in Camp, Boswell, & Magness, World in Your Gard., imp. 1, 82 & [83] (1957) and imp. 2, 82 & [83]. 1959; Booth, Encycl. Ann. & Bien. Pl. 439--440. 1962; A. P. Balf., Ann. & Bien. Fls. 85--86. 1963; Kamm, Old Time Herbs, imp. 2, 121. 1971; Wyman, Gard. Encycl., imp. 1, 49, 336, 493, & 1153 (1971) and imp. 2, 49, 336, 493, & 1153. 1972; Fogg, Dict. Ann. Pl. 164. 1972; D. Burpee, Burpee Seeds 1975: 48. 1974; Moldenke, Phytologia 29: 343, 353, 361, 369, 371, 380, 444, 451, & 464. 1974.

Additional & emended illustrations: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1045 & 1046. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 828, pl. 49. 1895; D. Burpee, Burpee Seeds 1975: 48 (in color). 1974.

Ruiz-Terán & López-Palacios refer to this plant as a "Sufrútice cultivado como ornamental, más o menos cespitoso. Flores de color muy variable: blancas, blanco-rosáceas, rosadas, rojo intensas, ametístinas etc.", flowering in September in Venezuela.

Voss (1895) gives an excellent description of the cultivated varieties and forms of this plant as they existed in his day. He claims that they arose from three crosses: (1) V. peruviana and V. phlogiflora giving rise to the "Einfarbige oder Scharlach-Verbenen" which he classifies as V. hybrida unicolor, (2) V. platensis and V. phlogiflora giving rise to the "Aurikelblütige oder Geäugelte Verbenen" which he calls V. hybrida auriculaeflora, and (3) V. tenera and V. incisa giving rise to the "Bunte oder Italienische Verbenen" which he calls V. hybrida striata. Descriptions are given in the work cited for all his Latin-named forms and he also describes forms known in the trade then as "Apotheker Kofler", "Baumeister Schneller", "Baronin von Bohlen", "Défiance", "Dr. Pressel", "Eugen Vaucher", "F. A. Laydig", "Frau Direktor Kreuser", "Frau Direktor Schindler", "Frau Dr. Gutzwiller", "Frau Dr. Kayser", "Frau Otto Grüner", "Freiherr von Schönau", "Fr. Ruoff", "Fürst Bismarck", "Graf von Türkheim", "Helgoland", "Klothilde Pfitzer", "Marie Maréchal", "Nordlicht", "Schwan", "Th. Mayer", and "Uranie".

Weiss & O'Brien (1953) describe the plant as a "Cultigen derived from V. teucrioides Gill. & Hook. and other spp. of South America; widely grown for ornament as a summer annual in the North [of the United States], as winter annual or perennial in the South."

Listed as pests and diseases of the plant in the United States are: Botrytis cinerea Pers., a flower-blight (in Massachusetts), Erysiphe cichoracearum DC., a powdery mildew (general), Meloidogyne sp. [Heterodera marioni (Cornu) Goodey], a root-knot nematode (Maryland), Phymatotrichum omnivorum (Shear) Dug., a root-rot (Texas), Rhizoctonia solani Kuehn, a root-rot (New York), Sclerotium bataticola Taub., a charcoal stem-rot (Oklahoma), Sphaerotheca humuli (DC.) Burr., a powdery mildew (Puerto Rico), and Thielaviopsis basicola (Berk. & Br.) Ferr., a root-rot (Pennsylvania).

Balfour (1963), in speaking of this plant in England, says that "Garden verbena[s] have arisen from the inter-crossing of various South American species and, although strictly speaking perennials, are best treated as half-hardy annuals. In the old days verbenas were always propagated by cuttings taken in the spring, but the great improvement in seedling strains both in trueness to colour and compactness of habit renders this unneces-

sary.....Modern strains of verbena form compact bushy plants 12--15 inches high and as much across and have a very wide range of colours, white, shades of pink, mauve, purple, and rich blue, mostly coming remarkably true from seed. The finest are the Large-flowered or Mammoth section. There is also a Dwarf compact strain 9 inches in height with small flower heads and a full range of colours. Flowering begins in June [in England] and lasts until stopped by frosts in autumn.....Verbena should be sown under glass in February, pricked out into trays as soon as fit to handle, hardened off in cold frames, and planted out in May. They prefer a rich, well-drained loam and love sunshine with sufficient moisture in the early stage of growth. Thrips are apt to be troublesome, so much so that a preventive spraying with nicotine or other convenient insecticide is often advisable in the early stages after planting out."

Fogg (1972) says "They are usually grouped into three sections, small flowered, giant flowered and the compact or bushy form. On the first section there are many auricula eyed varieties including a mixed strain listed as Royal Bouquet. The grandiflora or large flowered group is represented by well known varieties such as 'Ellen Willmott', salmon rose but variable; 'Lavender Queen' (or Glory) and 'Scarlet Queen'. The dwarf compact section takes in 'Fireball', scarlet; 'Salmon Queen'; 'Sparkle', scarlet and 'Violet Bouquet'."

Additional citations: CULTIVATED: Venezuela: Ruiz-Terán & Lopez-Palacios 7602 (Ld).

xVERBENA ILLICITA Moldenke

Additional bibliography: Jones & Bell, Trans. Ill. Acad. Sci. 67: 87. 1974; Moldenke, Phytologia 28: 353. 1974.

Jones & Bell (1974) record this hybrid from Piatt County, Illinois.

VERBENA INAMOENA Briq.

Additional bibliography: Moldenke, Phytologia 23: 278. 1972; Troncoso, Darwiniana 18: 310, 311, & 412. 1974.

Troncoso (1974) cites T. Rojas 1880 from Paraguay in the Darwinion herbarium at San Isidro.

VERBENA INCISA Hook.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 827, 1895; Cooke, Fl. Presid. Bombay, ed. 1, 3: 436--437 (1906), ed. 2, imp. 1, 2: 517 (1958), and ed. 2, imp. 2, 2: 517. 1967; Moldenke, Phytologia 28: 354 & 369. 1974; Troncoso, Darwiniana 18: 316, 319, & 409, fig. 3 m--o. 1974.

Additional illustrations: Troncoso, Darwiniana 18: 316, fig. 3 m--o. 1974.

Troncoso (1974) cites Hicken s.n. [Puerto Nuevo; Herb. Inst. Darwinion 3450] from Entre Ríos, Argentina, in the Darwinion herbarium at San Isidro, Argentina.

Cooke (1906) describes the plant as "A pretty little creeping

annual with irregularly and coarsely toothed leaves and rosy flowers resembling those of the garden Verbena but smaller. Flowers during January and February [in India] and often springs up from self-sown seeds." Jafri & Ghafoor, in their unpublished Flora of Pakistan treatment of this group, cite S. P. Bahl s.n., cultivated in the Pakistani part of Punjab, noting that the species is "Sometimes cultivated in gardens, as an ornamental, for its handsome blossoms of a deep-rose colour".

Additional citations: ARGENTINA: Santa Fé: Hubrich 54 (Mu).

VERBENA INTERMEDIA Gill. & Hook.

Additional synonymy: Verbena bonariensis f. gracilis (Cham.) Voss in Vilm., Blumengärt., ed. 3, 1: 826 [as "f. gracilis Cham"]. 1895.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895; Moldenke, Phytologia 28: 354 & 464. 1974; Troncoso, Darwiniana 18: 310, 311, & 412. 1974.

Pedersen encountered this plant in "medium dry grassland" in Paraguay, while Quarín and his associates found it "in lomas, pastizales". The corollas are said to have been "violet" in color on Pedersen 7680. Troncoso (1974) cites Cano 3103 from La Pampa, Argentina, deposited in the Darwinion herbarium at San Isidro.

Additional citations: PARAGUAY: Pedersen 7680 (W--2683131). ARGENTINA: Corrientes: Quarín, González, & Ishikawa 1832 (Ld).

VERBENA KUNTZEANA Moldenke

Additional synonymy: Glandularia kuntzeana (Mold.) Tronc., Darwiniana 18: 319. 1974.

Additional bibliography: Moldenke, Phytologia 23: 281 & 457. 1972; Troncoso, Darwiniana 18: 319 & 409. 1974.

VERBENA LACINIATA (L.) Briq.

Additional & emended synonymy: Verbena erinodes Lam. ex Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895. Erinus laciniatus L. ex Voss in Vilm., Blumengärt., ed. 3, 1: 826, in syn. 1895. Verbena pulcherrima Hort. ex Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895.

Additional bibliography: Kümpler in Vilm., Illustr. Blumeng., ed. 2, 1043. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 825 & 826. 1895; Booth, Encycl. Ann. & Bien. Gard. Pl. 439 & 440. 1962; A. P. Balf., Ann. & Bien. Fls. 85. 1963; Wyman, Gard. Encycl., imp. 1, 1153 (1971) and imp. 2, 1153. 1972; Moldenke, Phytologia 28: 345, 349, 354, 375, 451, & 460. 1974.

Voss (1895) includes Verbena selloi Spreng. and Shuttleworthia selloi Walp. in the synonymy of V. laciniata, by V. selloi is now regarded as a separate and valid species with Shuttleworthia selloi in its synonymy. He also places Verbena multifida Hort. in the synonymy of V. tenera Spreng., rather than in that of V. laciniata. He includes V. geraniifolia Hort. in the synonymy of

V. laciniata, but I place it in that of V. tenera. He gives as common names for V. laciniata the German vernaculars "Leberbalsamartiges Eisenkraut" and "schönstes Eisenkraut" and the English "prettiest vervain".

VERBENA LACINIATA var. CONTRACTA (Lindl.) Moldenke

Additional synonymy: Verbena erinodes f. sabini (Sweet) Voss in Vilm., Blumengärt., ed. 3, 1: 826 [as "f. sabini Sw."]. 1895. Verbena multifida f. contracta Lindl. ex Voss in Vilm., Blumengärt., ed. 3, 1: 826, in syn. 1895.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895; Moldenke, Phytologia 28: 247—249 & 451. 1974.

Voss (1895) describes this variety as "hat 3teilige Blätter, deren Teile tiefeeingeschnitten-fiederspaltig, die letzten aber linealisch-länglich und spitz sind. Blüten dunkelviolett oder lilafarbig und die Pflanzen etwas niedriger."

VERBENA LASIOSTACHYS Link

Additional bibliography: Moldenke, Phytologia 28: 249—250, 362, & 431. 1974.

The Reinecke s.n. [September 5, 1937], distributed as V. lasiostachys, is actually var. septentrionalis Moldenke.

VERBENA LASIOSTACHYS var. SEPTENTRIONALIS Moldenke

Additional bibliography: Moldenke, Phytologia 28: 249—250 & 362. 1974.

Denton found this plant to be "common in wet seepage among oaks" in lowland deciduous forests composed mostly of Quercus, Holodiscus, Pseudotsuga, and Calocedrus".

Additional citations: OREGON: Josephine Co.: Denton 2462 (N). CALIFORNIA: Monterey Co.: Reinecke s.n. [September 5, 1937] (Mi).

VERBENA LILACINA Greene

Additional bibliography: Moldenke, Phytologia 28: 250. 1974.

Additional citations: MEXICO: Baja California: R. Moran 17185 (Mi).

VERBENA LITORALIS H.B.K.

Additional bibliography: Demaree, Taxodium 1: 60. 1943; J. Moon, Living with Nat, Haw. 52. 1971; Moldenke, Phytologia 28: 347, 354—355, 362, 432, 435, & 438. 1974; Troncoso, Darwiniana 18: 308, 310, 311, & 412. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Additional illustrations: J. Moon, Living with Nat. Haw. 52. 1971.

Ruiz-Terán & López-Palacios describe this plant as an "Hierba sufruticulosa, erecta, inerme, 80 cm. Flores morado claras".

Solbrig and his associates describe this plant as "common in overgrazed areas" on the Juan Fernandez Islands. Moon (1971) records the Hawaiian names, "Cayenne vervain" and "valena", for the plant and note that in those islands it is used in the treat-

ment of "sprains and broken bones.....mash green leaves with rock salt, rub on swellings 4 times morning and night, wrap and keep warm.....Grows 2--5 ft. high, hairy stem and leaves, flowers blue-violet.....the leaves make good tea to drink."

Holm-Nielsen & Jeppesen found this plant growing on "exposed southern slopes by [a] small brook" in Ecuador. The corollas on Duque-Jaramillo 2632 are described as having been "bluish" when fresh.

Additional citations: COLOMBIA: Caldas: Duque-Jaramillo 2632 (N). VENEZUELA: Trujillo: Ruiz-Terán & López-Palacios 7400 (Ld). Yaracuy: H. M. Curran 135am (N). ECUADOR: Tunguragua: Holm-Nielsen & Jeppesen 158 (N). JUAN FERNANDEZ ISLANDS: Masafuera: Solbrig, Moore, & Walker 3664 (W--2531340).

VERBENA LOBATA Vell.

Additional bibliography: Moldenke, Phytologia 28: 355. 1974; Troncoso, Darwiniana 18: 310, 311, & 412. 1974.

Troncoso (1974) cites Ule 1173 from Santa Catarina, Brazil, deposited in the Munich herbarium.

VERBENA MACDOUGALII Heller

Additional bibliography: Moldenke, Phytologia 28: 355 & 431. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Blakley asserts that he found only a "few, local" specimens of this species growing in granite loam soil along roadsides in New Mexico.

Additional citations: NEW MEXICO: Catron Co.: E. R. Blakley B-616 (N).

VERBENA MACROSPERMA Speg.

Synonymy: Glandularia macrosperma (Speg.) Tronc., Darwiniana 18: 317. 1974.

Additional bibliography: Moldenke, Phytologia 28: 254, 441, & 457. 1974; Troncoso, Darwiniana 18: 317, 318, 409, & 412. 1974.

Troncoso (1974) cites Schajovskoy s.n. [Sañico; Herb. Inst. Darwinion 26740] from Neuquén, Argentina, deposited in the Darwinion herbarium.

VERBENA MARRUBIOIDES Cham.

Additional synonymy: Glandularia marrubioides Cham. ex Troncoso, Darwiniana 18: 319. 1974.

Additional bibliography: Moldenke, Phytologia 28: 254--255 & 457. 1974; Troncoso, Darwiniana 18: 319 & 409. 1974.

Additional citations: BRAZIL: Paraná: Hatschbach 17120 (Ld).

VERBENA MEDICINALIS Rojas, Cat. Hist. Nat. Corr. 206, nom. nud. 1897.

Bibliography: Rojas Acosta, Cat. Hist. Nat. Corr. 206. 1897; Krapovickas, Bol. Soc. Argent. Bot. 11: 269. 1970.

Nothing is known to me about this taxon except what is stated in the bibliography. It is apparently supposed to be a native of Corrientes, Argentina.

VERBENA MEGAPOTAMICA Spreng.
Additional bibliography: Moldenke, Phytologia 28: 355, 370, 384, 451, 457, & 464. 1974; Troncoso, Darwiniana 18: 319 & 409. 1974.

VERBENA MENDOCINA R. A. Phil.
Additional bibliography: Moldenke, Phytologia 28: 255. 1974; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA MICROPHYLLA H.B.K.
Additional bibliography: Moldenke, Phytologia 28: 356 & 366. 1974; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA MONTEVIDENSIS Spreng.
Additional bibliography: Moldenke, Phytologia 28: 351 & 356. 1974; Troncoso, Darwiniana 18: 311 & 412. 1974.
Demaree found this species as "a very few big plants in waste area" in Arkansas and this is the first record of the species from that state. The plants were in flower and fruit there in September. The corollas are said to have been "white" on Schinini 7792.
Additional citations: ARKANSAS: Ashley Co.: Demaree 67598 (Ld). ARGENTINA: Corrientes: Schinini 7792 (Ld).

VERBENA MONTICOLA Moldenke, Phytologia 29: 193. 1974.
Bibliography: Moldenke, Phytologia 29: 193. 1974.
Citations: PERU: La Libertad: Lopez M. 8079 (N--type).

VERBENA MORICOLOR Moldenke
Additional synonymy: Glandularia moricolor Solbrig, Princ. & Meth. Pl. Biosystem. 76. 1970. Glandularia moricolor (Mold.) Troncoso, Darwiniana 18: 319. 1974.
Additional bibliography: Moldenke, Phytologia 28: 257--258, 369, & 457. 1974; Troncoso, Darwiniana 18: 319, 409, & 412. 1974.

VERBENA MULTIGLANDULOSA Moldenke
Additional bibliography: Moldenke, Phytologia 23: 373. 1972; Heslop-Harrison, Ind. Kew. Suppl. 15: 142. 1974.

VERBENA NANA Moldenke
Additional synonymy: Glandularia nana (Mold.) Troncoso, Darwiniana 18: 319. 1974.
Additional bibliography: Moldenke, Phytologia 28: 258 & 457. 1974; Troncoso, Darwiniana 18: 319, 409, & 412. 1974.

VERBENA NEOMEXICANA (A. Gray) Small
Additional bibliography: Moldenke, Phytologia 28: 356. 1974.
The Engard, Getz, & Foster 202, distributed as V. neomexicana,

is actually var. xylopoda Perry, while Eckhardt 327 & 675 are V. plicata Greene.

Additional citations: ARIZONA: Cochise Co.: Wentworth 1061 (N), 1949 (It).

VERBENA NEOMEXICANA var. HIRTELLA Perry

Additional bibliography: Moldenke, Phytologia 28: 356—357. 1974.

Dunn encountered this plant in creosote-bush areas.

Material of this taxon has been misidentified and distributed in some herbaria as V. canescens var. roemeriana (Scheele) Perry and as "Labiatae". On the other hand, the Eckhardt 380, identified as this variety, is actually V. canescens var. roemeriana.

Additional citations: TEXAS: Presidio Co.: D. B. Dunn 16070 (N); Hinckley 1971 (W—2232458); Lundell & Lundell 14340 (Mi).

VERBENA NEOMEXICANA var. XYLOPODA Perry

Additional bibliography: Moldenke, Phytologia 28: 258 & 259. 1974.

Engard and his associates found this plant growing on a steep, rocky, chaparral-covered, northeast-facing slope, flowering and fruiting in April.

Additional citations: ARIZONA: Cochise Co.: Wentworth 53L (It). Yavapai Co.: Engard, Getz, & Foster 202 (N).

VERBENA NIGRICANS Rojas, Cat. Hist. Nat. Corr. 173, nom. nud. 1897.

Bibliography: Rojas Acosta, Cat. Hist. Nat. Corr. 173. 1897; Krapovickas, Bol. Soc. Argent. Bot. 11: 269. 1970; Heslop-Harrison, Ind. Kew. Suppl. 15: 142. 1974.

Nothing is known to me about this species except what is given in the bibliography. It is supposed to be a native of Corrientes, Argentina.

VERBENA OFFICINALIS L.

Additional synonymy: Verbena fficinalis L., Sp. Pl., ed. 1, imp. 1, 1: 20, sphalm. 1753.

Additional & emended bibliography: Anon., Breviary [mss. on vellum, Pierpont Morgan Libr.] 32 & 37. 15—; Piperno, De Magicis Affect. 1635; L., Sp. Pl., ed. 1, imp. 1, 1: 20—21. 1753; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Ruiz & Pav., Fl. Peruv. & Chil. 1: 21 & 22. 1798; Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 14—15. 1803; J. Grah., Cat. Pl. Bomb. 154. 1839; Jenner, Fl. Tunbridge Wells 33. 1845; J. Sm., Dict. Pop. Names Pl. 428. 1882; G. Ricci, Lo Sperimant. 66: 483. 1890; Dymock, Warden, & Hooper, Pharmacog. Ind. 3: [iii] & 58—60. 1893; Woodr., Journ. Bomb. Nat. 12: 359. 1899; Collett, Fl. Siml. 379. 1902; Cooke, Fl. Presid. Bombay, ed. 1, 3: 437. 1906; Kirby, Brit. Flow. Pl. 116, pl. 74. 1906; L., Sp. Pl., ed. 1, imp. 2, 1: 20—21 (1907) and ed. 1, imp. 3, 1: 20—21. 1907; F. Hermann, Fl. Deutschl. & Fennoskand. 387. 1912;

Georgia, Man. Weeds 343. 1914; Kloos, Nederl. Kruidk. Archief 1919: 96 & 97. 1919; Rohde, Old Engl. Herbals, imp. 1, 29, 30, 43, 44, 64, 72, 106, 107, & 113. 1922; Knoche, Fl. Balear., ed. 1, 252, 275, 293, 339, & 410. 1923; Parodi, Rev. Fac. Agron. & Vet. B. Aires 5: 138--139. 1926; L., Sp. Pl., ed. 1, imp. 4, 1: 20--21. 1934; Joshi in Kashyap, Lahore Dist. Fl. 193 & 194, fig. 165. 1936; Zangheri, Fl. & Veg. Pinet. Raven. 189, 235, & 271. 1936; Kamm, Old Time Herbs, imp. 1, 118--121. 1938; Glover, Prov. Check List Brit. & Ital. Somali. 268. 1947; Jovet, Valois Phytosoc. & Phytogéogr. 241, pl. 68. 1949; L., Sp. Pl., ed. 1, imp. 5, 1: 20--21. 1957; Steinmetz, Cod. Veget. 1189. 1957; Cooke, Fl. Presid. Bombay, ed. 2, imp. 1, 2: 517. 1958; Font Quer, Pl. Medic. 635. 1962; Engel, Fl. Magica 39. 1966; Cooke, Fl. Presid. Bombay, ed. 2, imp. 2, 2: 517. 1967; J. Graf, Pfl. Bestimm. 159. 1967; J. Hutchinson, Evol. & Phylog. Flow. Pl. 468, 470, & 715, fig. 414. 1969; Abbayes, Claustres, Corillon, & Dupont, Fl. & Veg. Mass. Armor. 662. 1971; Kamm, Old Time Herbs, imp. 2, 118--121. 1971; Perrot & Paris, Pl. Médic. 1: 103, fig. 8--13. 1971; Rohde, Old Engl. Herbals, imp. 2, 29, 30, 43, 44, 64, 72, 106, 107, & 113. 1971; Dymock, Warden, & Hooper, Hamdard 15: 330 & 345. 1972; H. L. V. Fletcher, Herbs 134 & 135. 1972; Cvančara & Šourková, Preslia 45: 272. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786 & 787. 1973; Beaugé, Chenop. Alb. 351 & 429, fig. 60. 1974; Dony, Perring, & Rob, English Names Wild Fls. 61 & 116. 1974; Fenaroli, Rivist. Ital. 56: 224. 1974; Fitter, Fitter, & Blamey, Wild Fls. Brit. & N. Eu. 192 & 193, fig. 7. 1974; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661, 663, & 676. 1973; Howes, Dict. Useful Pl. 125 & 270. 1974; Hylton, Rodale Herb Book 613--614. 1974; Knoche, Fl. Balear., ed. 2, 252, 275, 293, 339, & 410. 1974; Lust, Herb Book, ed. 1, 181--182, 549, 561, & 588. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 14--15. 1974; Moldenke, Phytologia 28: 357--365, 380, 381, 392, 393, 401, 427, 443, 444, & 464. 1974; J. P. Morgan Library, Flowers of Centuries Cat. 60 & 68. 1974; Ross-Craig, Drawings Brit. Pl. Ind. 36. 1974; Sunding, Gaveia Ort. Bot. 2: 20. 1974; Troncoso, Darwiniana 18: 308, 310, 311, & 412. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Additional illustrations: Anon., Breviary [mss. on vellum, Pierpont Morgan Libr.] 32 & 37. 15--; Joshi in Kashyap, Lahore Dist. Fl. 193, fig. 165. 1936; J. Graf, Pfl. Bestimm. 159. 1967; J. Hutchinson, Evol. & Phylog. Flow. Pl. 470, fig. 414. 1969; Perrot & Paris, Pl. Médic. 1: fig. 8--13 (in color). 1971; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 787. 1973; Fitter, Fitter, & Blamey, Wild Fls. Brit. & N. Eu. 193, fig. 7 (in color). 1974; Lust, Herb Book, ed. 1, 181. 1974.

Jenner (1845) reports the species as "common near houses, roadsides, waste places" in England, flowering in July. Sunding (1974) records it from Santiago Island in the Canaries. Perrot & Paris (1971) record an additional French vernacular name, "Herbe à tous maux". The corollas are said to have been "blue" on S. Y. Hu 5732 and "lavender" on S. Y. Hu 10350.

Cooke (1906) says of this plant: "A native of the Himalayas and Bengal, sometimes found as a weed in gardens [in Bombay]. It has variously lobed leaves and small blue flowers in terminal spikes."

Steinmetz (1957) lists the following additional vernacular names: "columbaria", "horse-whip", "lung-ya-ts'ao", "ma-pien-ts'ao", "mineçiçeği", and "pamukh", as well as the pharmaceutical names "Radix Verbonae" and "Herba Verbenae". He lists as among its chemical constituents: tannic acid (a peculiar tannin), invertin, saponin, verbenalin (verbenaloside), verberin, and emulsin. He lists for its properties: "herb: corroborant, nervine, antispasmodic, febrifuge, tonic, aphrodisiac, antiscorbutic, galactagogue, detersive, astringent, emetic, sudorific, diuretic, used in whooping-cough".

As indicated in the bibliographic addenda above, the species is depicted on pages 32 and 37 of a Breviary — existing in manuscript form on vellum — produced early in the 16th century at Bruges, probably by a man or men from Portugal. The p. 32 illustration appears to be original, but that on p. 37 depicts a garland worn by a Roman priest and was apparently taken from one of the works of Macer Floridus in about 1500 A.D.

The index in Beaugé's work (1974) indicates that this plant is mentioned on page "251", but I fail to find it there; it occurs on page 351.

Lust (1974) says of the reputed medicinal uses of this plant that "The whole plant" is used as an "Astringent, diuretic, emmenagogue, galactogogue, stimulant, tonic, vulnerary. In addition to the normal uses indicated by the categories, the decoction is said to be good for eczema and other skin conditions. It has also been used for whooping cough, dropsy, jaundice, and kidney and liver problems. An infusion or decoction is used to help heal wounds. European vervain is considered by some to be an aphrodisiac, and it is said to secure the favor of the ladies. Preparation and Dosage: Cold Extract: Use 1 tbsp. of the plant with 1 cup water; let stand for 8 to 10 hours. Take 1 cup a day. Powder: Take 1/4 to 1/2 tsp. three times a day. Tincture: Take 20 to 40 drops in water, as needed." Hylton (1974) comments that "Vervain has been used as a tonic, diaphoretic, and expectorant, but no strong claims have ever been made as to its efficacy. In China, it is used to induce menstruation, to relieve rheumatism, and as an astringent and vermifuge.....Historically, the plant has been associated with sorcerers, witches, and magic. In ancient times, it was bruised and worn about the neck as a charm against headaches and venomous bites. An old legend reputes the vervain to have been used to staunch the wounds of Christ on Calvary."

If this plant becomes a "weed", Georgia (1914) says "Prevent seed production by close cutting or pulling while the plant is in early bloom."

Jafri & Ghafoor, in their unpublished portion of the Flora of Pakistan, comment that this plant is "Fairly common near water in waste lands and cultivated fields in northern and western parts of

Pakistan, between 500—2000 m. Leaves are used as a febrifuge and tonic and root is a cure for scorpion and snake bite." They record the vernacular names "karenta" and "pamukh" and assert that its flowering period in Pakistan is June to December.

It is of considerable interest to note that Linnaeus (1753) regarded the New World specimens of this species as a separate taxon, V. spuria L. He claimed that the European plant (with which he was certainly very well acquainted in the living state!) has only single stems, while the American plants ["Habitat in Canada, Virginia"] have numerous stems. This point should be investigated.

Kamm (1938) claims that V. officinalis "has now gone wild and become a pernicious weed locally in cultivated fields from Maine to Texas". In a lifetime of botanical field work, also from Maine to Texas, my wife and I have seen no cases where this species has become such a "pernicious weed". In our experience, it is of very rare occurrence in the New World. Many of the New World plants formerly so identified are actually V. riparia Raf., V. halei Small, V. domingensis Urb., V. menthaefolia Benth., and V. gracilescens (Cham.) Herter.

Joshi (1936) reports V. officinalis from "In waste places and as a garden weed; common" in Lahore, Pakistan.

Dymock and his associates (1972) add some more details to the already very copious lore about this plant when they recount that "Pliny.....says....with this...the temple of Jupiter is cleansed, with this.....houses are purified and due expiation made. There are two varieties of it: the one, that is thickly covered with leaves (V. supina) is thought to be the female plant; that with fewer leaves (V. officinalis), the male. Pliny then notices the ridiculous superstitions of the Magi in reference to the plant, and remarks that the plant bruised in wine in used as a remedy for the stings of serpents. De Gubernatis states that Verbena was held in much the same estimation among the Romans as Kusa grass and the Tulasi plant among the Hindus. It bore numerous synonyms, such as Tears of Isis, Tears of Juno, Mercury's Blood, Demetria, Cerealis, &c. In the Middle Ages Verbena was held in high estimation by the Christian priesthood. Piperno...states, on the authority of Savonarola, that 'Verbena menducata non permittit per septem dies coitum'. It was considereed to be a purifying herb which enforced chastity. In Sicily it is used as a charm to cure diseases at the present day along with fennel." He then quotes an Italian prayer "used in curing polypus with it." Freely translated, the prayer is "Lucia, do not cry; come into my garden, gather the leaves of Verbena and Fennel. Thou hast planted it; thou hast trodden upon it. The scourge of polypus will melt away and die." The exorciser then makes three signs of the cross on the polypus with a clove of garlic. In some parts of Piedmont the people believe tha rubbing the palm of the hand at sunset with Verbena will ensure the goodwill of the first person whose hand they grasp."

Ruíz & Pavon (1798) tell us that in South America V. officinalis is used "Ad mensium obstructiones ciendas, et abortum pro movendum ab incolis decoctum commendatur".

Kamm (1938) adds further to the lore of this species when she tells us that "In pagan times it was the purification herb par excellence and the altar of Juniper was cleaned with it before the feast of the gods. Houses were purified with it in Greece and it may have been the plant used to cleanse the table of Baucis and Philemon upon the visit of the strangers although one of the mints is also regarded as the aromatic used. Thus early symbolic, vervain was woven into garlands for special religious festivals and Virgil says priests in celebrating their rites

'In purest white.....their heads attire,
And o'er their linen hoods and shaded hair,
Long twisted wreaths of sacred vervain wear.'
-- Aeneid, Book XII.

also decorated altars both in temples and the home:

'Festoon these altars and fat vervain burn,'

says Virgil (Book I). This writer [Publius Vergilius Maro, lived 70--19 B.C.] mentions vervain many times in his various works, the force of its powers indicated in this passionate appeal:

'Burn rich vervain and frankincense that I may array with magic spell and turn my lover's cool mood to passion!'
-- Eclogues, Book VIII

"Horace [Quintus Horatius Flaccus, lived 65--8 B.C.], in his charming Ode to Phyllis (Book IV), indicates its use in the home thus:

'I have in my garden, Phyllis, parsley for weaving garlands; I have a large abundance of ivy wherewith you bind your hair and brightly shine. The house is smiling with silver; the altar, twined with wreaths of holy vervain, longs to be sprinkled with the sacrifice of a lamb.'

"Virgil's love of quiet pastoral life is indicated in this quotation from the Georgics (Book IV):

'I saw a heavy Corycian swain, lord of a few acres of unclaimed soil, a domain too barren for the plough, unfitted for the flock, and ungracious to the vine. And yet, as he planted his potherbs here and there among the bushes, with white lilies and vervain, and fine-grained poppies about them, he matched in contentment the riches of kings.'.....

"Vervain was an herb of magic. Pliny [Gaius Plinius Secundus, lived 23--79 A.D.] tells of a messenger sent to a home to demand restitution of stolen goods, who carried with him a prig of vervain to assure return of the goods lest the holder bring upon his head the wrath of the gods. Verbenarius, one of the ambassadors sent by the Romans to a certain enemy, wore a garland of this plant to insure his personal safety, as a modern warrior might carry a flag of truce (Sir Thomas Elyot, Castell of Helth, 1539). Livy [Titus Livius, lived 59 B.C.--17 A.D.] says the ambassadors to a truce 'should carry with them, one by himself, certain flint stones and likewise verven'.

"The Druids of Devon and Cornwall looked upon the plant as a magic herb; it was used in foretelling events and gathered at the rise of the dog star. On Midsummer's Eve, the turning-point in the sun's movement, in villages of Germany, says a sixteenth century writer, people young and old gathered about fires wearing chaplets of mugwort and vervain, and performing ceremonies intended to work a charm upon the sun and lure it back again.

"This rite performed on a sick man and copied from a fourteenth century manuscript is part of a very old superstition:

'If a man lie sick, to know whether he shall live or die, take vervain in thy right hand and take his right hand in thine; and let the herb be between, so that he doth not know it. Ask him how he fareth and how he hopeth of himself. If he feels he is doomed, he will die, but if he be hopeful of recovery, so it shall be.'

"However, the plant has still another, and pleasanter role in literature, as depicted by John Fletcher in his charming pastoral drama 'The Faithful Shepherdess' (1609), upon which Milton is said to have based his masque 'Comus'. Clorin watching over her flocks and sorting over the various herbs she has collected on the mead recites the virtues of each as she mourns her dead lover. Of vervain she says:

'Thou, light vervain, too, thou must go after,
Provoking easy souls to mirth and laughter,
No more shall I dip thee in water now,
And sprinkle every post and every bough
With thy well-pleasing juice, to make the grooms
Swell with high mirth, and with joy all the rooms.'

"Fletcher was well-versed in the virtues of various herbs, and it is quite probable that Shakespeare's usage was gleaned from his close friend and one-time collaborator.....Vervain had still one more usage -- and no herb had more -- it was a symbol of death:

'Sad cypress, vervain, yew, compose the wreath,
And every baneful green denoting death.'

--Virgil, Aeneid, Book IV."

Additional citations: EGYPT: Sisi s.n. [El Giza, 24/5/1973] (Ld). HONGKONG: S. Y. Hu 5732 (W--2697289), 10350 (W--2732313).

VERBENA ORIGENES R. A. Phil.

Additional bibliography: Moldenke, Phytologia 28: 365. 1974; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA OVATA Cham.

Additional bibliography: Moldenke, Phytologia 28: 365. 1974; Troncoso, Darwiniana 18: 310, 311, & 412. 1974.

Troncoso (1974) cites T. Rojas 6128 from Paraguay and Krapovickas & al. 21302 from Corrientes, Argentina, deposited in the Darwinion herbarium.

VERBENA PARODII (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, Phytologia 28: 366. 1974; Troncoso, Darwiniana 18: 317, 318, & 409. 1974.

Troncoso (1974) cites Cabrera & Fabris 835 from Buenos Aires and Covas & Schnack 2112 from Mendoza, Argentina, deposited in the Darwinion herbarium at San Isidro -- the latter being the type collection.

VERBENA PARVULA Hayek

Additional bibliography: Moldenke, Phytologia 28: 366. 1974; Troncoso, Darwiniana 18: 311 & 412. 1974.

Ruiz-Terán and his associates describe this plant as "Sufrútice ramificado, 30--40 cm. Tallo y ramitas 4-gonos, verde claros. Cáliz verde claro en la mitad proximal, morado rojizo en la mitad distal, con pelos blancas. Corola morado claro". They found it flowering and fruiting in December.

Additional citations: VENEZUELA: Mérida: Ruiz-Terán, López-Figueiras, & López-Palacios 8231 (Ld). BOLIVIA: La Paz: Graf 257 (N), 351 (N).

VERBENA PERAKII (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, Phytologia 28: 366 & 441. 1974; Troncoso, Darwiniana 18: 317 & 409. 1974.

Troncoso (1974) cites Covas 2110, the type collection, from Mendoza, Argentina, deposited in the Darwinion herbarium at San Isidro, Argentina.

VERBENA PERENNIS Wooton

Additional bibliography: Moldenke, Phytologia 28: 356 & 366--367 (1974) and 29: 50. 1974.

Additional citations: NEW MEXICO: Sierra Co.: O. B. Metcalfe 1568 (Ca--885098).

xVERBENA PERRIANA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 367. 1974; A. L. Moldenke, Phytologia 29: 182. 1974.

VERBENA PERUVIANA (L.) Britton

Additional synonymy: Verbena chamaedryfolia f. melindrodes (Cham.) Voss in Vilm., Blumengärt., ed. 3, 1: 827 [as "melindrodes Cham."]. 1895. Verbena chamaedryfolia f. melindres splendens Hort. ex Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895. Verbena chamaedryfolia f. latifolia Hort. ex Voss in Vilm., Blumengärt., ed. 3, 1: 827, in syn. 1895. Verbena chamaedryfolia f. grandiflora Hort. ex Voss in Vilm., Blumengärt., ed. 3, 1: 827, in syn. 1895.

Additional bibliography: J. Sm., Dict. Pop. Names Pl. 428. 1882; Voss in Vilm., Blumengärt., ed. 3, 1: 825 & 827. 1895; Cooke, Fl. Presid. Bomb., ed. 1, 3: 437 (1906), ed. 2, imp. 1, 2: 518 (1958),

and ed. 2, imp. 2, 2: 518. 1967; Wyman, Gard. Encycl., imp. 1, 1153 (1971) and imp. 2, 1153. 1972; Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 347, 367--370, 380, 383, 384, 387, 451, 457, & 464. 1974; Troncoso, Darwiniana 18: 316, 317, 319, 409, & 411, fig. a--h. 1974.

Additional illustrations: Troncoso, Darwiniana 18: 316, fig. 3 a--h. 1974.

Troncoso (1974) makes this species the type species of her Section Nobiles (Schau.) Troncoso and cites Mroginski 2 from Corrientes, Argentina, deposited in the Darwinion herbarium at San Isidro. She describes the Section's characters as "Estambres superiores sin apéndices glandulares conectivales o solamente con glándulas vestigiales sésiles, inconspicuas, en la base del conectivo. Hojas enteras, dentadas, crenadas o lobado-incisas, menos comúnmente pinatisectas."

Wyman (1971) calls the species "Peruvian verbena". Voss (1895) records the German name, "Gamanderleinblättriges Eisenkraut". He tells us that "Diese Art ist die erste und älteste Stammform unserer Blumisten-Verbenen. Die wildwachsende Pflanze, die echte, dünnstengelige 'Melindres-' Verbene, hat länglich oder länglich-lanzettliche, ungleich-eingeschnitten-gesägt, weniger stark kurz-rauhaarige Blätter, die zweite Form, f. melindroides.....hat eirunde, ziemlich gleichmässig oder doppeltgekerbt-gesägte und stärker kurz-rauhaarige Blätter. Eine Kulturform, f. Melindres splendens.....wird noch heute als niedrige, feuerrot-blühende Gruppenpflanze geschätzt."

It is of more than passing interest to note that the famous English botanist, J. Smith (1882), apparently considered that this species was the ancestor of all the garden forms now known as xV. hybrida Voss, since he says "Verbenas have become favourite plants for ornamental flower-beds, a great number of varieties having come into notice of late years, which first originated from the scarlet-flowered species, V. Melindres, a native of South Brazil." Actually, several other species entered into the ancestry of the garden plants and I personally doubt very much if the true V. peruviana was much, if at all, involved. It seems to me, based on the morphological characters of the garden forms, that it is far more likely that the red colors are derived from V. incisa Hook.

The corollas on Schinini 6805 are described as having been "red" when fresh. Harkness (1974) speaks of the flowers of V. peruviana being "scarlet to pink" -- the pink form to which he here refers is probably f. rosea Moldenke, which see.

Additional citations: ARGENTINA: Corrientes: Schinini 6805 (Ld).

VERBENA PERUVIANA f. ROSEA Moldenke

Additional bibliography: Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 370. 1974.

Harkness (1974) speaks of "pink" flowers on V. peruviana (L.)

Britton -- probably he is here referring to this form.

VERBENA PHLOGIFLORA Cham.

Emended synonymy: Verbena phlogifolia Regel ex Voss in Vilm., Blumengärt., ed. 3, 1: 827, in syn. 1895. Verbena phlogiflora f. vulgaris Schau. ex Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895; Moldenke, Phytologia 28: 370--372, 464, & 465. 1974; Troncoso, Darwiniana 18: 317, 319, & 409. 1974.

Voss (1895) tells us that "Die gewöhnliche wilde Form f. vulgaris Schau.....hat schlanke, niederliegende Stengel mit stark abstehenden, dann aufstredend-aufrechten Ästen und stets einzeln stehenden 'Doldenähren'." On the other hand, the cultivated form has "Wuchs robuster, die Stengel aufstrebend. Äste über Kreuz gegenständig, 4 kantig, mit nach abwärts gerichteter Behaarung."

Krapovickas and his associates describe the plant as a "subshrub about 1 m. tall", the corollas "purple".

Troncoso (1974) cites Smith & Klein 13223 from Santa Catarina ["Santa Catalina" sphalm.], Brazil, deposited in the Darwinion herbarium.

Additional citations: ARGENTINA: Corrientes: Krapovickas, Cristóbal, Carnevali, Quarín, González, & Isikawa 24227 (Ld).

VERBENA PLATENSIS Spreng.

Additional synonymy: Verbena teucriodes Gill. & Hook. ex Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895. Verbena scordiodes Cham. ex Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895.

Additional bibliography: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1045. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 825 & 827. 1895; González, Lombardo, & Vallarino, Pl. Med. Vulg. Urug. 87. 1939; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177. 1953; Moldenke, Phytologia 28: 372--373, 377, & 465 (1974) and 29: 78. 1974; Troncoso, Darwiniana 18: 317, 319, & 409. 1974.

Additional illustrations: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1045. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895.

Troncoso (1974) cites Burkart 4799 from Buenos Aires, Argentina, and Rosengurtt B.810 from Uruguay, deposited in the Darwinion herbarium at San Isidro, Argentina. González, Lombardo, & Villarino (1939) report that the species is regarded as having medicinal properties in Uruguay. Voss (1895) records the additional German name, "Gamander-Eisenkraut".

VERBENA PLATENSIS f. IVERIANA (Bosse) Moldenke, Phytologia 29: 78. 1974.

Synonymy: Verbena teucriodes f. iveriana Bosse ex Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895.

Bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 827. 1895; Moldenke, Phytologia 29: 78. 1974.

This form is described by Voss (1895) as "hat grössere, hellfleischfarbig-rosenrote Blüten, mehr aufrechten Wuchs und stärkere Behaarung". It is possibly the same as f. violacea Moldenke, but without seeing authentic material one cannot be certain of this.

VERBENA PLICATA Greene

Additional & emended bibliography: Irwin & Wills, Roadside Fls. Tex. 190. 1961; Mahler, Fl. Taylor Co. 155 & 156, fig. 241. 1973; Moldenke, Phytologia 28: 373—375 & 431. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974.

Additional illustrations: Mahler, Fl. Taylor Co. 156, fig. 241. 1973; Moldenke, Phytologia 28: 373 & 374. 1974.

Stuckey & Wentz (1974) cite Tracy & Earle 30 from Ward County, Texas, as an "isosyntype", deposited in the Ohio State University herbarium, commenting that the label is inscribed "14 Apr 1902" while the date appears as "16 Apr as cited in the literature". The New York Botanical Garden has one specimen with its label inscribed "S. M. Tracy F. S. Earle" and the date as "April 14, 1902", and another, also no. 30, inscribed as collected by F. S. Earle and S. M. Tracy at "Barstow, field April 15 - May 3 1902". The latter specimen was originally identified as Verbena canescens H.B.K. and does not have the phrase "Type Collection" on its label. Interestingly, the introduction to Greene's paper (1903) mentions only "Prof. S. M. Tracy" as the collector of the plants discussed therein. Stuckey & Wentz note that "Although the dates do not agree, the designation, 'Type Collection', is part of the printed label" on their specimen.

King found V. plicata growing in "fine sandy loam to clay loam", "loam to clay loam over clay loam to light clay", "neutral fine sandy loam to clay loam on gentle slopes", and in 10—29-inch sand to loamy sand over sandy clay loam, while Eckhardt encountered it in "sandy limestone loam in disturbed areas" and "locally frequent in disturbed areas consisting of loose limestone loam". The corollas are said to have been "blue" on Eckhardt 675 & 702 and "blue to purple" on Eckhardt 327.

The M. F. White 258, distributed as V. plicata, is actually V. canescens var. roemeriana (Scheele) Perry.

Additional citations: TEXAS: Coke Co.: W. King 25 (Ac), 33 (Kh), 245 (Ld), 302 (Tu), 1566 (Mi). Tom Greene Co.: Eckhardt 327 (Sl), 675 (Sl), 702 (Sl).

VERBENA PORRIGENS R. A. Phil.

Additional synonymy: Glandularia porrigens (Phil.) Troncoso, Darwiniana 18: 317. 1974.

Additional bibliography: Moldenke, Phytologia 24: 46 (1972) and 28: 457. 1974; Troncoso, Darwiniana 18: 317 & 409. 1974.

Troncoso (1974) cites Ricardi 2107 from Coquimbo, Chile, deposited in the Concepcion and San Isidro herbaria.

VERBENA PULCHELLA Sweet

Additional synonymy: Glandularia pulchella (Spr.) Troncoso, Darwiniana 18: 318. 1974.

Additional bibliography: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1044—1045. 1879; Voss in Vilm., Blumergärt., ed. 3, 1: 825. 1895; Booth, Encycl. Ann. & Bien. Gard. Pl. 440. 1962; Wyman, Gard. Encycl., imp. 1, 1003 (1971) and imp. 2, 1003. 1972; Moldenke, Phytologia 28: 370, 375, 383, 398, 451, 457, & 464. 1974; Troncoso, Darwiniana 18: 318 & 409. 1974.

Voss (1895) regards this as conspecific and synonymous with V. tenera Spreng.

VERBENA PUMILA Rydb.

Additional bibliography: Demaree, Taxodium 1: 60. 1943; Mahler, Fl. Taylor Co. 156—157, fig. 242. 1973; Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 376 & 464. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974.

Additional illustrations: Mahler, Fl. Taylor Co. 157, fig. 242. 1973.

Stuckey & Wentz (1974) cite Tracy & Earle 106 from Reeves County and 178 from Jeff Davis County, Texas, deposited in the Ohio State University herbarium, referring to them as "isosyntypes" of V. inconspicua Greene.

King and Eckhardt report finding this plant in "weakly calcareous fine sandy loam with pebbles and limestone fragments on gentle to strong slopes", in "loam to clay loam over clay loam to light clay on nearly level ground to gentle slopes", in "neutral to slightly acid fine sandy loam", and "locally frequent in disturbed areas of loose limestone loam". The corollas are said to have been "lavender" on Eckhardt 680.

The Taylor & Taylor 6231, distributed as V. pumila, is actually V. ciliata Benth.

Additional citations: TEXAS: Coke Co.: W. King 61 (Ld), 239 (Ld), 240 (Mi), 244 (Ac), 246 (Kh), 465 (Tu). Tom Green Co.: Eckhardt 680 (Sl). Ward Co.: Dunn, Cox, & Fleak 15960 (N).

VERBENA PUMILA f. ALBIDA Moldenke

Additional bibliography: Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 376. 1974.

Harkness (1974) refers to V. pumila Rydb. with "fls. white", from Texas and Oklahoma, offered in horticultural trade seedlists.

VERBENA QUADRANGULATA Heller

Additional bibliography: Moldenke, Phytologia 28: 376—377. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974.

Stuckey & Wentz (1974) cite A. A. Heller 1388 from Nueces County, Texas, deposited in the Ohio State University herbarium and refer to it as an isotype.

VERBENA RACEMOSA Eggert

Additional bibliography: Moldenke, Phytologia 28: 377. 1974; Stuckey & Wentz, Ohio Journ. Sci. 74: 34. 1974.

Stuckey & Wentz (1974) cite Tracy & Earle 106a from Jeff Davis County, Texas, deposited in the Ohio State University herbarium and note that the label is inscribed "21 Apr 1902", not "23 Apr as cited in the literature.....Although the dates do not agree, the designation, 'Type Collection' [of V. pulchella Greene], is part of the printed label". In his original description of V. pulchella (1903) Greene gives the type locality as the Davis Mountains and the collection date as "23 April 1902", but cites no collector or collector's number. In the introduction of his paper he states that "Prof. S. M. Tracy" was the collector of the plant specimens discussed in the article.

VERBENA RIGIDA Spreng.

Additional synonymy: Verbena bonariensis f. venosa (Gill. & Hook.) Voss in Vilm., Blumengärt., ed. 3, 1: 826 [as "f. venosa Gill. & Hook."]. 1895.

Additional bibliography: Firminger, Man. Gard., ed. 3, 527 & 620. 1874; Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1044. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 826—827. 1895; Woodr., Journ. Bomb. Nat. 12: 359. 1899; Cooke, Fl. Presid. Bomb., ed. 1, 3: 436. 1906; Woodr., Gard. Trop., ed. 6, 445. 1910; Cooke, Fl. Presid. Bomb., ed. 2, imp. 1, 2: 517. 1958; Booth, Encycl. Ann. & Bien. Gard. Pl. 440. 1962; A. P. Balf., Ann. & Bien. Pl. 85. 1963; Batten & Bokelm., Wild. Fls. East. Cape Prov. 125, 172, & 182, pl. 99 (9). 1966; Cooke, Fl. Presid. Bomb., ed. 2, imp. 2, 2: 517. 1967; Wyman, Gard. Encycl., imp. 1, 330 & 1153 (1971) and imp. 2, 330 & 1153. 1972; Alemán Frías, Aurich, Excurra Ferrer, Gutiérrez Vázquez, Horstmann, López Rendueles, Rodríguez Graquitena, Roquel Casabella, & Schreiber, Die Kulturpfl. 19: 423. 1972; Hegenauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 676. 1973; D. Burpee, Burpee Seeds 1975: 48. 1974; Harkness, Seedlist Handb. 181. 1974; Moldenke, Phytologia 28: 265, 378—381, 451, & 464. 1974; Troncoso, Darwiniana 18: 308, 310, 311, & 412. 1974.

Additional illustrations: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1044. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895; Batten & Bokelm., Wild Fls. East. Cape Prov. pl. 99 (9) [in color]. 1966.

Cooke (1906) says of this plant "A dwarf spreading herbaceous plant, a native of S. America, with stiff ascending branches, rough sessile oblong-lanceolate leaves and bluish-purple flowers. The plant flowers freely in the cold season [in Bombay, India], is easy of culture, but of no great beauty." Balfour (1963) describes it as "A hardy perennial, very useful for bedding when grown as a half-hardy annual, and with small spikes of violet-purple flowers, flowering the whole summer, 1 foot. Particularly useful near the sea." Godfrey found it growing "locally abundant in old fields" in Florida.

Troncoso (1974) cites Schinini 3453 from Paraguay, Dusén 13329

from Paraná, Brazil, and Burkart 7890 from Corrientes, Argentina, deposited in the Darwinion herbarium at San Isidro, Argentina.

Harkness (1974) refers to the corollas of this species as "violet-purple".

The Moldenke & Moldenke 26823, 26855, & 26930 specimens cited below are transfers from the Bailey Hortorium herbarium.

Additional & emended citations: GEORGIA: Pulaski Co.: Moldenke & Moldenke 26930 (Ld). FLORIDA: Leon Co.: Godfrey 72332 (N). ALABAMA: Clarke Co.: Moldenke & Moldenke 26855 (Ac). MISSISSIPPI: Perry Co.: Moldenke & Moldenke 26835 (Ac, Kh, Ld). CULTIVATED: Sri Lanka: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28290 (Ld).

VERBENA ROBUSTA Greene

Additional bibliography: Moldenke, Phytologia 28: 381--382. 1974.

Additional citations: CALIFORNIA: Santa Clara Co.: Thomas 4309 (Mi).

VERBENA RUFIFLORA Rojas, Cat. Hist. Nat. Corr. 206, nom. nud. 1897.

Bibliography: Rojas Acosta, Cat. Hist. Nat. Corr. 206. 1897; Krapovickas, Bol. Soc. Argent. Bot. 11: 269. 1970.

Nothing is known to me of this species except what is given in the literature. It is apparently supposed to be native to Corrientes, Argentina.

xVERBENA RYDBERGII Moldenke

Additional bibliography: Moldenke, Phytologia 28: 382--383, 390, 426, 429, & 464. 1974.

Additional citations: KANSAS: Riley Co.: W. T. Swingle s.n. [Manhattan, Aug. 3, 1887] (Mi).

VERBENA SCABRA Vahl

Additional synonymy: Verbena hirsuta, foliis ovato-acuminatis atque serratis, spicis tenuissimis plurimis, caliculis subadnatis Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 117. 1755.

Additional bibliography: Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 117 (1755) and ed. 2, 117. 1789; Demaree, Taxodium 1: 60. 1943; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786. 1973; Moldenke, Phytologia 28: 383--384. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Sloane (1755) quite correctly implies that this species is related to V. urticifolia L. and he further comments that "In floribus hujus plantae stamina semper duo, & adnata sunt; seminaque quatuor oblonga aglutinata". The calls the species "The hairy Vervine with slender spikes" and asserts that in Jamaica "This plant grows pretty common in St. Mary's; and seldom rises above two feet and a half from the root: it is rare in most other parts of the island, altho' I have met with a few specimens about the

Ferry. It thrives best in a cool and rich soyl."

The Liogiers describe the plant as "Herbácea erguida de 75 cm de alto, flores azul morado, a orilla de la carretera".

The A. H. Liogier 20675, distributed as V. scabra, is actually V. domingensis Urb., while F. R. Fosberg 33538 is V. urticifolia L.

Additional citations: HISPANIOLA: Dominican Republic: Liogier & Liogier 19446 (N).

VERBENA SCABRA var. TERNIFOLIA Moldenke, Phytologia 29: 503. 1974.

Bibliography: Moldenke, Phytologia 29: 503. 1974.

Citations: TEXAS: Tom Green Co.: Eckhardt 1739 (Z—type).

VERBENA SCROBICULATA Griseb.

Additional synonymy: Glandularia scrobiculata (Gris.) Troncoso, Darwiniana 18: 317 & 319. 1974.

Additional bibliography: Moldenke, Phytologia 28: 369, 384, & 458. 1974; Troncoso, Darwiniana 18: 317, 319, & 409. 1974.

Troncoso (1974) cites Hjerting & al. 31 from Jujuy, Argentina, deposited in the Darwinion herbarium at San Isidro, Argentina

VERBENA SELLOI Spreng.

Additional bibliography: Moldenke, Phytologia 28: 385. 1974; Troncoso, Darwiniana 18: 316—318 & 409, fig. 3 i—l. 1974.

Additional illustrations: Troncoso, Darwiniana 18: 316, fig. 3 i—l. 1974.

Troncoso (1974) cites H. L. Parker s.n. [Carrasco; Herb. Inst. Darwinion 25668] from Uruguay, deposited in the Darwinion herbariun at San Isidro, Argentina.

VERBENA SIMPLEX Lehm.

Additional & emended bibliography: Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 14. 1803; Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 210. 1891; R. M. Harper, Torreya 20: 72. 1920; Kräusel in Just, Bot. Jahresber. 48 (1): 194. 1926; Demaree, Taxodium 1: 61. 1943; Ebinger, Trans. Ill. Acad. Sci. 66: 119. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786, 788, & 789. 1973; Ackerm. & Bamberg in Lieth, Phenol. & Season. Model. 243. 1974; Lieth, Phenol. & Season. Model. 444. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 14. 1974; Moldenke, Phytologia 28: 385—387, 404, 427, 464, & 465. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 376, 480, 505, 510, 643, & 788. 1974; F. G. Taylor in Lieth, Phenol. & Season. Model. 243. 1974.

Additional illustrations: Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 789. 1973.

Demaree refers to this plant as "common" in brushy glades and in poor sandstone glades in Arkansas and found it also in that state on limestone ridges and in rocky riverbottoms, at altitudes of 550—1000 feet. Ebinger (1973) cites Ebinger 7313 from Coles County, Illinois.

Additional citations: INDIANA: Warren Co.: Friesner 22854 (Mi). KENTUCKY: Fayette Co.: Kellerman s.n. [Lexington, June 14, 1882] (Mi). ARKANSAS: Boone Co.: Demaree 61952 (Ld). Marion Co.: Demaree 63511 (Ld), 63624 (Ld), 63726a (Ld). Randolph Co.: Demaree 68443 (Ld). Sharp Co.: Demaree 68452 (Ld). Stone Co.: Demaree 57924 (Ac).

VERBENA STRICTA Vent.

Additional bibliography: Michx., Fl. Bor.-Am., ed. 1, imp. 1, 2: 14. 1803; Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 211. 1891; Georgia, Man. Weeds 345 & 346. 1914; Kräusel in Just, Bot. Jahresber. 48 (1): 194. 1926; F. E. Clements, Pl. Succ. & Indicat. 375. 1928; Demaree, Taxodium 1: 60. 1943; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; Wyman, Gard. Encycl., imp. 1, 1153--1154. 1972; Bullington, Trans. Ill. Acad. Sci. 66: 73. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661. 1973; Hitchc. & Cronq., Fl. Pacif. Northw. 398, fig. 2b. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786, 788, & 789. 1973; Howes, Dict. Useful Pl. 270. 1974; Jones & Bell, Trans. Ill. Acad. Sci. 67: 87. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 14. 1974; Moldenke, Phytologia 28: 388--391, 426, 427, 430, & 465. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 377, 465, 643, & 788. 1974.

Additional illustrations: Hitchc. & Cronq., Fl. Pacif. Northw. 398, fig. 2b. 1973; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 789. 1973.

Bullington (1973) records this species from Ogle County, Illinois, while Jones & Bell (1974) found it in Piatt County. If this plant becomes a "nuisance weed", Georgia (1914) says "Only by a short rotation of cultivated crops is it practicable to rid the ground of the perennial roots and the dormant seeds of this weed."

Weiss & O'Brien (1953) record the following pests and diseases as attacking this species in the United States: Ascochyta verbenae Siem., a leaf-spot (in Wisconsin), Cercospora verbenae-strictae Pk. (Illinois & Kansas), Erysiphe cichoracearum DC., a powdery mildew (general), Phyllosticta texensis Seaver, a leaf-spot (Texas), Puccinia vilfae Arth. & Holw., a rust (Indiana to Oklahoma and South Dakota), and Septoria verbenae Rob., a leaf-spot (Vermont to Mississippi, Texas, and South Dakota).

Additional citations: INDIANA: Pulaski Co.: Friesner 22373 (Mi). KANSAS: Riley Co.: Varney s.n. [Aug. 9, 1889] (Mi).

VERBENA STRIGOSA Cham.

Additional bibliography: Moldenke, Phytologia 28: 391. 1974.

Recent collectors note that this plant grows from a xylopodium and have found it in anthesis (in addition to the months previously reported) in September. The corollas are said to have been "violet" in color on Hatschbach 32594.

Additional citations: BRAZIL: Paraná: Hatschbach 32594 (N).

xVERBENA STUPROSA Moldenke

Synonymy: xVerbena stiposa Moldenke, Phytologia 28: 465, in syn. 1974.

Additional bibliography: Moldenke, Phytologia 28: 391, 429, & 465. 1974.

Additional citations: ARKANSAS: Clay Co.: Eggert s.n. [N. Y. Bot. Gard. Type Photo neg. 8818] (N--photo of type, Z--photo of type).

VERBENA SUBINCANA (Troncoso) Shinners

Additional bibliography: Moldenke, Phytologia 24: 226. 1972; Heslop-Harrison, Ind. Kew. Suppl. 15: 142. 1974; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA SULPHUREA D. Don

Additional bibliography: Moldenke, Phytologia 28: 345, 391, 464, & 465. 1974; Troncoso, Darwiniana 18: 318 & 409. 1974.

VERBENA SUPINA L.

Additional & emended bibliography: L., Sp. Pl., ed. 1, imp. 1, 1: 21. 1753; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Ruíz & Pav., Fl.Peruv. & Chil. 1: 21. 1798; Dymock, Warden, & Hooper, Pharmacog. Ind. 3: 58. 1893; L., Sp. Pl., ed. 1, imp. 2, 1: 21 (1907), ed. 1, imp. 3, 1: 21 (1907), and ed. 1, imp. 4, 1: 21. 1934; Blakelock in H. Field, Contrib. Fauna & Fl. SW. Asia [7]. 1955; L., Sp. Pl., ed. 1, imp. 5, 1: 21. 1957; V. J. Chapm., Salt Marshes & Salt Deserts, ed. 1, 225 & 389. 1960; Dymock, Warden, & Hooper, Hamdard 15: 345. 1972; R. R. Stewart, Annot. Cat., in Nasir & Ali, Fl. W. Pakist. 608. 1972; V. J. Chapm., Salt Marshes & Salt Deserts, ed. 2, 225 & 389. 1974; Moldenke, Phytologia 28: 362, 391--393, & 441. 1974; Monod, Candollea 29: 412. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [116]. 1975.

Blakelock (1955) cites an unnumbered Lazar collection from Iraq.

VERBENA SWIFTIANA Moldenke

Additional bibliography: Moldenke, Phytologia 24: 231. 1972; Troncoso, Darwiniana 18: 311 & 412. 1974.

VERBENA TECTICAULIS Troncoso

Additional bibliography: Moldenke, Phytologia 24: 232. 1972; Heslop-Harrison, Ind. Kew. Suppl. 15: 142. 1974.

VERBENA TENERA Spreng.

Additional bibliography: Voss in Vilm., Blumengärt., ed. 3, 1: 825--826. 1895; Wyman, Gard. Encycl., imp. 1, 1003 & 1153 (1971) and imp. 2, 1003 & 1153. 1972; Moldenke, Phytologia 28: 356, 375, 394--395, 398, 451, 462, & 465. 1974; Troncoso, Darwiniana 18: 317, 318, & 409. 1974.

Additional illustrations: Voss in Vilm., Blumengärt., ed. 3, 1: 825. 1895.

Voss (1895) includes V. multifida Hort., V. pulchella Sweet, and Shuttleworthia pulchella Meissn. in the synonymy of V. tenera. The first of these names I feel should belong in the synonymy of V. laciniata, the second is a valid species, and the third is a synonym of the second. He records the popular German name, "zartes Eisenkraut" for V. tenera.

Troncoso (1974) cites Krapovickas & Cristóbal 15910 from Corrientes, Argentina, deposited in the Darwinion herbarium at San Isidro, Argentina.

VERBENA TENERA var. MAONETTI Regel

Additional synonymy: Verbena tenera f. maonetti Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895. Verbena tenera x incisa Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895.

Additional bibliography: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1044 & 1045. 1879; Voss in Vilm., Blumengärt., ed. 3, 1: 826. 1895; Booth, Encycl. Ann. & Bien. Gard. Pl. 440. 1962; Moldenke, Phytologia 28: 395. 1974.

Additional illustrations: Rümpler in Vilm., Illustr. Blumeng., ed. 2, 1044. 1879.

Voss (1895) says "V. tenera f. maonetti ist ein Bastard V. tenera x V. incisa und zudem die Mutterpflanze des gestreisten Blumisten-Eisenkrautes, der sogen. 'Italienischen Verbenen'." Personally, I doubt very much if V. incisa Hook. is at all involved in the ancestry of this taxon.

VERBENA TENUISECTA Briq.

Additional bibliography: A. P. Balf., Ann. & Bien. Fls. 85. 1963; Khush, Cytogen. Aneupl. 15, 148, 149, & 301. 1973; Howes, Dict. Useful Pl. 167. 1974; Moldenke, Phytologia 28: 345, 362, 375, 394--398, 440, 441, 443, & 451. 1974.

The corollas are described as having been "purplish-blue" when fresh on S. Y. Hu 6016, "purple" on his no. 9643, and "violet" on Hatschbach 23884. Hu describes the plant as a "perennial herb, creeping and forming roots [at the nodes].....rare" on Victoria Island, Hongkong. The corollas were "lilac" in color on Schinini & Quarín 7011.

Material has been misidentified and distributed in some herbaria under the name, "V. bipinnalefida Nutt." My good friend, Dr. Vivi Täckholm, distinguished expert on the flora of Egypt, tells me that this plant has always been known as V. bipinnatifida in Egypt.

Lehr found V. temuisecta "infrequent" in Maricopa County, Arizona. Khush (1973) says that trisomics have been produced from progenies of triploids by Arora & Khoshoo (1969). On page 148 of his work he lists the common name "moss" [sic]; on page 149 he avers that the trisomics are morphologically distinct and can be distinguished from each other phenotypically.

Most of the specimens collected by my wife and myself in the

southeastern United States, cited below, are transfers from the Bailey Hortorium herbarium.

Material of V. tenuisecta has been misidentified and distributed in some herbaria as Glandularia aristigera (S. Moore) Troncoso.

Additional & emended citations: GEORGIA: Calhoun Co.: Moldenke & Moldenke 26905 (Tu). Pulaski Co.: Moldenke & Moldenke 26927 (Ac). Warren Co.: Moldenke & Moldenke 26984 (Ld). Worth Co.: Moldenke & Moldenke 26914 (Ld). FLORIDA: Okaloosa Co.: Moldenke & Moldenke 26738 (W). Washington Co.: Moldenke & Moldenke 26744 (Ld). ALABAMA: Barbour Co.: Moldenke & Moldenke 26870 (Ac). Butler Co.: Moldenke & Moldenke 26865 (Tu). MISSISSIPPI: Pearl River Co.: Moldenke & Moldenke 26799 (Kh). Perry Co.: Moldenke & Moldenke 26827 (Mi). ARIZONA: Maricopa Co.: Lehr 786 (N). BRAZIL: Mato Grosso: Hatschbach 23884 (Mi). ARGENTINA: Corrientes: Schinini & Quarín 7011 (Ld). CULTIVATED: Hongkong: S. Y. Hu 6016 (W-2697282), 9643 (W—2730997).

VERBENA TENUISECTA var. ALBA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 397—398, 440, & 441. 1974.

The specimen cited below is a transfer from the Bailey Hortorium herbarium.

Emended citations: GEORGIA: Baker Co.: Moldenke & Moldenke 26892 (Kh).

VERBENA TRISTACHYA Troncoso & Burkart

Additional bibliography: Moldenke, Phytologia 24: 244. 1972.

Krapovickas and his associates found this species in fruit in December.

Additional citations: ARGENTINA: Corrientes: Krapovickas, Cristóbal, Carnevali, Quarín, González, & Isikawa 24385 (Z).

VERBENA URTICIFOLIA L.

Additional & emended bibliography: Breyn., Prod. Fasc. Rar. Pl., ed. 2, 2: 104. 1739; L., Sp. Pl., ed. 1, imp. 1, 1: 20. 1753; Sloane, Civil & Nat. Hist. Jamaic., ed. 1, 117. 1755; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Sloane, Civil & Nat. Hist. Jamaic., ed. 2, 117. 1789; Ruíz & Pav., Fl. Peruv. & Chil. 1: 21. 1798; Michx., Fl. Bor.-Am., ed. 1, 2: 15. 1803; Branner & Coville, Ann. Rep. Geol. Surv. Ark. 1888 (4): [List Pl. Ark.] 211. 1891; L., Sp. Pl., ed. 1, imp. 2, 1: 20 (1907) and ed. 1, imp. 3, 1: 20. 1907; Georgia, Man. Weeds 343—345. 1914; L., Sp. Pl., ed. 1, imp. 4, 1: 20. 1934; Demaree, Taxodium 1: 61. 1943; Weiss & O'Brien, Ind. Pl. Diseases U. S. 5: 1177 & 1178. 1953; L., Sp. Pl., ed. 1, imp. 5, 1: 20. 1957; Bullington, Trans. Ill. Acad. Sci. 66: 73. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661. 1973; C. M. Frederick, Ohio Journ. Sci. 74: 111. 1974; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786 & 787. 1973; Frederick, Ohio Journ. Sci. 74: 111. 1974; Howes, Dict. Use-

ful Pl. 270. 1974; Jones & Bell, Trans. Ill. Acad. Sci. 67: 87. 1974; Michx., Fl. Bor.-Am., ed. 1, imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 15. 1974; Moldenke, Phytologia 28: 349, 381, 399—401, 404, 427, 429, 464, & 465. 1974; Rousseau, Géogr. Florist. Québ. [Trav. & Doc. Centr. Étud. Nord. 7:] 377, 467, 479, 504, 516, 644, & 788. 1974.

Additional illustrations: Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 787. 1973.

Willis (1894) records V. urticifolia from Westchester County, New York, Jackson (1894) from Worcester County, Massachusetts, where, he says, it grows in waste ground, Stalter (1972) from Georgetown County, South Carolina, and Ellis, Wofford, & Chester (1971) from Stewart County, Tennessee. Bostick (1971) records it from Henry or Rockland County, Georgia, while Bradley (1955) says that it occurs occasionally in mixed open fields in Fairfield County, Connecticut. Blewitt (1926) says that it is "Frequent. Fields, roadsides and waste places, in dry soil. July—Aug." in New Haven County, Connecticut. Benner (1932) reports it as common in rather dry soil in waste places, along roadsides, and in fields in Bucks County, Pennsylvania, citing collections by Long from Narrowsville, Erwinna, Springtown, Dublin, and Penns Park, by Benner from Shelly, Telford, and Brownsburg, by McDowell from Neshaminy, and by Butler from Edison. Eilers (1971) reports it as common in openings in woods in Benton, Blackhawk, Buchanan, Cerro Gordo, Fayette, Floyd, Grundy, Hardin, Howard, Linn, and Winneshiek Counties, Iowa. Bullington (1973) encountered it in Ogle County, Illinois, while Jones & Bell (1974) found it in Piatt County.

Fell (1955) asserts that in Winnebago County, Illinois, this species "commonly grows in damp shady places. On Mitchell Road near Ill. Rt. No. 173 we found a patch with blue flowers but lacking other evidence of hybridization. Crosses with V. hastata, x engelmannii, have small blue flowers. Not common." Wherry (1971) records it from Montgomery County, Pennsylvania. Barans (1974) lists it from James City County, Virginia, where, he says, it is common in open woods, woodland borders, and cutover areas. Musselman and his associates (1971) report that it grows in woods, dry open woods, thickets, and roadsides in Rock County, Wisconsin. Dole (1937) asserts that it is common on "Waysides and waste places in the lower altitudes" in Vermont. Beaman (1970) records it from Ingham County, Michigan, where he found it "scattered through the woods, in some areas very abundant", citing Grashoff 13. Frederick (1974) encountered it in Champaign County, Ohio, while Fosberg found it growing "in weedy cleared ground in thin oak woods with very little undergrowth on [a] very slight slope". Demaree found it growing on moist creek banks and bottoms in Arkansas.

The Engelmann s.n. cited below consists solely of floral dissections mounted for comparison with those of related species and natural hybrids.

Stone (1911) asserts that the species is based on specimens

from "Virginia and Canada" and cites Knieskern 23 and Britton 194 as substantiation of his record of it from the New Jersey pine-barrens. He avers that it is "Frequent in the Northern and Middle Districts; usually in cultivated or waste ground. Two records from the Pine Barrens are obviously recently introduced plants". These, he says, are from Landisville and Weymouth. The Corrells (1972) give its habitat and distribution as "Low rich or open woods, wet meadows, thickets, river floodplains and bottomlands, waste places, fencerows, pastures and streamsides, Okla. (Murray Co.) and in Tex. from Bowie and Wilbarger to Newton, Brazoria and Gonzales cos., also in Wheeler Co. in the Panhandle, June--Oct.; Que. and Ont. to Neb., s. to Fla. and w. to Tex. and Okla." Wilkinson & Jaques (1972) tell us that it is "Common in pastures, fields and waste land", flowering from June to September. Recent collectors have encountered it in old fields, marshes, and campgrounds.

Hupke, who found V. urticifolia growing as a weed in Obenhessen, West Germany, in 1967, asserts that it came there "aus Wollstaubaussaat von Australien ewachsen", which is most remarkable, if true. I have no records of its being a weed in sheep pastures in Australia -- nor Argentina.

Additional common names listed for this plant beyond those previously reported by me are "netted-leaved vervain", "nettle-leaved verbena", "verveine à feuill. d'ortie", and "verveine étalée". Paxton (1840) says that it was introduced into cultivation in England in 1818.

Miller (1973) reports the isolation of verbenalin, the glucoside of verbenalol, from this species, while Grieve (1967) assert that "The root, boiled in milk and water with the inner bark of Quercus Alba, is said to be an antidote to poisoning by Rhus Toxicodendron."

Delotit (1970) describes the seeds as follows: "Oblong in outline; frequently slightly wider at the apex and gradually tapered to the base. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where joined. Dorsal side usually with three and occasionally five fine, weak longitudinal ribs which are joined by a few weak transverse ridges that frequently occur only between the margin and first rib in the upper one-third of the seed. Seed scar oval, oblique, white. Brown to reddish-brown. 1.5—1.8 mm long, 0.5—0.6 mm wide." Martin, Zim, & Nelson (1951) assert that these seeds are eaten by such birds as the stilt sandpiper, lark bunting, cardinal, junco, and field, song, swamp, tree, and white-crowned sparrows, and the entire plant by cottontail rabbits.

The Fedde & Schuster (1932) reference in the bibliography of this species bears the date "1925" on its title-page, but was not actually published until 1932.

Weiss & O'Brien (1953) list the following pests and diseases as attacking this species in the United States: Erysiphe cichoracearum DC., a powdery mildew (general), Puccinia vilfae, a rust (from Indiana to Oklahoma and South Dakota), Septoria verbenae

Rob., a leaf-spot (Vermont to Mississippi, Texas, and South Dakota), and an unidentified virus, causing a mosaic (Iowa). In Trans. Wisc. Acad. 53: 195 (1965) Ascochyta aureomaculata Greene, a leaf-spot, is added to the list.

If this species becomes a "nuisance weed", Georgia (1914) says that "Small areas may be grubbed out or hand-pulled when the ground is soft; but land badly infested with this weed should be put under cultivation for a short rotation, in order that its perennial roots and dormant seeds may be cleaned from the soil."

Verbena urticifolia var. simplex Farwell, hitherto relegated to synonymy here, is now regarded by me as a valid variety, which see below.

The Lawrence & Dress 570, distributed as V. urticifolia, is actually V. hastata f. albiflora Moldenke, Nash 1248 is V. scabra Vahl, and Beach s.n. [July 30, 1885], Demaree 14218, F. R. Fosberg 48000, and F. C. Stewart s.n. [July 25, 1892] are V. urticifolia var. leiocarpa Perry & Fernald.

Additional citations: NEW YORK: Albany Co.: C. A. Brown 742 (Mi). Ontario Co.: Graves s.n. [Aug. 26, 1920] (Ba), s.n. [8.26. 23] (Ba), s.n. [Aug. 22, 1924] (Ba). NEW JERSEY: Middlesex Co.: Halsted 175 (Ba). Monmouth Co.: Moldenke & Moldenke 28908 (E, Gz). Somerset Co.: Moldenke & Moldenke 28676 (Ac, Gz, Kh). Warren Co.: Moldenke & Moldenke 26098 (Ld). MARYLAND: Prince Georges Co.: E. C. Leonard 20931 (W--2162832). Plummer's Island: A. S. Hitchcock 15754 (W--2761256); Hotchkiss & Leonard 3409 (W--2761261); Killip 31887 (W--2761257); P. C. Standley 11821 (W--895396). DISTRICT OF COLUMBIA: Steele s.n. [July 7, 1896] (W--364287); Tidestrom 8321 (W--1769345); Ward s.n. [July 14, 1884] (W--147592), s.n. (W--155627). VIRGINIA: Arlington Co.: Allard 11412 (W--1896244). Fairfax Co.: E. H. Walker 3665 (W--1920723). Fauquier Co.: Allard 5363 (W--1787566), 7391 (W--18131146), 11989 (W--1916565), 12028 (W--1916564); F. R. Fosberg 33538 (W--26811553). Loudoun Co.: Allard 1953 (W--1728795), 21188 (W--2098549), 21560 (W--2134499); Hambleton 243 (W--2345939). Prince William Co.: Allard 803 (W--1677514), 3204 (W--1734687), 3351 (W--1734821), 20726 (W--2098520). NORTH CAROLINA: Davie Co.: Radford 14848 (Bl--150280). OHIO: Butler Co.: Cobbe 144 (Bl--161253). Hamilton Co.: E. L. Braun s.n. [VIII-5-05] (W--2712374). Lorain Co.: Dick s.n. [Oberlin, July 26, 1894] (Mi). INDIANA: Fulton Co.: Friesner 23098 (Mi). KENTUCKY: Owen Co.: E. L. Braun 3176 (W--2667619). KANSAS: Atchison Co.: Horr & McGregor E.531 (Bl--88313). Riley Co.: Varney s.n. [July 1889] (Mi). MISSOURI: Marion Co.: J. Davis s.n. [Hannibal, July 23, 1913] (E--1023345). Montgomery Co.: S. R. Hill 1215 (N). Saint Louis City: Engelmann s.n. (E--117332); Muehlenbach 3836 (Ld). ARKANSAS: Hempstead Co.: Demaree 63445 (Ac), 67156 (Ld). TEXAS: Smith Co.: H. E. Moore 899 (Ba). GER-

MANY: Hupke s.n. [1.8.1967] (Bl--218865).

VERBENA URTICIFOLIA var. INCARNATA (Raf.) Moldenke

Additional synonymy: Verbena urticifolia β floribus rubicundis Willd., Enum. Pl. Hort. Berol. 2: 634. 1809.

Additional bibliography: Willd., Enum. Pl. Hort. Berol. 2: 634. 1809; J. Torr., Fl. State N. Y. 2: 52. 1843; Moldenke, Phytologia 24: 251 & 252 (1972) and 28: 401 & 465. 1974.

It is interesting to note that both Willdenow (1809) and Torrey (1843) noted a pink-flowered form of this species, thus adding support to my belief that this is the taxon to which Rafinesque (1832) referred when he proposed his new name.

VERBENA URTICIFOLIA var. LEIOCARPA Perry & Fernald

Additional & emended bibliography: Musselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 184. 1971; Wherry, Bartonia 41: 79. 1971; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1399. 1972; Moldenke, Phytologia 24: 248, 250--252, & 427. 1972; Strausbaugh & Core, Fl. W. Va., ed. 2, 3: 786. 1973.

The Corrells (1972) say of this variety "known from Cass County, Tex.; it occurs sporadically almost throughout the extralimital range of the species". Recent collectors have found it in valley land at 180 feet altitude. Musselman and his associates (1971) encountered it growing along roadsides in Rock County, Wisconsin, and cite Wickham s.n. [1947], deposited in the University of Wisconsin herbarium. Demaree reports it as "common" on rocky ridges, at 600 feet altitude, in Arkansas. Wherry (1971) records it from Montgomery County, Pennsylvania.

The Allard 11989 and Hotchkiss & Leonard 3409, distributed as var. leiocarpa, appear, rather, to represent typical V. urticifolia L.

Additional citations: MARYLAND: Frederick Co.: L. B. Smith 5470 (W--2098181). DISTRICT OF COLUMBIA: Leonard & Killip 1547 (W--1769571); Ward s.n. [1878] (W--2761253), s.n. (W--155626). VIRGINIA: County undetermined: F. R. Fosberg 48000 [Lands Run] (W--2685648). INDIANA: Orange Co.: Friesner 22803 (Mi). IOWA: Story Co.: Beach s.n. [July 30, 1885] (Ba); F. C. Stewart s.n. [July 25, 1892] (Ba). ARKANSAS: Arkansas Co.: Demaree 14218 (Ba). Stone Co.: Demaree 65385 (Ld).

VERBENA URTICIFOLIA var. SIMPLEX Farwell, Papers Mich. Acad. Sci. 3: 103. 1924.

Bibliography: Farwell, Papers Mich. Acad. Sci. 3: 103. 1924; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 1076 [1058]. 1932; Moldenke in Lundell, Fl. Tex. 3 (1): 24. 1942; Moldenke, Phytologia 11: 328 (1965) and 28: 429 & 465. 1974

The original description of this variety (1924) is as follows: "Stems 4 to 8 dm. in height, strictly simple and terminated by a single filiform raceme about a decimeter in length and often with a similar simple raceme from the axiles of the 3 or 4 uppermost

pairs of leaves. Nutlets smaller than those of the typical form, 1 1/4 -- 1 1/2 mm. in length. A slender unbranched woods form with smaller flowers and fruits. In woods near Lakeville, Billington, Farwell & Gladewitz, No. 6443, Oct. 11, 1922; Northville, No. 6463, Oct. 18. Mr. Gladewitz has collected it also near Vassar." These localities are in Oakland, Wayne, and Tuscola Counties, Michigan.

xVERBENA VAGA Moldenke

Additional synonymy: Glandularia megapotamica x G. santiaguensis Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968; Moldenke, Phytologia 24: 252 & 451. 1972.

VERBENA VALERIANOIDES H.B.K.

Additional bibliography: Schau., Linnaea 20: [476]. 1847; Moldenke, Phytologia 24: 252. 1972.

VERBENA VIOLATA Rojas, Cat. Hist. Nat. Corr. 206, nom. nud. 1897.

Bibliography: Rojas Acosta, Cat. Hist. Nat. Corr. 206. 1897; Krapovickas, Bol. Soc. Argent. Bot. 11: 269. 1970.

Nothing is known to me about this species except what is given in the literature. It is apparently native to Corrientes, Argentina.

VERBENA WRIGHTII A. Gray

Additional & emended bibliography: E. B. Bartr., Bull. Torrey Bot. Club 49: 248. 1922; Irwin & Wills, Roadside Fls. Tex. 189. 1961; Pase & Johnson, U. S. Forest Serv. Res. Paper RM.41: 18. 1968; Moldenke, Phytologia 24: 254--255. 1972; Burlage, Wild Flow. Pl. Lakes Country 144. 1973; Rickett, Wild Fls. U. S. 6 (3): [543], 544, & 783, pl. 195. 1973; Moldenke, Phytologia 28: 242, 344, 345, & 431. 1974.

Additional illustrations: Rickett, Wild Fls. U. S. 6 (3): [543], pl. 195 (in color). 1973.

Recent collectors describe this plant as having decumbent stems, many stems per clump -- and this describes exactly the plants my wife and son and I saw so abundantly in Apache County, Arizona, forming a spectacularly beautiful display on roadbanks and hillsides. Other recent collectors have found it growing in gypseous soils on knolls, on rocky knolls, in sandy soil of Larrea communities, in overgrazed gravelly ground, in the pinyon-juniper-oak community on rocky hillsides, on slopes with juniper, along roadsides, on foothills, on grassy slopes, and in Yucca-Agave associations below Fouquieria. Pase & Johnson (1968) describe it as an "occasional chaparral plant in dry uplands", Dunn encountered it in an apple orchard in a yellow pine and juniper area, Spellenberg found it growing at the juncture of the Larrea zone with that of Juniperus monosperma in gravelly granitic sand, while Kruckeberg found it on brushy flats and slopes of open juniper-pinyon-scrub

type with Agave, Acacia, cacti, and many other shrubby species.

Bartram (1922) says that "This is one of the showiest of the early flowers in the foothills [of southern Arizona], where it blooms profusely in January". Burlage calls it the "Wright's verbena" and says of it "The flowers are reddish-purple. The foliage is coarse. The flowers form flat clusters at the top of the stalks."

The Lehto, McGill, Nash, & Pinkava 11566 collection, cited below, found among volcanic rocks at 6300 feet altitude, flowering and fruiting in July, is not typical since its inflorescences seem to have only very few inconspicuous glands on the hairs.

The corollas are described as having been "lavender" on Kruckeberg 4739 and Spellenberg & Spellenberg 3031, "vivid blue-lavender" on Spellenberg & Spellenberg 3079, "pink" on Reséndez 79 and R. Spellenberg 2989, "pink, fading paler" on Spellenberg, Delson, & Syvertsen 3294, and "deep pink-lavender" on Spellenberg & Spellenberg 3557.

The Higgins 7765 and Weber & Livingston 6258, distributed as V. wrightii, are V. ambrosifolia Rydb., while G. N. Jones 35900 is V. bipinnatifida Nutt. and Hollister 509 and N. H. Holmgren 3308 are V. gooddingii Briq.

Additional citations: TEXAS: Brewster Co.: Janke s.n. [29 March 1964] (Bl--191557); Kruckeberg 4739 (N); C. L. Lundell 13185 (Mi); Shushan s.n. [8 June 1959] (Bl--148237); Von Schrenk s.n. [Aug. 11, 1937] (E--1287033). El Paso Co.: Waterfall 3922 (E--1247452). Hudspeth Co.: L. C. Higgins 6871 (N). Jeff Davis Co.: L. C. Higgins 6827 (N); Tharp & Janszen 49-1141 (Bl--91934), Presidio Co.: Lundell & Lundell 14339 (Mi). NEW MEXICO: Catron Co.: Weber & Salamun 12790 (Bl--201130). Dona Ana Co.: Wooton s. n. [June 7, 1900] (Bl--91286). Eddy Co.: Cutak & Christ 97 (E--1286288); Spellenberg & Spellenberg 3031 (N). Grant Co.: Weber & Salamun 12873 (Bl--199904). Hidalgo Co.: Spellenberg & Spellenberg 3079 (N). Lincoln Co.: J. A. Moore 1018 (E--1024094). Luna Co.: R. Spellenberg 2989 (N). Otero Co.: D. B. Dunn 7609 (Bl--86266). Valencia Co.: Spellenberg & Spellenberg 3557 (N). ARIZONA: Apache Co.: Lehto, McGill, Nash, & Pinkava 11566 (N); Moldenke & Moldenke 27735 (Ac, Ld); Spellenberg, Delson, & Syvertsen 3294 (N). MEXICO: Coahuila: Rinehart 7004 (E--2149429). Nuevo León: Reséndez 79 (Bl--197871).

VERBENA XUTHA Lehm.

Emended synonymy: Verbena zutha Lehm. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941; Demaree, Taxodium 1: 61. 1943.

Additional bibliography: Schau., Linnaea 20: 477. 1847; E. B. Bartr., Bull. Torrey Bot. Club 49: 248. 1922; Oertel, U. S. Dept. Agr. Circ. 554: 21. 1939; Demaree, Taxodium 1: 61. 1943; Moldenke, Phytologia 24: 224 & 255--257. 1972; Anon., Biol. Abstr. 55 (10): B.A.S.I.C. S.270. 1973; Hocking, Excerpt. Bot. A.23: 291. 1974;

Moldenke, Phytologia 28: 428. 1974.

Oertel (1939) lists this among the honey and pollen plants in Louisiana. Bartram (1922) says that this plant is "Rare and local on dry slopes of the Tucson Mts." of southern Arizona. Rogers found it growing in ditches at the edge of a yard and in fields, flowering and fruiting in April. Rogers & Watson refer to it as "locally numerous" at the edges of low woods and fields. Demaree encountered "a few" on riverbottoms in Arkansas, at 255--300 feet altitude.

The Pringle s.n. [Santa Rita Mtns., May 11, 1884], distributed as V. xutha, is actually V. neomexicana var. xylopoda Perry.

Additional citations: MISSISSIPPI: Wilkinson Co.: Rogers & Watson 8453-G (N). ARKANSAS: Hempstead Co.: Demaree 63846 (Ac). Little River Co.: Demaree 54082 (Bl--239834, Bl--239888), 68513a (Ld). LOUISIANA: Cameron Par.: K. E. Rogers 7972-C (N). TEXAS: Hardin Co.: C. L. Lundell 14082 (Mi). Harris Co.: Boon 20001 (E--1292631); G. L. Fisher 51048 (Bl--252601); Lindheimer 154 (Bl--262805); Lundell & Lundell 13107 (Mi). Jefferson Co.: C. L. Lundell 14135 (Mi). Travis Co.: C. L. Lundell 11921 (Mi).

ADDITIONAL NOTES ON THE GENUS BAILLONIA. III

Harold N. Moldenke

BAILLONIA Bocq.

Additional & emended bibliography: Bocq., Déscr. Gen. Nouv. Fam. Verbén. 1862; Ball, Notes Nat. S. Am. 201--202. 1887; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 264 & 768. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 50. 1901; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 430. 1904; Reiche & Phil., Fl. Chil. 5: 303. 1910; Anon., Arnold Arb. Publ. 6: [Car. Lib. Arnold Arb.] 342. 1917; G. Klein, Handb. Pflanzenanal. 3 (2): 1224. 1932; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 50. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 264 & 768. 1946; Metcalfe & Chalk, Anat. Dicot. 1030--1034 & 1040, fig. 247 F. 1950; R. C. Foster, Contrib. Gray Herb. 184: 169. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 50. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 264 & 768. 1960; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 430. 1963; Hocking, Excerpt. Bot. A.6: 532 (1963) and A.13: 571. 1968; Moldenke, Biol. Abstr. 49: 4697. 1968; Moldenke, Phytologia 16: 168 & 505. 1968; Moldenke, Résumé Suppl. 16: 15. 1968; Anon., Torrey Bot. Club Ind. Am. Bot. Lit. 3: 306 & 308. 1969; Farnsworth, Blomster, Quimby, & Schermerh., Lynn Index 6: 262 & 263. 1969; J. Hutchinson, Evol. & Phylog. Flow. Pl. [471] & 670, fig. 416. 1969; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 826 & ii. 1971; Farnsworth, Lynn Index 7: 228. 1971;

Moldenke, Fifth Summ. 1: 5, 147, 181, 185, 195, 355, 395, & 434 (1971) and 2: 756 & 850. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 117 & 369. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661. 1973; Moldenke, Phytologia 28: 507. 1974; Troncoso, Darwiniana 18: 297, 301, 306, 354, 375—378, & 408, fig. 27. 1974.

Addenda & errata to the list of excluded species:

Baillonia iuncea Benth. & Hook. ex Moldenke, Résumé Suppl. 11: 5, in syn. 1964 = Diostea juncea (Gill. & Hook.) Miers

Baillonia juncea Benth. in Benth. & Hook. f., Gen. Pl. 2: 1144. 1876 = Diostea juncea (Gill. & Hook.) Miers

Baillonia juncea Benth. & Hook. f. ex Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 264. 1893 = Diostea juncea (Gill. & Hook.) Miers

Baillonia juncea (Gill. & Hook.) Benth. ex Moldenke, Prelim. Alph. List Invalid Names 6, in syn. 1940 = Diostea juncea (Gill. & Hook.) Miers

Baillonia juncea Sch. ex Moldenke, Résumé 236, in syn. 1959 = Diostea juncea (Gill. & Hook.) Miers

Baillonia spartioides Ball, Notes Nat. S. Am. 202. 1887 = Diostea scoparia (Gill. & Hook.) Miers

Baillonia spicata Baill., Bull. Soc. Linn. Paris 2: 880. 1890 = Citharexylum ligustrinum Van Houtte

Baillonia spicata (Jacques) Baill. ex Moldenke, Prelim. Alph. List Invalid Names 6, in syn. 1940 = Citharexylum ligustrinum Van Houtte

Baillonia szovitsii Farnsworth in Farnsworth, Blomster, Quimby, & Schermerh., Lynn Index 6: 263, sphalm. 1969 = Gaillonia szovitsii P. DC., Rubiaceae

The Angely (1971) publication cited in the bibliography above bears a title-page with the date "1970", but the volume involved here was not actually issued until 1971. The Bocquillon work, also mentioned above, is deposited in the library of the Arnold Arboretum and is entitled "Déscription d'un genre nouveau de la famille des verbénacées", published in Paris in 1862.

Troncoso (1974) sums up the systematics of this genus as follows: "El género Baillonia fue erróneamente rediscrito por Bentham y Hooker (1876) y luego por Briquet (1897), al reunirlo estos autores con Diostea Miers. Spencer Le M. Moore.....señala en un minucioso estudio comparativo de Baillonia y Diostea que ambos géneros se diferencian notablemente, tanto en su morfología floral cómo en sus caracteres vegetativos, así como en su área geográfica y que ambos constituyen dos taxones bien diferenciables. Este autor hace notar además, la evidente afinidad de Baillonia con Citharexylum cuya única diferencia reside en que Baillonia presenta pirenas uniloculares y uniseminadas, las que en Citharexylum son 2-loculares y 2-seminadas. Junell.....establece que no hay ninguna diferenciación en la estructura del ovario de ambos géner-

os y los ubica en la misma tribu Citharexyleae de la Subfam. Verbenoideae. La falta de material fructificado y la fragilidad del ovario, que dificulta su estudio, me han impedido profundizar en el problema de la posición sistemática de esto género."

The description of Baillonia spartioides by Ball (1887) is merely "In the warmer zone the allied genus Lippia becomes predominant, and displays an equal variety [to Verbena] of aspect; but in Chili especially we find a number of plants very different in aspect, although nearly allied in structure to the familiar types. The plant of the Rio Colorado -- known to botanists as Baillonia spartioides -- appears to be rare in Chili, as it is not among the species collected by the earlier explorers of this region."

In regard to Baillonia szovitsii, in a letter to me from Dr. N. R. Farnsworth, dated June 16, 1971, he says "Apparently the entry of 'Baillonia szovitsii' in Monograph VI was an error. Dr. Lynn obtained most of his data from Chemical Abstracts, and to add confusion to the issue, the abstract in CA lists a 'Daillonia szovitsii', which is obviously an error in transposition by the CA abstrator, and the entry should be 'Gaillonia szovitsii'."

BAILLONIA AMABILIS Bocq.

Additional bibliography: Metcalfe & Chalk, Anat. Dicot. 1032. 1950; R. C. Foster, Contrib. Gray Herb. 184: 169. 1958; Hocking, Excerpt. Bot. A.6: 532 (1963) and A.13: 571. 1968; Moldenke, Phytologia 16: 168. 1968; J. Hutchinson, Evol. & Phylog. Flow. Pl. [471] & 670. 1969; Moldenke, Fifth Summ. 1: 147, 181, 185, 195, 355, 395, & 434 (1971) and 2: 850. 1971; Troncoso, Darwiniana 18: [376], 377, & 408, fig. 27. 1974.

Additional illustrations: ARGENTINA: Formosa: I. Morel 5023 (N).

BAILLONIA AMABILIS var. PUBESCENS Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.6: 532 (1963) and A.13: 571. 1968; Moldenke, Phytologia 16: 168. 1968; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 850. 1971.

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ADDITIONAL NOTES ON THE GENUS BOUCHEA. V

Harold N. Moldenke

BOUCHEA Cham.

Additional & emended bibliography: Sloane, Voy. Jamaic. Nat. Hist. 1: 172, pl. 107, fig. 2. 1707; L., Sp. Pl., ed. 1, imp. 1, 1: 19. 1753; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Thwaites, Enum. Pl. Zeyl. 2: 241.

1839; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 327, 349, 733, & 753 (1893) and imp. 1, 2: 504, 564, & 567. 1894; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 430. 1904; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 28 & 57. 1904; Cooke, Fl. Presid. Bombay, ed. 1, 3: 418 & 420. 1905; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 673 & 715. 1907; L., Sp. Pl., ed. 1, imp. 2, 1: 19 (1907) and ed. 1, imp. 3, 1: 19. 1907; Alston in Trimen, Handb. Fl. Ceylon 6: Suppl. 229. 1931; M. Martinez, Pl. Medic. Mex., ed. 1, 469 & 602. 1933; L., Sp. Pl., ed. 1, imp. 4, 1: 19. 1934; M. Martinez, Pl. Medic. Mex., ed. 2, 467 & 591. 1939; Glover, Prov. Check List Brit. & Ital. Somal. 16, 266, & 355. 1947; L., Sp. Pl., ed. 1, imp. 5, 1: 19. 1957; Cooke, Fl. Presid. Bombay, ed. 2, imp. 1, 2: 497 & 500. 1958; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 217. 1959; Dalla Torrey & Harms, Gen. Siphonog., imp. 2, 430. 1963; Jafri, Fl. Karachi 286, 287, & 352, fig. 282. 1966; Cooke, Fl. Presid. Bombay, ed. 2, imp. 2, 2: 497 & 500. 1967; Gunawardena, Gen. & Sp. Pl. Zeyl. 146. 1968; Alemán Frías, Aurich, Ezcurra Ferrer, Gutiérrez Vázquez, Horstmann, López Rendueles, Rodríguez Graquitena, Roquel Casabella, & Schreiber, Die Kulturpfl. 19: 421. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 154, 168, 682, & 920. 1973; Farnsworth, Pharmacog. Titles 8 (8): iii. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 676. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 487 & 917. 1973; Moldenke, Phytologia 28: 109 (1974) and 29: 38—65. 1974; Molina R., Ceiba 18: 66. 1974; Troncoso, Darwiniana 18: 408 & 409. 1974; Moldenke, Phytologia 29: 505, 506, 508, & 509. 1974.

Airy Shaw (1973) still maintains that the genus Lomake Raf. is a synonym of Stachytarpheta Vahl, but of course, as I have pointed out numerous times over the past years, it is actually a synonym of Bouchea. Jackson (1893, 1894) and Thiselton-Dyer (1904) place Denisaea Neck. in the synonymy of Phryma L. in the Phrymaceae, also incorrectly.

BOUCHEA BOYACANA Moldenke

Additional bibliography: Moldenke, Phytologia 29: 44 & 48. 1974; Troncoso, Darwiniana 18: 408. 1974.

Cuatrecasas & Castañeda encountered this plant on dry savannas, at 10 meters altitude, flowering and fruiting in November.

Material has been misidentified and distributed in some herbaria as B. prismatica (L.) Kuntze and as Stachytarpheta elatior Schrad.

Additional citations: COLOMBIA: Guajira: Cuatrecasas & Castañeda 25472 (W—2342013).

BOUCHEA FLUMINENSIS (Vell.) Moldenke

Additional & emended bibliography: Moldenke, Phytologia 29: 41—48 & 56. 1974; Troncoso, Darwiniana 18: 348—350, 408, 411, & 412, fig. 12. 1974.

The Plowman 2737, distributed as typical B. fluminensis, is actually better regarded as var. pilosa Moldenke.

Additional citations: BRAZIL: Distrito Federal: Irwin, Maxwell,

& Wasshausen 21013 (N, N).

BOUHEA FLUMINENSIS var. PILOSA Moldenke

Additional bibliography: Moldenke, Phytologia 29: 49. 1974.

Plowman describes this plant as an herb, 1 m. tall, the corollas "blue-violet with white at [the] throat", and found it growing in secondary thickets, flowering in May. The corollas on Hatschbach 33850 are described by the collector as having been "lila".

Additional citations: BRAZIL: Paraná: Hatschbach 33850 (Ld). ARGENTINA: Misiones: Plowman 2737 (W—2639772).

BOUCHEA LINIFOLIA A. Gray

Additional bibliography: Moldenke, Phytologia 29: 42 & 49—50. 1974.

Rowell describes this plant as a globose shrub and found it growing in limestone soil on rocky hillsides.

Additional citations: TEXAS: Val Verde Co.: Rowell 15274 (Sl, Z).

BOUCHEA NELSONII Grenz.

Additional bibliography: Moldenke, Phytologia 29: 42, 50—51, 56, 62, & 63. 1974.

Additional citations: MEXICO: Oaxaca: Orcutt 5268 (E—711915).

BOUCHEA PRISMATICA (L.) Kuntze

Additional synonymy: Denisaea prismatica Kuntze apud Thiselt.-Dyer, Ind. Kew. Suppl. 2: 57, in syn. 1904. Bouchea prismatica (Lam.) Kuntze, in herb.

Additional & emended bibliography: Sloane, Voy. Jamaic. Nat. Hist. 1: 172, pl. 107, fig. 2. 1707; L., Sp. Pl., ed. 1, imp. 1, 1: 19. 1753; L., Syst. Nat., ed. 10 [Stockh.], 2: 852 (1759) and ed. 10 [Halle], 2: 852. 1760; Ait., Hort. Kew. 3: 480. 1789; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 28 & 57. 1904; L., Sp. Pl., ed. 1, imp. 2, 1: 19 (1907), ed. 1, imp. 3, 1: 19 (1907), ed. 1, imp. 4, 1: 19 (1934), and ed. 1, imp. 5, 1: 19. 1957; Alemán Frías, Aurich, Ezcurra Ferrer, Gutiérrez Vázquez, Horstmann, López Rendueles, Rodríguez Graquitena, Roquel Casabella, & Schreiber, Die Kulturpfl. 19: 421. 1972; Farnsworth, Pharmacog. Titles 8 (8): iii. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 676. 1973; Moldenke, Phytologia 29: 42, 47, 48, & 51—64. 1974; Molina R., Ceiba 18: 66. 1974.

Additional illustrations: Sloane, Voy. Jamaic. Nat. Hist. 1: pl. 107, fig. 2. 1707.

Aiton (1789) calls this plant the "germander-leav'd vervain" and asserts that it was introduced into cultivation in England in 1787 by Alexander Anderson from the West Indies and that it blooms in England in May and June. It existed in cultivation in the gardens at Kew at least until 1789.

The corollas on Correll & Correll 42376 are said to have been "pink", and these collectors found the plant growing as a "weed in vacant lots" in the Bahamas.

In addition to the months previously reported by me, this species has been collected in anthesis in December and in fruit in June. The corollas on Alston 5438 are described as having been "mauve" in color when fresh, while those on S. R. Hill 2213 were "light-violet". Hill describes the plant as an "erect herb to 2 feet tall" and found it to be "common in waste places and roadsides" in the Bahamas, flowering and fruiting there in June. Liogier refers to it as 30--40 cm. tall, the "flores morado claro", growing "in manigua, sobre cuelo calcáreo", the fruit green, at 10--20 m. altitude, flowering and fruiting in May and September.

The illustration accompanying Sloane's description (1707) of Verbena folio subrotundo serrato flore coeruleo is definitely not of Bouchea prismatica, but represents Stachytarpheta jamaicensis (L.) Vahl instead. However, his Verbena minima Chamaedryos folio is definitely Bouchea prismatica. His description of the latter is: "This plant has a great many blackish fibrils coming from each side, of a long, reddish brown, deep Root. At its appearance out of the Earth it sends out on every hand several small, square, trailing, jointed Stalks, two Foot long, at the Joints striking some fibrous Roots into the Earth. At every two Inches distance are swelled, reddish Joints, where come the Leaves set opposite one to the other, on a quarter of an Inch Foot-Stalks. They are three quarters on an Inch long, and half an Inch broad, hairy, snipt about the edges, and like those of Chamaedrys Spuria. At the ends of the Branches come the Inch and a half long Spikes of small blue headed Flowers, each of which stands in a rough Calyx, and after them succeed several roundish Seeds, having Asperities and Depressions in them, and being of a light brown colour. It grew near the Banks of the Rio-Cobre, below the Town of of [sic] St. Jago de la Vega, on the same side of the River."

Material has been misidentified and distributed in some herbaria as B. prismatica var. brevirostra Grenz., B. prismatica var. longirostra Grenz., or even as Stachytarpheta fruticosa (Millsp.) B. L. Robinson. On the other hand, the Cuatrecasas & Castañeda 25472, distributed as B. prismatica, is actually B. boyacana Moldenke, while R. Kral 25562 is B. prismatica var. brevirostra Grenz.

Additional citations: BAHAMA ISLANDS: Little Exuma: Correll & Correll 42376 (N). Long: S. R. Hill 2213 (Ld, N). HISPANIOLA: Dominican Republic: A. H. Liogier 19138 (N), 20258 (N). VENEZUELA: Federal District: Alston 5438 (W--2674375). Yaracuy: H. M. Curran 249 (N).

BOUCHEA PRISMATICA var. BREVIROSTRA Grenz.

Additional bibliography: Moldenke, Phytologia 29: 42, 55, 56, & 58--61. 1974.

Kral found this plant growing in heavy black clay of disturbed grasslands.

The Alston 5438, distributed as this variety, seems actually to represent the typical B. prismatica (L.) Kuntze.

Additional citations: MEXICO: Michoacán: R. Kral 25562 (Mi). LEEWARD ISLANDS: Guadeloupe: Bourgeau 545 (E--1641749, E--1641926, E--1641943).

BOUCHEA PRISMATICA var. LONGIROSTRA Grenz.

Additional bibliography: Alemán Frías, Aurich, Ezcurra Ferrer, Gutiérrez Vázquez, Hortsmann, López Rendueles, Rodríguez Graquitena, Roquel Casabella, & Schreiber, Die Kulturpfl. 19: 421. 1972; Farnsworth, Pharmacog. Titles 8 (8): iii. 1973; Moldenke, Phytologia 29: 42, 51, 55, 56, 59, & 62--63. 1974.

The Ruiz-Terán & López-Palacios collection, cited below, bears this description of the plant: "Sufrútice erecto, 80 cm" and "Hierbe sufruticulosa, 40--60 cm", with the corollas said to have been "morado claras". They found it growing at an altitude of 1750 meters in Venezuela, fruiting in December. Tillett describes it as "to 6 dm. tall, 6 dm. spread; roots manila; stems lightly purplish; herbage with rank odor; leaves membranous, matte medium green above, matte light green beneath; sepals green; corolla tube and throat nearly white, limb lavender-pink above, lighter beneath" and refer to it as "locally common in dry quebrada" in an area of desert scrub, with cactus and "cují" on dry talus and alluvium in broken ground between base of mountain and river, at 625 meters altitude.

The Correll & Correll 42376, distributed as this variety, is actually typical B. prismatica (L.) Kuntze instead.

Additional citations: VENEZUELA: Mérida: Ruiz-Terán & López-Palacios 9289 (Ac); Tillett 737-45 (N). Sucre: Ruiz-Terán & López-Palacios 9978 (Ld).

BOUCHEA RUSEYI Moldenke

Additional bibliography: Moldenke, Phytologia 29: 42 & 64. 1974.

Additional citations: BOLIVIA: Department undetermined: M. Bang 2226 (Pd--isotype).

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ADDITIONAL NOTES ON THE GENUS BURROUGHSIA. I

Harold N. Moldenke

BURROUGHSIA Moldenke, Phytologia 1: 411--412. 1940.

Synonymy: Burroughisia Moldenke, Résumé Suppl. 15: 16, in syn. 1967.

Additional bibliography: T. S. Brandeg., Proc. Calif. Acad. Sci., ser. 2, 2: 196. 1889; Vasey & Rose, Contrib. U. S. Nat. Herb.

1: 86. 1890; Robinson & Greenm., Proc. Am. Acad. 29: 390—391. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 250 (1903) and imp. 1, 507. 1906; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1244 & 1247. 1924; H. B. Davis, Life & Works Pringle 124. 1936; Moldenke, Phytologia 1: 411—412. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 250 & 507. 1941; Moldenke, Alph. List Invalid Names 29 & 30. 1942; Moldenke, Phytologia 2: 93. 1945; Hill & Salisb., Ind. Kew. Suppl. 10: 36 & 251. 1947; Shreve & Wiggins, Carnegie Inst. Wash. Publ. 591: 111. 1951; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 250 & 507. 1959; Moldenke, Résumé 34, 310, 312, 405, & 443. 1959; S. Hicks, Desert Mag. 27 (10): 39. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1246—1247. 1964; F. A. Barkley, List Ord. Fam. Anthoph. 75 & 147. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 167. 1966; Moldenke, Résumé Suppl. 15: 16. 1967; Moldenke, Fifth Summ. 1: 67 & 403 (1971) and 2: 550, 554, 752, & 851. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 172. 1973.

BURROUGHSIA APPENDICULATA (Robinson & Greenm.) Moldenke, Phytologia 1: 412. 1940.

Synonymy: Lippia appendiculata Robinson & Greenm., Proc. Am. Acad. 29: 390—391. 1894.

Bibliography: Robinson & Greenm., Proc. Am. Acad. 29: 390—391. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 507. 1906; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1244—1247. 1924; H. B. Davis, Life & Works Pringle 124. 1936; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 507. 1941; Moldenke, Alph. List Invalid Names 29. 1942; Hill & Salisb., Ind. Kew. Suppl. 10: 26 & 251. 1947; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 507. 1959; Moldenke, Résumé 34, 310, & 443. 1959; Moldenke, Fifth Summ. 1: 67 (1971) and 2: 550 & 851. 1971.

The type of this species was collected by Cyrus Guernsey Pringle (no. 4625) in wet alkaline soil on the Mapimi desert in Durango [the labels are inscribed "San Luis Potosí" but the original description says "Durango"], Mexico, flowering in November. The same distinguished collector's no. 11082 is from 6000 feet altitude at Yermo, also on the Mapimi desert but in Coahuila, flowering in September. The collector asserts that the species is "known only from the Mapima desert". More recent collectors have encountered it on "low ground" and on "lava flows", describe it as suffrutescent, and have found it in flower in May and in fruit in November.

The corollas are described as having been "whitish" on Correll & Johnston 21557 and as "white with yellow eye" on Correll & Johnston 21440.

Additional citations: MEXICO: Chihuahua: Correll & Johnston 21557 (Ld). Coahuila: Pringle 11082 (Cm, F—159643, It, N), s.n. [Yermo Station, 9.1902] (Gg—31166). Durango: Correll & Johnston 21440 (Ld); Pringle 4625 (Br—isotype, C—isotype, Ca—104926—isotype, F—1062l1—isotype, F—photo of isotype, G—type, Io—

38718—isotype, Me—isotype, Me—isotype, Me—isotype, Ms—30866—isotype, N—photo of isotype, Ob—50723—isotype, S—isotype, Si—photo of isotype, Vt—isotype, Z—photo of isotype).

BURROUGHSIA FASTIGIATA (T. S. Brandeg.) Moldenke, Phytologia 1: 412. 1940.

Synonymy: Lippia fastigiata T. S. Brandeg., Proc. Calif. Acad. Sci., ser. 2, 2: 196. 1889. Burroughisia fastigiata (Brand.) Moldenke, Résumé Suppl. 15: 16, in syn. 1967.

Bibliography: T. S. Brandeg., Proc. Calif. Acad. Sci., ser. 2, 2: 196. 1889; Vasey & Rose, Contrib. U. S. Nat. Herb. 1: 86. 1890; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 250. 1903; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1244 & 1247. 1924; Moldenke, Phytologia 1: 412. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 250. 1941; Moldenke, Phytologia 2: 93. 1945; Shreve & Wiggins, Carnegie Inst. Wash. Publ. 591: 111. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 250. 1959; Moldenke, Résumé 34, 312, & 443. 1959; S. Hicks, Desert Mag. 27 (10): 39. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1247. 1964; Moldenke, Phytologia 12: 20, 27, & 30. 1965; Moldenke, Fifth Summ. 1: 67 & 403 (1971) and 2: 554 & 851. 1971.

Illustrations: S. Hicks, Desert Mag. 27 (10): 39. 1964.

Recent collectors describe this plant as a small, bushy perennial herb 1—2 dm. tall or a prostrate shrub forming mats 2—3 m. in diameter, with a pronounced minty odor and the small flowers in close spikes. They report the vernacular name, "damiana", and have found the plant growing on dry playas or lake-beds, plains, and flats inland from sand dunes, at the margins of small depressions in the bottoms of dry vernal ponds, in flatlands, and in sandy valleys, flowering in January, March, April, October, and November, and fruiting in April and November.

Gentry found it "in [a] sandy wash near 4-foot well" and comments that it "forms colonial patches 15—20 cm. tall, the herbage aromatic, decocted as a tea, reputed to have aphrodisiac properties; known only from this spot in Atriplex-Frankenia halophyte association along old and modern beaches". He and Fox encountered it "on [a] small clay flat with mesquite trees, subject to perennial overflow, used as a decoction of tea for stomach troubles and by women to insure conception." In Shreve & Wiggins (1964) its distribution is given as "Lower Sonoran Zone, vicinity of Calmallí to the Magdalena Plain, Baja California".

The corollas are said to have been "lavender" on H. S. Gentry 7768, Gentry & Fox 11749, Sikes & Babcock 294, and Wiggins & Wiggins 18201, "lavender-pink" on I. L. Wiggins 15086, "light-lavender" on I. L. Wiggins 5423, "pinkish" on I. L. Wiggins 15161, and "white or pinkish" on I. L. Wiggins 5522.

There is some question whether I. L. Wiggins 5522 in the Gray Herbarium is perhaps a mixture with something else.

Hicks (1964) says that "Somehow, somewhere, the damiana plant of Baja California became known as an aphrodisiac. For many years

tons of damiana were shipped from the sea ports of southern Baja to destinations all over the world. Gathering the native shrub meant an increase in tortillas and frijoles to a good many families living in areas where damiana grew and jobs were scarce. But, after several years of uncontrolled harvesting and marketing, the supply was depleted. A single order from a large pharmaceutical firm for 50 tons of damiana was placed at La Paz. It was never filled. A liqueur called Creme de Damiana is manufactured in Guadalajara and is probably flavored by damiana gathered from the interior of Mexico. In Baja the natives continue to gather the shrubs in limited quantities for use as an aromatic tea. Its growth is pretty much confined to the Territory of Southern Baja where the shrubs first become noticeable a short distance south of El Arco, then continue to grow intermittently on down the peninsula to Cape San Lucas. Tips of the branches and tiny leaves and flowers, if the plant is in blossom, are boiled together to make a delicious tea. I have drunk damiana on many occasions and heartily recommend it as a refreshing, flavorful drink. The accepted measurement for making most herb teas, yerba del manzo and eucalyptus leaves excepted, is un porcion de la mano, or, a small handful of twigs and leaves to a quart of water."

Additional citations: MEXICO: Baja California: T. S. Brandegee s.n. [San Benito, 1889] (N--isotype, N--photo of type, Po--63921-type, Z--photo of type), s.n. [Soledad, Jan. 8, 1890] (G); H. S. Gentry 7768 (Ca--757127, Du--323542, Mi, N, Sd--42815, Tu--122005); Gentry & Fox 11749 (Mi); Edw. Palmer 264 (Ca--770290, F-707686, Fs, G, G, Mi, Mi, S); Shreve 6999 (F--892372, Fs, G, Mi); Sikes & Babcock 294 (Au--259160, Au--284573); J. Whitehead 645 (La, N--photo, Z--photo); I. L. Wiggins 5423 (Ca--660687, Du--251739, Du--265884, G, Gg--292595, Gg--305053, Ld, Mi, N, Po--261781, Rs--29956, Se--82598), 5522 (Ca--660961, Du--263482, G, Gg--305157, Mi, N, Po--261912, Se--84384), 7847 (Ca--665436, Du--265984, G, Mi), 15086 (Du--453234, Tu--181096), 15161 (Du--453235, Se--208880); Wiggins & Wiggins 18201 (Au--238528, Du--493655, Mi).

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ADDITIONAL NOTES ON THE GENUS CASSELIA. III

Harold N. Moldenke

CASSELIA Nees & Mart.

Additional synonymy: Timotoica Moldenke in Fedde, Repert. Spec. Nov. 39: 135, sphalm. 1936. Timotocea Moldenke ex Rennó, Levant. Herb. Inst. Agron. Minas 150, sphalm. 1960. Timotoua Duarte ex Moldenke, Résumé Suppl. 9: 5, in syn. 1964. Timitocia

Moldenke, Phytologia 15: 95, in text. 1968. Timotecia Moldenke ex Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: 830 & xviii, sphalm. 1971.

Additional & emended bibliography: Nees & Mart., Nov. Act. Physico-Med. Acad. Caes. Leopold.-Carol. Nat. Cur. 11: 73, pl. 6, fig. A & B. 1823; Reichenb., Consp. Reg. Veg. 1: 117. 1828; D. Dietr., Syn. Pl. 3: 371. 1843; Walp., Repert. 4: 40. 1845; Schau. in A. DC., Prodr. 11: 527--528 & [733]. 1847; Paxt., Fl. des Serres, pl. 361. 1848; Paxt., Mag. Bot. 15: 75. 1849; Schau. in Mart., Fl. Bras. 9: 173--176 & 311, pl. 32. 1851; Schnitzl., Icon. Fam. Nat. Veg. 137. 1856; Bocq., Adansonia, ser. 1, 2: 89, 109, 125, 126, 129, 141, 142, 153, 154, & 158 (1862) and 3: 179, 184, 185, & 237--238, pl. 16. 1863; Bocq., Rev. Verbénac. 89, 109, 125, 126, 129, 141, 142, 153, 154, 158, 179, 184, 185, & 237--238, pl. 16. 1863; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1148. 1876; Pfeiffer, Nom. Bot. 1 (1): 616. 1873; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 449. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 158. 1894; Solered., Bull. Herb. Boiss., ser. 1, 6: 628. 1898; Briq. in Chod. & Hassl., Bull. Herb. Boiss., ser. 2, 4: 1165--1166. 1904; Briq. in Chod. & Hassl., Pl. Hassler. 2: 501--502. 1904; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 431. 1904; T. Peckolt, Bericht. Deutsch. Pharm. Gesel. 14: 465. 1904; Prain, Ind. Kew. Suppl. 3: 37. 1908; Solered., Syst. Anat. Dicot. Ergänz. 255. 1908; M. Kunz, Anatom. Untersuch. Verb. 60--62 & 78, fig. 4. 1911; Sandw., Kew Bull. Misc. Inf. 1929: 124. 1929; Junell, Symb. Bot. Upsal. 4: 17, 18, & 20. 1934; Moldenke in Fedde, Repert. Spec. Nov. 39: 129--153. 1936; Moldenke, Chron. Bot. 3: 311. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 742. 1938; Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 401. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 54. 1938; Moldenke, Prelim. Alph. List Invalid Names 14. 1940; Moldenke, Alph. List Invalid Names 12. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 38, 40, 41, 74, & 100. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 449. 1946; Moldenke, Alph. List Cit. 1: 237 & 264. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 43, 233, & 251. 1947; Metcalfe & Chalk, Anat. Dicot. 1031--1033 & 1040. 1950; Stellfeld, Trib. Farmac. 19 (10): 171. 1951; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956; Moldenke, Biol. Abstr. 30: 1092. 1956; Rambo, Sellowia 7: 260. 1956; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14360. 1958; Anon., Kew Bull. Gen. Index 1929-1956, 67. 1959; G. Taylor, Ind. Kew. Suppl. 12: 30. 1959; Angely, Liv. Gen. Bot. Bras. 35 & 40. 1960; Moldenke, Biol. Abstr. 36: 2311. 1961; Moldenke, Phytologia 7: 350--352. 1961; Angely, Fl. Bacia Paran. 22: 39. 1962; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 431. 1963; Hocking, Excerpt. Bot. A.6: 532. 1963; Moldenke, Résumé Suppl. 9: 5. 1964; F. A. Barkley, List Ord. Fam. Anthoph. 75, 76, 150, & 216. 1965; Moldenke, Phytologia 12: 6. 1965; Rambo, Pesquis. Bot. 21: 31 & [59]. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 205 & 1126. 1966; Moldenke, Phytologia 16: 95, 506, & 512. 1968; Moldenke, Résumé Suppl. 16: 5, 19, & 27. 1968; Anon., Torr. Bot. Club Ind. Am. Bot. Lit. 3: 306 & 308. 1969; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: 8 (1969),

ed. 2: xxxi (1970), and ed. 1, 4: 826, 830, 1375, iv, & xviii. 1971; Moldenke, Fifth Summ. 1: 5, 6, 147, 181, 185, 356, 423, & 424 (1971) and 2: 642, 756, 771, 856--857, & 968. 1971; A. L. Moldenke, Phytologia 23: 318. 1972; Moldenke, Phytologia 23: 435, 505, & 511. 1972; Rouleau, Taxon Index Vols. 1-20, part 1: 72. 1972; Stafleu, Internat. Code Bot. Nom. 354 & 381. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 211 & 1156. 1973; Hegnauer, Chemotax. Pfl. 6 [Cham. Reihe 21]: 659. 1973; Troncoso, Darwiniana 18: 297, 299, 301, 306, 385--387, 408, & 411, fig. 31. 1974.

Barkley (1965) reduces Timotocia to synonymy under Casselia on page 75 of his excellent work, but regards it as a valid genus on page 76. It is most unfortunate that the Casselia of Nees and Martius (1823) should have been conserved over the Casselia of Dumortier (1822) by the International Code.

CASSELIA CHAMAEDRYFOLIA Cham.

Additional synonymy: Timotocia chamaedryfolia (Cham.) Moldenke in Fedde, Repert. Spec. Nov. 39: 143. 1936. Timotocea chamaedryfolia (Cham.) Moldenke ex Rennó, Levant. Herb. Inst. Agron. Minas 150, sphalm. 1960. Timitocia chamaedryfolia (Cham.) Moldenke, Phytologia 16: 95, in textu. 1968.

Additional bibliography: Schau. in A. DC., Prodr. 11: 528. 1847; Schau. in Mart., Fl. Bras. 9: 175 & 311. 1851; Bocq., Adansonia, ser. 1, 3: [Rev. Verbénac.] 238. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 449. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 158. 1894; Briq. in Chod. & Hassl., Bull. Herb. Boiss., ser. 2, 4: 1165 & 1166. 1904; Briq. in Chod. & Hassl., Pl. Hassler. 2: 501 & 502. 1904; M. Kunz, Anatom. Untersuch. Verb. 60. 1911; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 449. 1946; Moldenke, Phytologia 2: 243--244. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Rambo, Sellowia 7: 260. 1956; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 449. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 150. 1960; Moldenke, Phytologia 7: 351. 1961; Rambo, Pesquis. Bot. 21: 31 & [59]. 1965; Moldenke, Phytologia 16: 95. 1968; Moldenke, Résumé Suppl. 16: 27. 1968; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 642 & 856. 1971.

Recent collectors have encountered this plant along roadsides in campos, in gallery margins, and "occasional among campo grasses", at altitudes of 600--1000 meters, flowering in October and November, describing it as a subshrub 40 cm. tall or an herb 15 cm. tall from a woody root. The corollas are said to have been "bluish" on Markgraf, Mello Barreto, & Brade 3166, "violet" on Oliveira 1312, "light-violet, falling by midday" on Irwin & Soderstrom 7147, and "purple with dark-violet venation" on Irwin, Souza, & Reis dos Santos 10311.

Rambo (1965) cites the following Herb. Anchieta numbers, all collected by himself in Rio Grande do Sul, Brazil: 8777, 32167, 36410, 54015, 54533, 60150, 60173, & 60198. He describes the

plant as a "Small herb, prostrate to ascending, branches dense, up to 30 cm long", found in "Moist, grassy Campos" in the "Northeasternmost Highlands only.....From Goiás to RGS [=Rio Grande do Sul]." Nos. 54015 and 54533, along with 49436, are actually Verbena jordanensis Moldenke.

The actual type specimen of Casselia chamaedryfolia, Sellow 1517, deposited in the herbarium of the Botanisches Museum in Berlin, was photographed there by Macbride as his type photograph number 17576, but is now destroyed. His type photograph number 34298, distributed as C. chamaedryfolia, is actually a photograph of an isotype of C. confertiflora (Moldenke) Moldenke.

Additional citations: BRAZIL: Goiás: Irwin & Soderstrom 7147 (N, W—2454339); Irwin, Souza, & Reis dos Santos 10311 (N). Minas Gerais: Markgraf, Mello Barreto, & Brade 3166 [Herb. Jard. Bot. Rio de Jan. 40067] (N); J. E. de Oliveira 1312 [Herb. Jard. Bot. Belo Horiz. 45105] (N); Sellow 1517 [Macbride photos 17576] (F—663055—photo of type, F—photo of type, N—photo of type, Rb—photo of type, W—photo of type). State undetermined: Héringer 6561 (Z).

CASSELIA CONFERTIFLORA (Moldenke) Moldenke

Additional synonymy: Timotocia confertiflora Moldenke in Fedde, Repert. Spec. Nov. 39: 148—149. 1936. Timotecia confertiflora Moldenke ex Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: 830 & xviii, sphalm. 1971.

Bibliography: Moldenke in Fedde, Repert. Spec. Nov. 39: 148—149. 1936; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 38 & 100. 1942; Moldenke, Phytologia 2: 244. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 93 & 197. 1949; Moldenke, Phytologia 5: 132. 1955; Moldenke, Biol. Abstr. 30: 1092. 1956; Moldenke, Résumé 87, 354, & 445. 1959; G. Taylor, Ind. Kew. Suppl. 12: 30. 1959; Moldenke, Résumé Suppl. 16: 5. 1968; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 830, iv, & xviii, map 1375. 1971; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 642 & 857. 1971; Moldenke, Phytologia 23: 435. 1972.

The Angely (1971) publication cited above bears the date "1970" on its title-page, but was not actually published until 1971.

Felippe states that this species has underground tubers, flowers that are "roxo-avermelhadas" in color, grows in cerrado, and flowers in September. An isotype, G. Gardner 3369, deposited in the herbarium of the Naturhistorisches Museum in Vienna, was photographed there by Macbride as his type photograph number 34298 and was erroneously distributed by Field Museum as C. chamaedryfolia Cham.

Additional citations: BRAZIL: Goiás: G. Gardner 3369 [Macbride photos 34298] (F—photo of isotype, N—photo of isotype, Rb—photo of isotype, W—photo of isotype). São Paulo: Felippe 81 (W—2404952).

CASSELIA CONFERTIFLORA var. LACINIATA (Moldenke) Moldenke

Synonymy: Timotocia confertiflora var. laciniata Moldenke in Fedde, Repert. Spec. Nov. 39: 149. 1936.

Bibliography: Moldenke in Fedde, Repert. Spec. Nov. 39: 149. 1936; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 38 & 100. 1942; Moldenke, Phytologia 2: 244. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 93 & 197. 1949; Moldenke, Phytologia 5: 132. 1955; Moldenke, Biol. Abstr. 30: 1092. 1956; Moldenke, Résumé 87, 354, & 445. 1959; Moldenke, Résumé Suppl. 16: 5. 1968; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 642 & 857. 1971.

An isotype of this variety, G. Gardner 3370, deposited in the herbarium of the Naturhistorisches Museum in Vienna, was photographed there by Macbride as his type photograph number 34297.

The plant is described by recent collectors as an herb, 15 cm. tall, growing on upland bushy campos or in cerrado, flowering in October. Irwin & Soderstrom refer to it as "locally common in cerrado on foothills", at 300--400 meters altitude. The corollas are said to have been "rose" colored on N. T. Silva 57733 and "light-violet" on Irwin & Soderstrom 6739.

Additional citations: BRAZIL: Goiás: G. Gardner 3370 [Macbride photos 34297] (F--photo of isotype, N--photo of isotype, Rb--photo of isotype, W--photo of isotype); N. T. Silva 57733 (N). Mato Grosso: Irwin & Soderstrom 6739 (Ca--1336467, N, W--2454330).

CASSELIA GLAZIOVII (Briq. & Moldenke) Moldenke

Synonymy: Timotocia glaziovii Briq. & Moldenke ex Moldenke in Fedde, Repert. Spec. Nov. 39: 145--146. 1936.

Additional & emended bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Moldenke, Biol. Abstr. 30: 1092. 1956; G. Taylor, Ind. Kew. Suppl. 12: 30. 1959; Moldenke, Phytologia 7: 351. 1961; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 642 & 857. 1971.

The actual type of this species, J. E. Pohl 2158, deposited in the herbarium of the Naturhistorisches Museum in Vienna, was photographed there by Macbride as his type photograph number 34296. His type photograph number 24626 depicts a specimen of Glaziou 21890 deposited in the herbarium of the Conservatoire et Jardin Botaniques in Geneva as well as a specimen which is C. serrata Nees & Mart.

Macedo encountered this plant on "campestre da serra", the corollas "roxas" in color, and flowering in October.

Material of C. glaziovii has been misidentified and distributed in some herbaria as belonging in the Acanthaceae, a very understandable mistake.

Additional citations: BRAZIL: Goiás: Burchell 8140 (G); Glaziou 21890 [Macbride photos 24626, in part] (N--photo, W--photo); J. E. Pohl 2158 [Macbride photos 34296] (F--photo of type, N--photo of type, Rb--photo of type, W--photo of type). Minas Gerais: Macedo 2655 (N, W--2025585).

CASSELIA HASSLERI Briq.

Synonymy: Timotocia hassleri (Briq.) Moldenke in Fedde, Repert. Spec. Nov. 39: 141--142. 1936.

Bibliography: Briq. in Chod. & Hassl., Bull. Herb. Boiss., ser. 2, 4: 1165 & 1166. 1904; Briq. in Chod. & Hassl., Pl. Hassler. 2: 501 & 502. 1904; Prain, Ind. Kew. Suppl. 3: 37. 1908; M. Kunz, Anatom. Untersuch. Verb. 61. 1911; Moldenke, Prelim. Alph. List Invalid Names 14. 1940; Moldenke, Lilloa 6: 433--434 (1941) and 8: 427. 1942; Moldenke, Alph. List Invalid Names 12. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 41 & 100. 1942; Moldenke, Phytologia 2: 244. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 99 & 197. 1949; Moldenke, Résumé 115, 354, & 445. 1959; Moldenke, Fifth Summ. 1: 185 (1971) and 2: 642 & 857. 1971; Troncoso, Darwiniana 18: 387 & 408. 1974.

The type specimen of this species, Hassler 7889, deposited in the herbarium of the Conservatoire et Jardin Botaniques in Geneva, was photographed there by Macbride as his type photograph number 24627. Hassler describes the plant as a small shrub, 20--40 cm. tall, the "petals" rose-colored, and encountered it in sandy fields, on high plateaus, and on barrancas, flowering in February and November.

Additional citations: PARAGUAY: Hassler 7889 [Macbride photos 24627] (F--photo of type, N--photo of type, Rb--photo of type, S--isotype, W--photo of type); Rojas s.n. [Hassler 10760; Herb. Osten 20409] (Ca--950623, Mi, N, N, S, Ug, W--2055461).

CASSELIA HYMENOCALYX Briq.

Synonymy: Timotocia hymenocalyx (Briq.) Moldenke in Fedde, Repert. Spec. Nov. 39: 139--141. 1936.

Bibliography: Briq. in Chod. & Hassl., Bull. Herb. Boiss., ser. 2, 4: 1165--1166. 1904; Briq. in Chod. & Hassl., Pl. Hassler. 2: 501--502. 1904; Prain, Ind. Kew. Suppl. 3: 37. 1908; Moldenke in Fedde, Repert. Spec. Nov. 39: 139--141. 1936; Moldenke, Prelim. Alph. List Invalid Names 14. 1940; Moldenke, Lilloa 6: 434 (1941) and 8: 427. 1942; Moldenke, Alph. List Invalid Names 12. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 47, 74, & 100. 1942; Moldenke, Phytologia 2: 244. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 99, 163, & 197. 1949; Moldenke, Résumé 116, 214, 354, & 445. 1959; Moldenke, Fifth Summ. 1: 185 & 356 (1971) and 2: 642 & 857. 1971; Troncoso, Darwiniana 18: 385--387 & 408, fig. 31. 1974.

Illustrations: Troncoso, Darwiniana 18: 386, fig. 31. 1974.

The type specimen of this species, Hassler 7637, deposited in the herbarium of the Conservatoire et Jardin Botaniques in Geneva, was photographed there by Macbride as his type photograph number 24628. Hassler describes the plant as a subshrub, 20--50 cm. tall, with "rose"-colored "petals", and found it growing at the edge of woods, flowering in October.

Additional citations: PARAGUAY: Hassler 7637 [Macbride photos 24628] (Ca--935073--isotype, F--photo of type, Mi--isotype, N--

isotype, N--photo of type, Rb--photo of type, S--isotype, W--2055304--isotype, W--photo of type).

CASSELIA INTEGRIFOLIA Nees & Mart.

Synonymy: Timotoica integrifolia (Nees & Mart.) Moldenke in Fedde, Repert. Spec. Nov. 39: 135, sphalm. 1936. Casselia subintegerrima Nees ex Moldenke in Fedde, Repert. Spec. Nov. 39: 135, in syn. 1936. Timotocia integrifolia (Nees & Mart.) Moldenke, Prelim. Alph. List Invalid Names 14. 1940. Casselia semiserrata Hort. ex Moldenke, Prelim. Alph. List Invalid Names 14, in syn. 1940.

Additional bibliography: Schau. in A. DC., Prodr. 11: 527. 1847; Schau. in Mart., Fl. Bras. 9: 173--174 & 311. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 449. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 158. 1894; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 465. 1904; Solered., Syst. Anat. Dicot. Ergänz. 255. 1908; M. Kunz, Anatom. Untersuch. Verb. 61. 1911; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 449. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 43 & 233. 1947; Moldenke, Phytologia 2: 244--245. 1947; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 449. 1960; Moldenke, Phytologia 7: 351. 1961; Moldenke, Résumé Suppl. 16: 27. 1968; Moldenke, Fifth Summ. 1: 147, 356, 423, & 487 (1971) and 2: 642, 857, & 968. 1971.

Recent collectors describe this plant as an herb and have found it growing in cerrado with sandy soil, flowering in November. The corollas are described as having been "rose-lilac" on Hatschbach & Koczicki 33147.

Peckolt (1904) records the species from Alagoas and Pernambuco, as well as from Rio de Janeiro, Brazil, records the vernacular names, "flor de natal", "manacan-anacõn", and "Weinachtsblume", and describes the plant as "eit Strauch mit länglich-lanzettlichen, spitzen Blättern", the flowers pleasantly fragrant, and the corollas white. He notes that "Das Dekokt der Wurzel, 50 g zu 250 g Kolatur, wird esslöffelweise bei Rheumatismus genommen; 10 g des Wurzelpulvers dienen als Abfuhrmittel."

Material of this species has been misidentified and distributed in some herbaria as "Acanthaceae".

Additional citations: BRAZIL: Mato Grosso: Hatschbach & Koczicki 33147 (W--2744744, Z). Rio de Janeiro: Riedel & Luschnath 1328 (F-photo, Rb--photo). CULTIVATED: Belgium: M. Martens s.n. [h. b. Brux. 1838] (Br).

CASSELIA INTEGRIFOLIA var. FISCHERI (Mart.) Moldenke

Synonymy: Duranta fischeri Mart., Flora 21, Beibl. 2: 60. 1838. Casselia diversifolia Regel, Ind. Sem. Hort. Petrop. 46. 1857. Timotocia integrifolia var. fischeri (Mart.) Moldenke in Fedde, Repert. Spec. Nov. 39: 136--137. 1936.

Additional & emended bibliography: Mart., Flora 21, Beibl. 2: 60. 1838; Schau. in Mart., Fl. Bras. 9: 272. 1951; Regel, Ind. Sem.

Hort. Petrop. 46. 1857; Hill & Salisb., Ind. Kew. Suppl. 10: 43. 1947; Moldenke, Phytologia 2: 245 (1947) and 7: 351--352. 1961; Moldenke, Fifth Summ. 1: 356, 423, & 487 (1971) and 2: 642 & 857. 1971.

An isotype of this variety, Lucae s.n., deposited in the herbarium of the Botanisches Museum in Munich, was photographed there by Macbride as his type photograph number 20347.

Additional citations: CULTIVATED: Belgium: M. Martens s.n. [h. b. lov. 1841] (Br). Germany: Lucae s.n. [Herb. Kummer; Martius 1281; Macbride photos 20347] (F--684154--photo of isotype, N--photo of isotype, N--photo of isotype, W--photo of isotype). Russia: Herb. Hort. Bot. Petrop. s.n. (F--photo, Rb--photo).

CASSELIA MANSOI Schau.

Synonymy: Timotocia mansoi (Schau.) Moldenke in Fedde, Repert. Spec. Nov. 39: 142--143. 1936. Casselia mansii Schau. ex Moldenke, Prelim. Alph. List Invalid Names 14, in syn. 1940. Casselia peduncularis Mart. ex Moldenke, Prelim. Alph. List Invalid Names 14, in syn. 1940.

Additional bibliography: Schau. in A. DC., Prodr. 11: 527. 1847; Schau. in Mart., Fl. Bras. 9: 175, 307, & 311, pl. 32, fig. 2. 1851; Bocq., Adansonia, ser. 1, 2: 125 (1862) and 3: 238. 1863; Bocq., Rev. Verbénac. 125, 126, & 238. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 449. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 158. 1894; Briq. in Chod. & Hassl., Bull. Herb. Boiss., ser. 2, 4: 1166. 1904; Briq. in Chod. & Hassl., Pl. Hassler. 2: 502. 1904; M. Kunz, Anatom. Untersuch. Verb. 61 & 78, fig. 4. 1911; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 449. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 4. 1947; Moldenke, Phytologia 2: 245. 1947; F. C. Hoehne, Ind. Bibl. & Num. Pl. Col. Com. Rondon 350. 1951; R. C. Foster, Contrib. Gray Herb. 184: 170. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 449. 1960; Moldenke, Phytologia 7: 352. 1961; Moldenke, Fifth Summ. 1: 147, 181, & 423 (1971) and 2: 642 & 857. 1971; Troncoso, Darwiniana 18: 387. 1974.

Illustrations: Schau. in Mart., Fl. Bras. 9: pl. 32, fig. 2. 1851; M. Kunz, Anatom. Untersuch. Verb. 78, fig. 4. 1911.

Recent collectors describe this plant as "quite prostrate" and have found it growing in sandy damp soil and in "open country", at altitudes of 142--200 meters, flowering in February. The corollas are said to have been "blue" on Cárdenas 4406. Lankester records the vernacular name, "cha de Minas", and reports the plant being used as a diuretic and "local remedy" in Mato Grosso.

Additional citations: BRAZIL: Mato Grosso: F. C. Hoehne Com. Rondon 4465 (Sp--31980); Lankester s.n. [June 14th, 1937] (K); Silva-Manso s.n. [Martius 1025; Macbride photos 24629] (F--photo of isotype, N--photo of isotype, Rb--photo of isotype). Minas Gerais: A. P. Duarte 7542 [Herb. Brad. 27653] (N). BOLIVIA: El Beni: Cárdenas 4406 (N, W--1989872). MOUNTED ILLUSTRATIONS:

Schau. in Mart., Fl. Bras. 9: pl. 32, fig. 2. 1851 (N, Z).

CASSELIA ROSULARIS Sandw., Kew Bull. Misc. Inf. 1929: 124--125. 1929.

Synonymy: Timotocia rosularis (Sandw.) Moldenke in Fedde, Repert. Spec. Nov. 39: 150--151. 1936.

Additional & emended bibliography: Sandw., Kew Bull. Misc. Inf. 1929: 124--125. 1929; Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 401. 1938; F. C. Hoehne, Plant. Subst. Veg. Tox. 40, fig. 16 G & 48, fig. 21. 1939; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Anon., Kew Bull. Gen. Index 1929-1956, 67. 1959; Moldenke, Phytologia 7: 352. 1961; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 642 & 857. 1971.

Illustrations: F. C. Hoehne, Plant. Subst. Veg. Tox. 40, fig. 16 G & 48, fig. 21. 1939.

Macedo encountered this plant "in cerrado em local aberto". Archer & Gehrt tell us that the flowers have a Canela-like odor. The corollas are said to have been "lilac" in color on Macedo 2658 and "rose" on Archer & Gehrt s.n. The plant has been found flowering in September and October.

Additional citations: BRAZIL: Goiás: Macedo 2658 (N, W--2025587). Mato Grosso: Archer & Gehrt s.n. (Sp--36320); Collenette 185 (F--photo of type, Rb--photo of type).

CASSELIA SERRATA Nees & Mart.

Synonymy: Timotocia serrata (Nees & Mart.) Moldenke in Fedde, Repert. Spec. Nov. 39: 137. 1936. Casselia brasiliensis Nees ex Moldenke in Fedde, Repert. Spec. Nov. 39: 137, in syn. 1936. Casselia serratifolia Nees ex Moldenke in Fedde, Repert. Spec. Nov. 39: 137, in syn. 1936.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 174 & 311. 1851; Bocq., Adansonia, ser. 1, 3: [Rev. Verbénac.] 238. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 449. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 158. 1894; Junell, Symb. Bot. Upsal. 4: 19, fig. 25, & pl. 1, fig. 1. 1934; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 449. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 43 & 233. 1947; Moldenke, Phytologia 2: 246. 1947; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 449. 1960; Rickett & Stafleu, Taxon 9: 84. 1960; Moldenke, Phytologia 7: 352. 1961; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: 830 & iv. 1971; Moldenke, Fifth Summ. 1: 147 & 423 (1971) and 2: 642 & 857. 1971; Rouleau, Taxon Index Vols. 1-20, part 1: 72. 1972; Stafleu, Internat. Code Bot. Nom. 354. 1972; Troncoso, Darwiniana 18: 387 & 408. 1974.

Illustrations: Junell, Symb. Bot. Upsal. 4: 19, fig. 25, & pl. 1, fig. 1. 1934.

A specimen of Glaziou 13060, deposited in the herbarium of the Conservatoire et Jardin Botaniques in Geneva, was photographed there by Macbride as his type photograph number 24626, even though it is not part of any type collection, and on the same photograph

is Glaziou 21890, which is C. glaziovii (Briq. & Moldenke) Moldenke, but, again, is not a type collection.

Additional citations: BRAZIL: Bahia: Wied-Neuwied s.n. (F--photo of isotype, Rb--photo of isotype). Minas Gerais: Glaziou 13060 [Macbride photos 24626, in part] (N--photo, W--photo).

CASSELIA VERONICAEFOLIA Cham.

Synonymy: Timotocia veronicaefolia (Cham.) Moldenke in Fedde, Repert. Spec. Nov. 39: 146. 1936. Casselia veronicifolia Cham. apud Hill & Salisb., Ind. Kew. Suppl. 10: 233, in syn. 1947. Timotocia veronicifolia (Cham.) Moldenke apud Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947.

Additional & emended bibliography: Schau. in A. DC., Prodr. 11: 528. 1847; Schau. in Mart., Fl. Bras. 9: 175--176 & 311. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 449. 1893; M. Kunz, Anatom. Untersuch. Verb. 61--62. 1911; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 449. 1946; Moldenke, Phytologia 2: 246. 1947; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 449. 1960; Moldenke, Phytologia 7: 352. 1961; Moldenke, Résumé Suppl. 16: 19 & 27. 1968; Moldenke, Fifth Summ. 1: 147 & 424 (1971) and 2: 642 & 857. 1971.

Irwin & Soderstrom 7147 is said to have had its corollas "light violet" in color when fresh and "falling off by midday". These collectors found the plant to be "occasional" among campo grasses, at an altitude of 800--1000 meters, flowering in October.

Additional citations: BRAZIL: Goiás: Irwin & Soderstrom 7147 (Au--250268). Minas Gerais: Sellow 1518 [Macbride photos 17577] (F--663056--photo of type, F--photo of isotype, N--photo of type, Rb--photo of type).

CASSELIA ZELOTA (Moldenke) Moldenke

Synonymy: Timotocia zelota Moldenke in Fedde, Repert. Spec. Nov. 39: 133--134. 1936.

Bibliography: Moldenke in Fedde, Repert. Spec. Nov. 39: 133--134. 1936; Moldenke, Geogr. Distrib. Avicenn. 26. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 38 & 100. 1942; Moldenke, Phytologia 2: 246. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 93 & 197. 1949; Moldenke, Phytologia 5: 132. 1955; Moldenke, Biol. Abstr. 30: 1092. 1956; Moldenke, Résumé 87, 354, & 445. 1959; G. Taylor, Ind. Kew. Suppl. 12: 30. 1959; Moldenke, Fifth Summ. 1: 147 (1971) and 2: 642 & 857. 1971.

Additional citations: BRAZIL: Minas Gerais: Blanchet 3133 (F--photo of isotype, Rb--photo of isotype).

ADDITIONAL NOTES ON THE GENUS CHASCANUM. V

Harold N. Moldenke

CHASCANUM E. Mey.

Additional & emended synonymy: Denisia Kuntze ex Dalla Torre & Harms, Gen. Siphonog., imp. 1, 673 & 715. 1907. Denisia Post & Kuntze apud Prain, Imp. Kew. Suppl. 4, imp. 1, 69, in syn. 1913. Marulea Schrad. ex Moldenke in Fedde, Repert. Spec. Nov. 45: 114, in syn. 1938; F. A. Barkley, List Ord. Fam. Anthoph. 76. 1965. Gisania Ehrenb. ex Moldenke in Fedde, Repert. Spec. Nov. 45: 114, in syn. 1938; F. A. Barkley, List Ord. Fam. Anthoph. 75. 1965. Gisania "Ehrenb. ex Moldenke" apud Hill & Salisb., Ind. Kew. Suppl. 10: 251. 1947. Marulea "Schrad. ex Moldenke" spud Hill & Salisb., Ind. Kew. Suppl. 10: 251. 1947. Chaschanum E. Mey. ex Martin & Noel, Fl. Albany & Bathhurst 92, sphalm. 1960. Chascanium E. Mey. apud Batten & Bokelm., Wild Fls. East. Cape Prov. 124 & 125, sphalm. 1966.

Additional & emended bibliography: L. f., Suppl. Pl., imp. 1, 277 & 288. 1781; Harv., Gen. S. Afr. Pl., ed. 1, 267 & 269. 1838; D. Dietr., Syn. Pl. 3: 371. 1843; F. Krauss, Flora 28: 68. 1845; Bocq., Adansonia, ser. 1, 3: [Rev. Verbénac.] 181 & 235--237, pl. 16. 1863; Pfeiffer, Nom. Bot. 1 (1): 450 & 702 (1873) and 2 (1): 759. 1874; Kuntze, Rev. Gen. Pl. 2: 502. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 327, 507, & 733 (1893) and imp. 1, 2: 504, 564, & 567. 1894; T. R. Sims, Sketch & Checklist Fl. Kaffr. 63. 1894; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 273 & 281--284. 1900; H. H. W. Pearson in Thiselt.-Dyer, Fl. Cap. 5 (1): 181 & 197--206. 1901; Dalla Torre & Harms., Gen. Siphonog., imp. 1, 430 (1904) and imp. 1, 673 & 715. 1907; M. Kunz, Anatom. Untersuch. Verb. 39, 40, & 48. 1911; Thiselt.-Dyer, Fl. Cap. 5 (1): 727 & 728. 1912; Prain, Ind. Kew. Suppl. 4, imp. 1, 28 & 69 (1913) and 5, imp. 1, 35. 1921; Bews, Pl. Forms & Evol. S. Afr. 156. 1925; Grenz., Ann. Mo. Bot. Gard. 13: 71, 72, & 76. 1926; Wangerin in Just, Bot. Jahresber. 54 (1): 1170. 1932; A. W. Hill, Ind. Kew. Suppl. 8: 31. 1933; L. f., Suppl. Pl., imp. 2, 277 & 288. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 61. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 571. 1941; J. Hutchinson, Botanist in South. Afr. 178, 356, 361, 366, & 400. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 327, 507, & 733 (1946) and imp. 2, 2: 504, 564, & 567. 1946; Glover, Prov. Check List Brit. & Ital. Somal. 16, 19, 266, 268, 355, 427, 429, & 431. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 33, 49, 99, 141, 222, & 251. 1947; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 1, 1: 302. 1951; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448 & 449, fig. 256 E. 1952; Goossens, Suid-Afrik. Blompl. 188. 1953; E. J. Salisb., Ind. Kew. Suppl. 11: 51. 1953; J. B. Gillett, Kew Bull. 1955: 131--136. 1955; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3.

1956; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 2, 1: 302. 1956; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Humbert, Fl. Sahara Sept. & Cent. 407. 1958; Mostert, Bot. Surv. S. Afr. Mem. 31: 83 & 191. 1958; Prain, Ind. Kew. Suppl. 4, imp. 2, 28 & 69. 1958; Anon., Kew Bull. Gen. Index 1929-1956, 47 & 72. 1959; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; G. Taylor, Ind. Kew. Suppl. 12: 23 & 33. 1959; Martin & Noel, Fl. Albany & Bathhurst 92. 1960; Prain, Ind. Kew. Suppl. 5, imp. 2, 35. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 327, 507, & 733 (1961) and imp. 3, 2: 504, 564, & 567. 1961; Moldenke, Biol. Abstr. 36: 2311 & 3141. 1961; Moldenke, Phytologia 7: 369--376. 1961; Anon., Assoc. Étud. Tax. Fl. Afr. Trop. Index 1961: 60. 1962; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 792--793. 1962; Giess, Scient. Pap. Namib Des. Res. Stat. 3 [Cimbebasia 2]: 32. 1962; Letty, Dyer, Verdoorn, & Codd, Wild Fls. Transv. 281 & [282], pl. 140 (3 & 3a). 1962; Dalla Torrey & Harms, Gen. Siphonog., imp. 2, 430. 1963; Hepper in Hutch. & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437--438. 1963; Hocking, Excerpt. Bot. A.6: 532 & 533. 1963; Huber, Hepper, & Meikle in Hutch. & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 432. 1963; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 535 & 558. 1963; Quezel & Santa, Nouv. Fl. Alg. 2: 779 & 781. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; F. A. Barkley, List Ord. Fam. Anthoph. 75, 76, 151, 168, & 184. 1965; Moldenke, Phytologia 12: 6. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 230, 479, 699, & 896. 1966; Batten & Bokelm., Wild Fls. East. Cape Prov. 124 & 125, pl. 99.8. 1966; R. H. Compton, Journ. S. Afr. Bot. Supp. 6: 65 & 157. 1966; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448 & 449, fig. 256 E. 1966; Jafri, Fl. Karachi 286, 287, & 352, fig. 282. 1966; J. K. Maheshwari, Illustr. Fl. Delhi 172, fig. 172. 1966; Moldenke, Bol. Soc. Brot., ser. 2, 40: 121. 1966; Friedrich-Holzhammer, Meeuse, & Meikle in Merxmüller, Prodr. Fl. Südw. Afr. 13 (122): [1]--4. 1967; Moldenke, Résumé Suppl. 15: 16 (1967), 16: 8, 16, 19, 22, & 24 (1968), and 18: 8. 1968; Anon., Assoc. Étud. Tax. Fl. Afr. Trop. 1967: 62. 1968; Anon., Biol. Abstr. 49: 390. 1968; Anon., Torrey Bot. Club Ind. Am. Bot. Lit. 3: 304, 306, & 308. 1969; P. J. Greenway, Journ. East Afr. Nat. Hist. Soc. & Nat. Mus. 27: 196. 1969; Quezel, Fl. & Veg. Plat. Darfur [Doss. 5 Recherch. Coop. Prog. 45:] 131. 1969; M. A. Rau, Bull. Bot. Surv. India 10, Suppl. 2: 62. 1969; Van der Schijff, Check List Vasc. Pl. Kruger Natl. Park 81. 1969; El-Gazzar & Wats., New Phytol. 69: 457, 483, & 485. 1970; Bews in Eyre, World Veget. Types 161. 1971; Erdtman, Pollen Morph. & Pl. Tax., ed. 3, 448. 1971; Moldenke, Fifth Summ. 1: 5, 208--213, 226, 233, 235, 240, 242, 245, 247, 250, 253--255, 259, 264, 265, 267, 272, 356, 398--402, 424--426, & 475 (1971) and 2: 520, 526, 534, 570, 600, 604, 615, 617, 629, 630, 754, 777, 857, & 858. 1971; V. Singh, Journ. Bomb. Nat. Hist. Soc. 68: 343. 1971; Bavazzano, Webbia 25 [Erb. Trop. Firenz. Publ. 21]: 319, 355, & 356. 1972; Cuf., Bull. Jard. Bot. Nat. Belg. 42 (3): [Suppl. Enum. Pl. Aethiop.] 1629 & 1653. 1972; Lebrun in Hepper, Kew Bull. 26: 567--568. 1972; Letouzey, Man. Bot. Forest. Afr. Trop. 2 (B): 360. 1972; J. Mukherjee, Trans. Bose Res. Inst. Calcutta 35: 37--44. 1972; R. R. Stewart, Annot.

Cat. in Nasir & Ali, Fl. W. Pakist. 605. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 236, 490, 717, & 920. 1973; J. Hutchinson, Fam. Flow. Pl., ed. 3, 487 & 921. 1973; Moldenke, Phytologia 25: 236, 240, 505, & 508 (1973), 26: 501 (1973), 28: 442, 454, & 507 (1974), and 29: 41, 42, 506, 507, & 510. 1974; "H. R.", Biol. Abstr. 57: 6940. 1974; Troncoso, Darwiniana 18: 350 & 409. 1974.

Batten & Bokelmann (1966) tell us that the generic name, Chascanum, supposedly is derived from the Greek, chaskanum, meaning a mask with wide-open mouth.

It should be noted here that in Glover's work (1947) on page 19 there is a statement to the effect that this genus is mentioned on page "366" of the same work, but it is not mentioned on that page; it is mentioned, instead, on page 266.

Riley (1963) reports the sporophytic chromosome number for this genus as 40. I am not certain if he includes the related genus, Bouchea, here or not, although probably not. Jafri & Ghafoor, in their part of the as yet unpublished Flora of West Pakistan, assert that the genus Chascanum "differs from Bouchea Cham., a new world genus, by its fruits enclosed within the slightly inflated calyx (not equalling or exceeding the calyx). Svensonia Moldenke, with laterally winged or ribbed pyrenes, is hardly different from this genus."

The Bayliss 1755, distributed as Chascanum sp., is not verbenaceous.

CHASCANUM ADENOSTACHYUM (Schau.) Moldenke

Additional & emended bibliography: Schau. in A.DC., Prodr. 11: 560. 1847; H. H. W. Pearson in Thiselt.-Dyer, Fl. Cap. 5 (1): 199. 1901; Thiselt.-Dyer, Fl. Cap. 5 (1): 727. 1912; Grenz., Ann. Mo. Bot. Gard. 13: 71. 1926; Moldenke, Phytologia 1: 18. 1933; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 571. 1941; J. Hutchinson, Botanist in South. Afr. 366. 1946; Moldenke, Phytologia 4: 440. 1953; J. B. Gillett, Kew Bull. 1955: 135. 1955; Anon., Kew Bull. Gen. Index 1929-1956, 72. 1959; Moldenke, Biol. Abstr. 36: 2311. 1961; Moldenke, Fifth Summ. 1: 247, 254, 255, 398, 400, & 425 (1971) and 2: 857. 1971.

Hutchinson (1946) cites J. Hutchinson 2503 from South Africa. Tassman 10 is said to have had "deep cream" colored corollas; it was collected in flower in January at an altitude of 4500 feet.

Additional citations: SOUTH AFRICA: Transvaal: Tassman 10 (B).

CHASCANUM ANGOLENSE Moldenke

Additional & emended bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 49. 1947; J. B. Gillett, Kew Bull. 1955: 135. 1955; Moldenke, Fifth Summ. 1: 242 (1971) and 2: 857. 1971.

CHASCANUM ARABICUM Moldenke

Additional & emended bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 49. 1947; J. B. Gillett, Kew Bull. 1955: 131, 133, &

134. 1955; Anon., Kew Bull. Gen. Index 1929-1956, 72. 1959; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 792. 1962; Moldenke, Fifth Summ. 1: 212, 264, & 265 (1971) and 2: 857. 1971.

CHASCANUM CAESPITOSUM (H. H. W. Pearson) Moldenke

Additional & emended bibliography: H. H. W. Pearson, Trans. S. Afr. Phil. Soc. 15: 178. 1905; Moldenke, Phytologia 4: 441. 1953; Moldenke, Fifth Summ. 1: 255 & 399 (1971) and 2: 857. 1971.

CHASCANUM CERNUUM (L.) E. Mey.

Emended synonymy: Buchnera cernua L., Mant. 2: 251. 1771 [not B. cernua Houtt., 1778]. Büchnera cernua L., Syst. Veg., ed. 14, 571. 1784. Chascanum cernnum E. Mey., Comm. Pl. Afr. Austr. 1: lxiv, nom. nud. 1837. Buechnera cernua L. ex E. Mey., Comm. Pl. Afr. Austr. 1: 276, in syn. 1837.

Additional & emended bibliography: L., Mant. 2: 251. 1771; L., Syst. Veg., ed. 14, 571. 1784; Thunb., Prodr. Pl. Cap. 100. 1800; Thunb., Fl. Cap., ed. Schult., 466. 1823; E. Mey., Comm. Pl. Afr. Austr. 1: lxiv & 276. 1837; Harv., Gen. S. Afr. Pl., ed. 1, 269. 1838; F. Krauss, Flora 28: 68. 1845; Bocq., Adansonia, ser. 1, 3: [Rev. Verbénac.] 236. 1863; H. H. W. Pearson in Thiselt.-Dyer, Fl. Cap. 5 (1): 203. 1901; M. Kunz, Anat. Untersuch. Verb. 39. 1911; Thiselt.-Dyer, Fl. Cap. 5 (1): 727 & 728. 1912; Grenz., Ann. Mo. Bot. Gard. 13: 71, 98, & 100, pl. 11, fig. 25--28, & pl. 12, fig. 34. 1926; Wangerin in Just, Bot. Jahresber. 54 (1): 1170. 1932; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448 & 449, fig. 256 E. 1952; Moldenke, Phytologia 4: 441. 1953; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; Erdtmann, Pollen Morph. & Pl. Tax., ed. 2, 448 & 449, fig. 256 E. 1966; El-Gazzar & Wats., New Phytol. 69: 457, 483, & 485. 1970; Erdtman, Pollen Morph. & Pl. Tax., ed. 3, 448. 1971; Moldenke, Fifth Summ. 1: 255, 399, 401, 492, & 424 (1971) and 2: 857. 1971.

Illustrations: Grenz., Ann. Mo. Bot. Gard. 13: 98 & 100, pl. 11, fig. 25--28, & pl. 12, fig. 34. 1926; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 449, fig. 256 E (1952) and ed. 2, 449, fig. 356 E. 1966.

Riley (1963) states that this plant is found occasionally in the southern half of the Cape of Good Hope peninsula in South Africa. Erdtman (1966) has examined the pollen of Acock 1504 from South Africa and describes the grains as 3-colporate, subprolate, 104 x 84 mu, the apertures more or less different from those seen in C. garipense, C. gillettii, C. marrubiifolium, and C. schlechteri. Krauss (1845) cites Krauss 1086 from South Africa.

CHASCANUM DEHISCENS (L. f.) Moldenke

Additional synonymy: Bouchea cuneifolia Schau. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 327. 1893. Chaschanum cuneifolium (L. f.) E. Mey. ex Martin & Noel, Fl. Albany & Bathhurst 92, sphalm. 1960 Chascanium cuneifolium E. Mey. ex Batten

& Bokelm., Wild Fls. East. Cape Prov. 125 & 175, sphalm. 1966.

Additional & emended bibliography: L. f., Suppl. Pl., imp. 1, 277 & 288. 1781; Harv., Gen. S. Afr. Pl., ed. 1, 269. 1838; F. Krauss, Flora 28: 68. 1845; Bocq., Adansonia, ser. 1, 3: [Rev, Verbénac.] 236. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 327, 350, 507, & 733. 1893; T. R. Sims, Sketch & Check-list Fl. Kaffr. 63. 1894; M. Kunz, Anatom. Untersuch. Verb. 39. 1911; Thistelt.-Dyer, Fl. Cap. 5 (1): 727 & 728. 1912; Grenz., Ann. Mo. Bot. Gard. 13: 71. 1926; L. f., Suppl. Pl., imp. 2, 277 & 288. 1936; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 327, 350, 507, & 733. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 141. 1947; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 1, 1: 302. 1951; Moldenke, Phytologia 4: 441—443. 1953; Chittenden, Roy. Hort. Soc. Dict. Gard., ed. 2, 1: 302. 1956; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 327, 350, 507, & 733. 1959; Martin & Noel, Fl. Albany & Bathhurst 92. 1960; Moldenke, Phytologia 7: 373. 1961; Batten & Bokelm., Wild Fls. East. Cape Prov. 125 & 175, pl. 99 (8). 1966; Moldenke, Résumé Suppl. 16: 19. 1968; Moldenke, Fifth Summ. 1: 255, 356, 399, 402, 424, & 475 (1971) and 2: 600, 604, 615, & 857. 1971.

Illustrations: Batten & Bokelm., Wild Fls. East. Cape Prov. pl. 99 (8) [in color]. 1966.

Recent collectors describe this plant as a small bush, woody at the base, erect, wiry, 30—38 cm. tall, straggling, the leaves fleshy, light-green, the flowers fragrant, profuse after rains, and the corollas "white" or "pure white". It has been found in anthesis from September to April, growing at altitudes of 100 to 1500 feet. It has been found growing in shade, among shrubs, and with Euphorbia in succulent bush. Bayliss reports finding it in association with Tritonia rubro-lucens, Martin & Noel say that it inhabits "Dry grassld., semi-karr. scrub", and Batten & Bokelmann found it to be "fairly frequent in dry poor grassland around King William's Town and in semi-karoid areas in [the] Albany district; wide distribution". Chittenden (1956) asserts that it has been cultivated for ornament in England since 1821. Krauss (1845) cites Krauss 1129 from South Africa.

Additional citations: SOUTH AFRICA: Cape Province: Bayliss BS. 2352 (N, W--2564360), BS.2405 (N), BS.5053 (W--2670690); Ecklon & Zeyher 33.10 (W--1170570); Flanagan 352 (S).

CHASCANUM GARIPENSE E. Mey.

Additional synonymy: Bouchea glanduloufera Pearson ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 327 & 507. 1893; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 282--283. 1900; Thiselt.-Dyer, Fl. Cap. 5 (1): 727 & 728. 1912; Grenz., Ann. Mo. Bot. Gard. 13: 71. 1926; J. Hutchinson, Botanist in South. Afr. 178. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 327 & 507. 1946; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448. 1952; Moldenke, Phytologia 4: 443. 1953; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 327 & 507.

1960; Giess, Scient. Pap. Namib Des. Res. Stat. 3 [Cimbebasia 2]: 32. 1962; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448. 1966; Friedrich-Holzhammer, Meeuse, & Meikle, Prodr. Fl. Südw. Afr. 13 (122): [1]--4. 1967; Erdtman, Pollen Morph. & Pl. Tax., ed. 3, 448. 1971; Moldenke, Fifth Summ. 1: 253, 255, 399, & 424 (1971) and 2: 857. 1971.

Recent collectors refer to this plant as a woody shrub, 70 cm. to 2 m. tall, but Liebenberg describes it as an "annual herb, 2—5 ft. tall, very general" and Seydel calls it a "tall growing annual or biennial shrub, not rare in [the] granite region". The corollas are either described as white or as "white turning to lilac with wilting". It has been collected in anthesis from February to April and in October, in fruit in March, growing among rocks or in granite soil, at altitudes of 3300 to 4500 feet.

Giess asserts that this species grows "only at [the] lower parts of the Zwartbank Mountains in sandy watercourses". Soedahl found it "in crater canyon; it had a delicate pleasing scent; it is locally called 'the Sylvia'; it was also seen growing on the slopes of the kopjies in the desert" of Southwest Africa.

Erdtman (1966) has examined the pollen of Örtendahl 65 from South Africa and gives its dimensions as 98 x 87 mu and its shape as 3-colporate and subprolate.

Friedrich-Holzhammer and his associates (1967) describe the species as having "Ähren lang, dicht, vielblütig, nicht von Seitenzweigen übergipfelt. Pflanze kahl oder mit winzigen, sitzenden Drüsen, meist etwa 40--70 cm hoch. Blätter ca. 1,5—3 (—4) cm lang, 1—2 cm breit, grob gezähnt bis eingeschnitten mit stumpfen Zähnen. Kelch 6—7 (—8) mm lang. Krone rein weiss, beim Abblüten etwas nach lila verfärbend."

Baker (1900) cites Pechuel-Loesche s.n. from Namibia as Boucheа garipensis var. microphylla Kuntze with the comment that "The typical form is South African". Giess (1962) cites Giess 3031; Hutchinson (1946) cites Hutchinson 943; and Friedrich-Holzhammer and his associates (1967) cite from Namibia: De Winter 3172 & 3412, Giess 2366 & 3031, Giess & Van Vuuren 777, Giess, Volk, & Bleissner 5225, Kinges 2181, 2315, & 4772, Kräusel 683 & 840, Merxmüller & Giess 1647, 2225, & 2823, and Seydel 2005.

The Seydel 3597, distributed as Chascanum garipense, is actually Hebenstreitia erinoides L. f. or H. integrifolia L. in the Selaginaceae. The Bass s.n., cited below, is a transfer from the Moldenke herbarium.

Additional & emended citations: NAMIBIA: Bass s.n. [Herb. Transvaal Mus. 36201] (Ld); Mrs. W. H. Hoover 14 (W--1379082); Liebenberg 5133 (B); Örtendahl 65 (W--1992398); Seydel 453 (N, N, S. W—2671790), 3116 (N, W—2670915); Sordahl 6499 (W--1529518); E. Wall 12 (Ew). SOUTH AFRICA: Cape Province: L. E. Taylor 1183 (N).

CHASCANUM GILLETTII Moldenke

Synonymy: Chascanum adenostachyum Auct. ex Cuf., Bull. Jard.

Bot. Brux. 32: Suppl. 792, in syn. 1962 [not C. adenostachyum (Schau.) Moldenke, 1934]. Chascanum africanum Auct. ex Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 792 (in part). 1962 [not C. africanum Moldenke, 1938].

Additional & emended bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 49. 1947; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 448. 1952; Moldenke, Phytologia 4: 443. 1953; J. B. Gillett, Kew Bull. 1955: 132--135. 1955; Anon., Kew Bull. Gen. Index 1929-1956, 72. 1959; G. Taylor, Ind. Kew. Suppl. 12: 33. 1959; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 792. 1962; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 448 (1966) and ed. 3, 448. 1971; Moldenke, Fifth Summ. 1: 212, 213, 240, & 424 (1971) and 2: 857. 1971.

Gillett reports the color of the corollas of this species as "yellow-lime, tube cream", while Ashall refers to them as just "yellow". Erdtman (1966) has examined the pollen of Gillett 4934 from Somali and describes it as 3-colporate, subprolate, about 50 x 58 mu.

The species has been found growing in cracks in granite rocks, in rich Commiphora-Acacia open scrub, and on gravel plains, at altitudes of 3400 feet, flowering and fruiting in May.

It should be noted here that the C. africanum Auct. of Cufodontis is, by his definition, in part synonymous with C. gillettii Moldenke, in part with C. sessilifolium (Vatke) Moldenke, and in part with Svensonia laeta (Fenzl) Moldenke.

Additional citations: ETHIOPIA: Ashall C.A.7 (B). KENYA: J. B. Gillett 13196 (B), 13383 (B).

CHASCANUM GÜRKEANUM (Loes.) Moldenke

Additional bibliography: Moldenke, Phytologia 4: 443--444. 1953; G. Taylor, Ind. Kew. Suppl. 12: 23. 1959; Friedrich-Holzhammer, Meeuse, & Meikle, Prodr. Fl. Südw. Afr. 13 (122): 3. 1967; Moldenke, Fifth Summ. 1: 253, 399, & 424 (1971) and 2: 777 & 857. 1971.

Friedrich-Holzhammer and his associates (1967) reduce this species to synonymy under C. pumilum E. Mey. with a question.

CHASCANUM HANNINGTONII (Oliv.) Moldenke

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 282 & 283. 1900; Moldenke, Phytologia 4: 444. 1953; J. B. Gillett, Kew Bull. 1955: 132 & 135. 1955; Anon., Kew Bull. Gen. Index 1929-1956, 47 & 72. 1959; Moldenke, Fifth Summ. 1: 235 & 399 (1971) and 2: 857. 1971.

Baker (1900) cites only the original Hannington collection from Tanganyika.

CHASCANUM HEDERACEUM (Sond.) Moldenke

Additional bibliography: Thiselt.-Dyer, Fl. Cap. 5 (1): 727. 1912; Moldenke, Suppl. List Invalid Names 2. 1941; J. Hutchinson, Botanist in South. Afr. 356 & 400. 1946; Moldenke, Phytologia 4: 444--445. 1953; Letty, Dyer, Verdoorn, & Codd, Wild Fls. Trans-

vaal 281 & [282], pl. 140 (3 & 3a). 1962; R. H. Compton, Journ. S. Afr. Bot. Suppl. 6: 65. 1966; Van der Schijff, Check List Vasc. Pl. Kruger Natl. Park 81. 1969; Moldenke, Fifth Summ. 1: 247, 253—255, 399, & 401 (1971) and 2: 857. 1971.

Illustrations: Letty, Dyer, Verdoorn, & Codd, Wild Fls. Transvaal [282], pl. 140 (3 & 3a) [in color]. 1962.

Fetty and his associates (1962) describe this species as "about 1 ft. tall and most of the plant is covered with glandular hairs. A long inflorescence terminates the short leafy stems.....and, from the axils of the closely packed bracts, grow the tubular, creamy-white flowers, which contribute substantially to the bright veld scene in early spring." They also note that "There are only about 25 species of Chascanum and of these 7 are found in the Transvaal".

Recent collectors have described the plant as a perennial low shrub, 40—60 cm. tall, or an "annual, 1.5—2 m. tall" [Seydel]. The corollas are uniformly described as white and the plant has been found in anthesis from January to April and in fruit in January, growing at altitudes of 3300—4500 feet [4500 "m." according to Dahlstrand, but this is probably an error for "ft."]. It has been encountered on rocks, in sandy soil with granite rocks, and in mixed Euphorbia tirucalli scrub. Edwards refers to it as "local" in Natal and Seydel as "not rare" in Namibia.

Material of this species has been misidentified and distributed in some herbaria under the designation "Bouchea glanduloufera Pearson". Hutchinson (1946) cites his nos. 2349 and 2847, while Van der Schijff (1969) cites his nos. 1415, 1628, 3277, & 4954 from Kruger National Park. He comments that the species is an "Herb scattered in the southern part of the Park".

Additional citations: NAMIBIA: Örtendahl 65 (Ca—988064); Seydel 453 (Ca—77638). SOUTH AFRICA: Cape Province: L. E. Taylor 1183 (Ca—956340). Natal: D. Edwards 2778 (S). Transvaal: Dahlstrand 1927 (Go); F. R. R. Schlechter 3707 (Ca—298946); Schlieben 7661 (N, W—2272451), 9368 (S); Werdermann & Oberdieck 1276 (W—2582922).

CHASCANUM HEDERACEUM var. NATALENSE (H. H. W. Pearson) Moldenke

Additional synonymy: Denisia wilmsii Kuntze apud Prain, Ind. Kew. Suppl. 4, imp. 1, 69. 1913.

Additional & emended bibliography: Thiselt.-Dyer, Fl. Cap. 5 (1): 727. 1912; Prain, Ind. Kew. Suppl. 4, imp. 1, 28 & 69. 1913; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 571. 1941; Moldenke, Phytologia 4: 444—445. 1953; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Prain, Ind. Kew. Suppl. 4, imp. 2, 28 & 69. 1958; Moldenke, Phytologia 7: 359. 1961; Moldenke, Fifth Summ. 1: 245, 250, 254, 255, 399, 401, 425, & 475 (1971) and 2: 857. 1971.

Additional citations: MOZAMBIQUE: Lourenço Marques, E. Sousa 23 (U1, U1, Z); Torre 1778 (U1).

CHASCANUM HILDEBRANDTII (Vatke) Gillett

Emended synonymy: Stachytarpheta hildebrandtii Vatke, Linnaea 43: 529. 1882.

Additional & emended bibliography: Gürke in Engl., Pflanzenw. Ost-Afr. C: 338. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 974. 1895; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 283 & 284. 1900; M. Kunz, Anatom. Untersuch. Verb. 48. 1911; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 974. 1946; Glover, Prov. Check List Brit. & Ital. Somal. 266, 268, 427, 429, & 431. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 49. 1947; Moldenke, Phytologia 4: 441. 1953; J. B. Gillett, Kew Bull. 1955: 132 & 134--135. 1955; Anon., Kew Bull. Gen. Index 1929-1956, 72. 1956; G. Taylor, Ind. Kew. Suppl. 12: 33. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 974. 1960; Moldenke, Phytologia 7: 375. 1961; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 792. 1962; P. J. Greenway, Journ. East Afr. Nat. Hist. Soc. 27: 196. 1969; Moldenke, Fifth Summ. 1: 233, 235, 240, 424, & 630 (1971) and 2: 857. 1971; Bavazzano, Webbia 26 [Erb. Trop. Firenz. Publ. 21]: 319 & 355. 1972; Lebrun in Hepper, Kew Bull. 26: 567. 1972; Moldenke, Phytologia 28: 442. 1974.

Recent collectors have described this plant as an "annual to 80 cm. tall", a low to ascending herb, or a spreading shrubby herb, the stem ridged, the calyx green, and the corollas white, the limb milk-white. They have encountered it along roadsides, at the margins of cultivation, in scrub, open grassy spots on granite rock, in sandy or red clay soil, in regions of short grass and scattered bushes, and in very open irregular woodland in granite hills, at altitudes of 435 to 1200 meters, flowering in January, March, May, July, August, and October, and fruiting in March, May, August, and October. Polhill & Paulo describe it as an "Herb with a number of spreading branches to 2 ft.; corolla white with conspicuous yellow anthers in throat" and found it growing in black clay soil with a mixture of sand, among scattered trees of Terminalia, Euphorbia, and Acacia and tangled shrub clumps of Grewia, Lannea, Lecaniodiscus, Commiphora, Thespesia, Dobera, Suaeda, etc.

Bavazzano (1972) describes the species as a "Plante vivace. Feuilles opposées dentelées.....Plante herbacée dressée. Feuilles vert clair, dentelées, opposées, au bas des tiges. Épis allongées formant le haut des tiges", citing Chedeville 1301 & 1686 from Afars & Issis. Baker (1900) cites only the type collection, Hildebrandt 2737, from Kenya. Greenway (1969) cites Gillett 17208, Greenway & Kabuie 12915, and Hucks 773a from Tsavo East National Park.

Vernacular names recorded for the species are "ubololu", "yiblula", and "youblulu" from Somaliland.

Material of C. hildebrandtii has been distributed in some herbaria as something in the Scrophulariaceae.

Additional citations: UGANDA: Dyson-Hudson 82 (S, W--2568360), 249 (W--2568336). TANZANIA: Tanganyika: Drummond & Hemsley 2338

(B); M. Richards 25278 (N). KENYA: F. R. Fosberg 49951 (W—2579860a); J. B. Gillett 13053 (B); Polhill & Paulo 587 (S); Strid 2512 (Go), 3915 (Go).

CHASCANUM HUMBERTI Moldenke

Additional bibliography: Moldenke, Phytologia 7: 361—362. 1961; Moldenke, Fifth Summ. 1: 259 (1971) and 2: 857. 1971.

CHASCANUM INCISUM (H. H. W. Pearson) Moldenke

Additional & emended synonymy: Bouchea incisa H. H. W. Pearson, Trans. S. Afr. Phil. Soc. 15: 180. 1905 [not B. incisa Rusby, 1907]. Chascanum incisum Moldenke, in herb.

Additional & emended bibliography: H. H. W. Pearson, Trans. S. Afr. Phil. Soc. 15: 180. 1905; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 571. 1941; Moldenke, Biol. Abstr. 36: 2311. 1961; Moldenke, Phytologia 7: 369—370. 1961; Moldenke, Fifth Summ. 1: 253, 255, & 400 (1971) and 2: 857. 1971.

The corollas on E. E. Galpin 508m are said to have been "white" when fresh, but on Meeuse 10264 as "pale buffy-cream". In addition to the months previously reported by me, this species has been collected in anthesis in October. It has been found growing in loam soil. Material has been misidentified and distributed in some herbaria under the name Bouchea pinnatifida Schau.

Additional citations: SOUTH AFRICA: Transvaal: E. E. Galpin 508m (Ew); Meeuse 10264 (S).

CHASCANUM INCISUM var. CANESCENS Moldenke

Additional bibliography: Moldenke, Phytologia 7: 370. 1961; Friedrich-Holzhammer, Meeuse, & Meikle, Prodr. Fl. Südw. Afr. 13 (122): 3. 1967; Moldenke, Fifth Summ. 1: 259 (1971) and 2: 857. 1971.

Friedrich-Holzhammer and his associates (1967) reduce this taxon to synonymy under C. pumilum E. Mey. Seydel describes the plant as annual or perennial.

Additional citations: NAMIBIA: Seydel 131 (S).

CHASCANUM INSULARE Moldenke

Additional & emended bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 49. 1947; Moldenke, Phytologia 4: 445—446 (1953) and 7: 370—371. 1961; Moldenke, Fifth Summ. 1: 259 (1971) and 2: 857. 1971.

CHASCANUM INSULARE var. CANESCENS Moldenke

Additional bibliography: Moldenke, Phytologia 4: 445—446 (1953) and 7: 370. 1961; Moldenke, Fifth Summ. 1: 259 (1971) and 2: 857. 1971.

CHASCANUM INSULARE var. HUMBERTI Moldenke

Additional bibliography: Moldenke, Phytologia 7: 370—371. 1961; Moldenke, Fifth Summ. 1: 259 (1971) and 2: 857. 1971.

[to be continued]

NOTES ON LEAF VARIATION IN LANTANA ARISTEGUIETAE

Julian A. Steyermark[1]

For the past five years I have had under observation a living plant of Lantana aristeguietae Moldenke, presented me by Dr. Leandro Aristeguieta from the type collection in Venezuela (Aristeguieta & Labbiente 7306, from woods near Playa Colorado, about 25 kms from Puerto La Cruz on the road to Cumaná, Estado Anzoátegui, September, 1969).

The plant, growing at my residence in Caracas, has attained a height of two meters, and during the past three years has been more or less in continuous flower. The flower-heads are orange with rose-red, although Dr. Moldenke notes in his publication (Phytologia 19: 199. 1969) that the flowers are rose-colored, and are similar in aspect to those of L. camara, but the leaves are much thinner than those of L. camara and partake of a lemon-like scent when crushed.

In his original description, Dr. Moldenke states that the leaves are "ternate". However, during the first two years the living plant had opposite leaves only. Then, during the third and fourth years, both opposite and ternate leaves appeared on different stems from the same plant. Finally, in the fifth year, this single plant produced an additional stem showing alternate leaves only, so that on the same plant at the same time one could observe alternate, opposite, and ternate leaves arising from three separate stems. Herbarium voucher specimens collected by the author in 1974 are deposited in VEN and bear the following numbers (Steyermark 110998 for the ternate-leaved specimen, 110999 for the specimen with opposite leaves, and 111000 for the specimen with alternate leaves).

Cuttings have been started from the adult plant for continued observations. At the present time, it may be stated that the species can produce the three types of leaf arrangement noted, but over a period of five years under observation the type with opposite leaves has predominated. The ternate-leaved condition is less common, but may be present from time to time, while the alternate-leaved type is the rarest and seldom appears.

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[1] Instituto Botanico, Ministerio de Agricultura y Cría, Caracas, Venezuela.

THREE NEW SPECIES OF HELICONIA (MUSACEAE) FROM COSTA RICA

ROBERT R. SMITH
Department of Biology
Hartwick College, Oneonta, New York

After completing a revision of the genus Heliconia in Middle America, two collecting trips were taken to Central America, 1968 and 1970. The main purpose of these trips was to collect specimens of the genus Heliconia. These rather large and showy plants are not frequently collected, primarily because of their size. As a result of studies made on these collections, three new species of Heliconia found in Costa Rica are herein described.

1. Heliconia beckneri R. R. Smith, sp. nov.

Planta musoidis, 3-4 m. alta. Folia longe petiolata; petioli ca. 35 cm. longi; lamina elliptica-ovata, ca. 1 m. longa, 20 cm. lata, utrinque viridis, glabra. Caulis et petiolus maculis marroninis. Inflorescentia ca. 37 cm. longa, erecta; pedunculata breviter; rhachi flexuoso et torsivo. Bracteae 7-11, citrinae, glabrae, ovatae-lanceolatae, aliquantum profundis cymbiformibus. Bracteae infernae 29 cm. longae; internodiis 2-2.5 cm. Bracteae internae florales numerosae, conspicuae, membranaceae, lanceolatae, 5.5 cm. longae, 3 cm. latae. Flores multi in bractearum axillis, virides, basis flavo-virenis. Perianthium 5 cm. longum, glabrum vel sparse prope marginem purberulum. Pedicellus 0.5 cm. longus, albus, glabrus.

Large, musoid plants, 3-4 m. tall. Leaves 6-8 per stem; leaf-blades ca. 1 m. long, broadly elliptic-ovate, apex acuminate, base slightly acuminate; upper and lower surfaces green; petiole ca. 35 cm. long. Stem and petioles with maroon blotches. Inflorescence ca. 37 cm. long, erect; peduncle short; rachis flexuosed, spiralled, 1 cm. thick at base, glabrous. Fertile branch-bracts 7-11, lemon-yellow, glabrous, ovate-lanceolate, rather deeply boat-shaped. Lower branch-bracts 29 cm. long, ca. 4 cm. side-width; internode between lower branch-bracts 2-2.5 cm. Floral-bracts numerous, conspicuous, whitish to transparent turning brown with age, lanceolate, 5.5 cm. long, 3 cm. wide, glabrous and apparently persistent. Flowers many per branch-bract, green with yellow-green base, glabrous except for slight pubescence on margin of sepals; perianth 5 cm. long; pedicel 0.5 cm. long, white, glabrous. Fruit not examined.

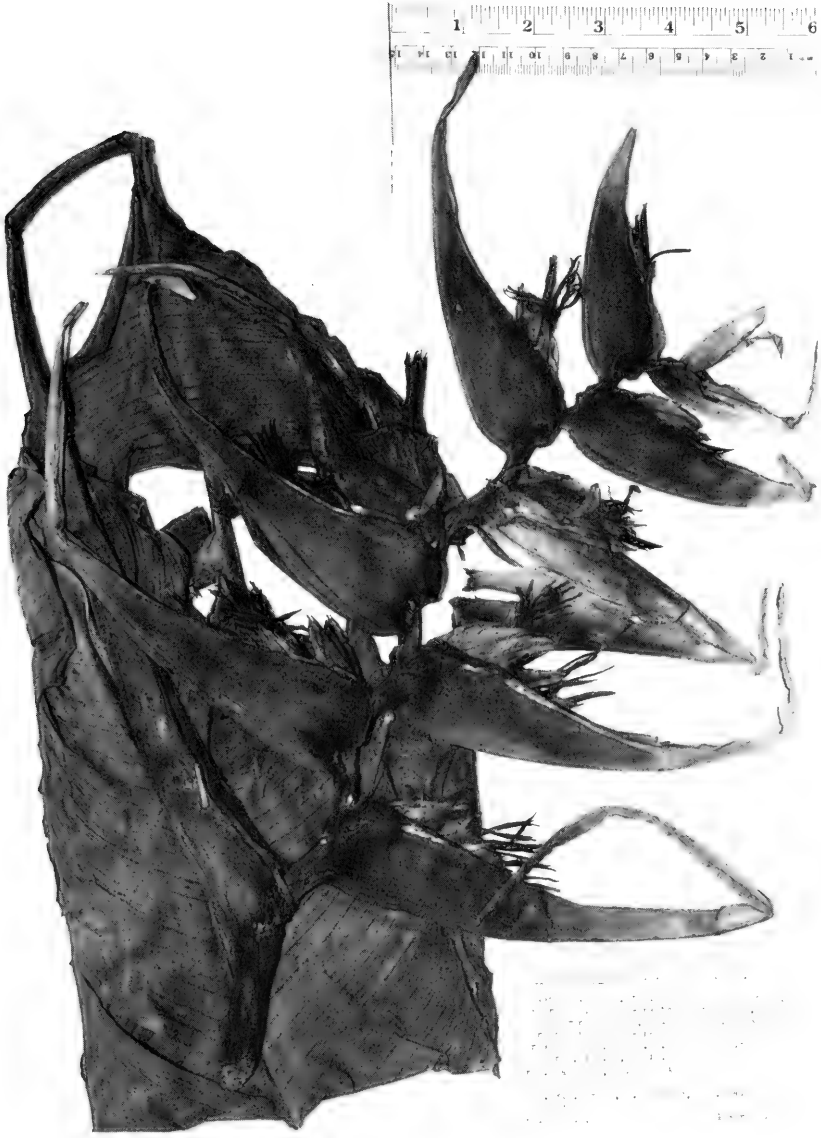

Fig. 1. Holotype of H. beckneri (FLAS).

Type: COSTA RICA: PROV. SAN JOSE: on slope along roadside, ca. 15 km. n. of San Isidro del General, alt. 5,800 ft., 14 April 1968, R. R. Smith 2317 (Holotype: FLAS) (Fig. 1).

Distribution: Infrequent on disturbed slope in full sun near road in rocky, clay soil at elevation of about 5,800 feet.

This species grows at an altitude higher than any other Heliconia species examined. It shows some affinity to H. latispatha by having the spiral characteristic of the inflorescence. It is named for Mr. John Beckner, a Florida botanist, who first introduced the genus Heliconia to the author.

2. Heliconia clinophila R. R. Smith, sp. nov.

Planta gracilis, 2.5-3 m. alta. Folia 70-85 cm. longa, 15-18 cm. lata; pagina supera atroviridis, pagina inferna pallida viridis. Inflorescentia 18-25 cm. longa, erecta, breviter pedunculata. Rhachi flexuoso, flavo-virenti, glabra. Bracteae 4-10, citrinae, glabrae, distichae, lanceolatae, margine plicato-extrinseco. Bracteae internae florales 10, pallidae, membranaceae, ovatae, glabrae, 2.5 cm. longae, ca. 1.2 cm. latae. Flores in bractearum axiliis 10, lutei, glabri. Perianthium 4-4.5 cm. longum, glabrum. Pedicellus 1.5 cm. longus, glabrus.

Slender plant, 2.5-3 m. tall; musoid habit. Leaves 2-3 per stem; leaf-blade elliptic-ovate, 70-85 cm. long, 15-18 cm. wide, apex attenuate, base obtuse and often unequal; upper surface dark green, lower surface pale green; petiole 22-30 cm. long. Inflorescence 18-25 cm. long, erect; peduncle short, 2-3 cm. long, yellow-green; rachis flexuosed, not spiralled, yellow-green, glabrous. Branch-bracts 4-10, lemon-yellow, glabrous, arranged distichously, lanceolate, with margins folding outward near base, shallow boat-shaped. Lower branch-bracts 15 cm. long, 1.8-2 cm. side-width; internode between lower branch-bracts 2-2.5 cm. Floral-bracts ca. 10, transparent, ovate with acuminate apices, 2.5 cm. long, 1.2 cm. wide, glabrous, persistent. Flowers ca. 10 per branch-bract, yellow with greenish-yellow apices, glabrous; perianth 4-4.5 cm. long, glabrous; pedicel 1.5 cm. long, glabrous. Ovary green, subglobose, glabrous, 1.0 cm. wide, 1.2 cm. long.

Type: COSTA RICA: PROV. HEREDIA: ca. 7.2 km. n. of Vara Blanca de Sarapiqui, alt. 5000 ft., 4 April 1968, R. R. Smith 2207 (Holotype: FLAS; Isotype: GH, MO, US) (Fig. 2).

Distribution: Occasional along roadside on steep slopes of cleared forest in shaded areas at 5000 ft. altitude.

The outstanding feature of this species is the lemon-yellow inflorescence which has the shape of a distichous candelabrum. In

Fig. 2. Holotype of H. clinophila (FLAS)

the area where these plants are found the vegetative portions of the plant extended outward from the steep slope with its inflorescence curving upward.

Additional specimens examined:
COSTA RICA: PROV. HEREDIA: on steep, moist slope near waterfall, ca. 7 km. n. of Vara Blanca de Sarapiqui, alt. 5000 ft., 29 Dec. 1970, R. R. Smith 2561, 2562 (FLAS).

3. Heliconia secunda R. R. Smith, sp. nov.

Planta musoidis, 4-5 m. alta. Inflorescentia ca. 43 cm. longa, pendula; pedunculata rubra, ca. 3.5 cm. longa. Rhachi torsivo, rubra, glabra. Bracteae secundae, 9-11, rubrae, lanceolatae, vadosae. Bracteae infernae 14 cm. longae. Bracteae internae florales ca. 8, flavidae albae, lanceolatae, 5-5.5 cm. longae, persistentiae. Flores in bractearum axillis ca. 8, lutei, glabri. Perianthium 5 cm. longum. Pedicellus 1.5 cm. longus, viridis citrinus.

Large plant 4-5 m. tall; musoid habit. Leaf-blade broadly oblong, 80-110 cm. long, 25-35 cm. wide, apex acuminate, base obtuse and unequal; upper surface dark green, lower surface green; petioles 55-110 cm. long. Maroon blotches on stem, petiole and midrib. Inflorescence ca. 43 cm. long, pendent. Branch-bracts extend outward from one side (secund). Branch-bracts 9-11, red, glabrous, lanceolate, shallow. Lower branch-bracts 14 cm. long, 3 cm. side-width. Floral-bracts ca. 8 per branch-bract, yellowish-white, persistent. Flowers ca. 8 per branch-bract, yellow, glabrous; perianth 5-5.5 cm. long; pedicel 1.5 cm. long, light yellow-green. Fruit not seen.

Type: COSTA RICA: PROV. HEREDIA: along steep slope near road and waterfall, ca. 7 km. n. of Vara Blanca de Sarapiqui, alt. 5000 ft., 4 April 1968, R. R. Smith 2206 (Holotype: FLAS; Isotype: GH, MO, US) (Fig. 3).

Distribution: Infrequent on moist slopes in shaded areas of cloud forest near waterfall, approximately 500 feet altitude.

This is the only species of Heliconia with a secund inflorescence.

Additional specimens examined:
COSTA RICA: PROV. HEREDIA: ca. 7 km. n. of Vara Blanca de Sarapiqui, alt. 5000 ft., 29 Dec. 1970, R. R. Smith 2563 (FLAS).

Fig. 3. Holotype of H. secunda (FLAS).

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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXIX.

A NEW GENUS, ARISTEGUIETIA.

R. M. King and H. Robinson
Department of Botany
Smithsonian Institution, Washington, D.C. 20560

The new genus described here constitutes a series of Critonioid Eupatorieae widely distributed in the Andes of South America from Colombia south to Chile, with the center of diversity in Ecuador and Peru. The genus has the basic simple style and smooth corolla lobes but also shows strongly subimbricate often reddish phyllaries which are mostly persistant, and in all but one species the style appendages are broad and flattened throughout their length. The phyllaries are reminiscent of some Ayapanoid genera in which they are prominently multiseriate but only the innermost are deciduous. The Aristeguietia series is further distinguished by the achenes being scabrid or setiferous but never glanduliferous, by the carpopodium being short and poorly delimited above with small cells continuing along the ribs, by the scarcely spreading pappus setae, and by the mostly ascending and alternate branching of the inflorescence. More distantly related Andean genera share the broad style branches but differ by their glanduliferous achenes, the more prominent or more sharply demarcated carpopodia, the usually more spreading pappus setae, the more deciduous phyllaries and the usually more spreading often prominently paired branches of the inflorescence.

Aristeguietia has some variation in leaves but most forms have slightly to strongly bullate upper surfaces and the margins are usually densely crenate to dentate with scarcely any inclination toward serrate. A few more southern members of the group have only crenulate margins or margins incurved and essentially entire. The leaves have two basic shapes, with cordate bases, or without cordate bases but with closely pinnate venation.

In floral structure the proper relationships within the group seem evident. Most of the species have glabrous corolla lobes or rarely show a hair or gland. Only A. chimboracensis of the more typical species seems to regularly have a few hairs or glands on the corolla lobes. Pubescent lobes are characteristic of some more peripheral members of the group.

In southern Peru the two species with narrow and entire-margined leaves have numerous small glands on the corolla lobes. At the northern limits of the alliance in Colombia there are two distinct variants. The first A. lamiifolia which has prominent hairs and some glands on the corolla lobes and a strongly conical receptacle. The second A. perezioides has small glands on the corolla lobes and differs from all other members of the series by its narrow style branches. Though the style of A. perezioides presents problems for keys the relationship of the species is clear. Because of the wider distribution of the broad style in Andean genera, and because of the rather specialized nature of Aristeguietia, the style condition of A. perezioides seems best interpreted as a regression.

The genus is named after Dr. Leandro Aristeguieta of the Instituto Botanico in Caracas, Venezeula though the genus is not found in Venezeula.

Aristeguieta R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae suffrutescentes vel subarborescentes erectae vel procumbentes mediocriter ramosae. Caules teretes vel tetrangulares vel hexagonales. Folia opposita petiolata; laminae late ovatae vel lineares base cordatae vel cuneatae margine plerumque dense crenulatae vel dentatae, supra vix vel valde bullatae subtus dense puberulae vel tomentosae glanduliferae. Inflorescentiae pauce vel multo capitatae, ramis plerumque ascendentibus base solum oppositis; squamae involucri ca. 25-70 multiseriatae valde subimbricatae inaequales plerumque persistentes extus multistriatae subcoriaceae; receptacula plana vel conica; flores 13-ca. 100; corollae anguste infundibulares extus et intus laeves, lobis longioribus quam latioribus extus plerumque glabris interdum piliferis vel glanduliferis; filamenta antherarum in parte superiore cellulis plerumque oblongis, parietibus distincte parum transverse annulatis; cellulae exotheciales subquadratae, appendicibus longioribus quam latioribus; styli inferne glabri non nodulosi, appendicibus plerumque perlatis planis vel canaliculatis mamillatis. Achaenia scabrida vel setifera non glandulifera; 5-costata carpopodia brevia superne non distincta in costis continua, cellulis parvis subquadratis vel oblongis, parietibus mediocriter incrassatis; setae pappi perdense subbiseriatae parum patentes scabrae apice non incrassatae plerumque angustae, cellulis apicalibus acutis vel subacutis. Grana pollinis 22-25μ diam. minute spinulosa.

Species typica: Eupatorium salvia Colla

Our studies of the genus indicate that it contains the following twenty one species.

Aristeguietia amethystina (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium amethystinum B.L.Robinson, Contr. Gray Herb. n.s. 77:8. 1926. Ecuador.

Aristeguietia anisodonta (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium anisodontum B.L. Robinson, Proc. Amer. Acad. 55:6. 1919. Peru.

Aristeguietia arborea (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium arboreum H.B.K., H.B.K. Nov. Gen. et Sp. 4: 103. 1818, ed folio. Ecuador.

Aristeguietia ballii (Oliver) R.M.King & H.Robinson, comb. nov. Eupatorium ballii Oliver in Hook. Ic. Pl. t. 1462, third series, 5: 49. 1884. Peru.

Aristeguietia buddleaefolia (Benth.) R.M.King & H. Robinson, comb. nov. Eupatorium buddleaefolium Benth., Pl. Hartw. 135. 1844. Ecuador.

Aristeguietia cacalioides (H.B.K.) R.M.King & H. Robinson, comb. nov. Eupatorium cacalioides H.B.K., H.B.K. Nov. Gen. et Sp. 4: 101. 1818. Ed. folio Ecuador.

Aristeguietia chimborazensis (Hieron.) R.M.King & H. Robinson, comb. nov. Eupatorium chimborazense Hieron, Engl. Bot. Jahrb. 29:7. 1900. Ecuador.

Aristeguietia cursonii (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium cursonii B.L. Robinson, Proc. Amer. Acad. 42:38. 1906. Peru.

Aristeguietia dielsii (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium dielsii B.L.Robinson in Diels Bibl. Bot. 116: 159. 1937. Eupatorium salviaefolium H.B.K. not Eupatorium salviaefolium Sims. Ecuador.

Aristeguietia diplodictyon (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium diplodictyon

B.L.Robinson, Proc. Am. Acad. 54: 242. 1918. Peru (Colombia by error).

Aristeguietia discolor (A.P.Decandolle) R.M.King & H. Robinson, comb. nov. Eupatorium discolor A.P. Decandolle, Prodr. 5: 161. 1836. Peru.

Aristeguietia gascae (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium gascae B.L.Robinson, Proc. Amer. Acad. 55:15. 1919. Peru.

Aristeguietia gayana (Wedd.) R.M.King & H.Robinson, comb. nov. Eupatorium gayanum Wedd., Chlor. And. 1:216. 1855. Peru.

Aristeguietia glutinosa (Lam.) R.M.King & H.Robinson, comb. nov. Eupatorium glutinosum Lam. Encyc. 2: 408. 1786. Ecuador.

Aristeguietia lamiifolia (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium lamiifolium H.B.K., H.B.K. Nov. Gen. et Sp. 4: 88. 1818 Ed. folio. Colombia, Ecuador.

Aristeguietia perezioides (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium perezioides B.L.Robinson, Proc. Amer. Acad. 54:255. 1918. Colombia.

Aristeguietia persicifolia(H.B.K) R.M.King & H.Robinson, comb. nov. Eupatorium persicifolium H.B.K. H.B.K. Nov. Gen. et Sp. 4:102.1818. Ed. folio. The name is often misapplied to A. discolor of Peru. Ecuador.

Aristeguietia pseudarborea (Hieron.) R.M.King & H. Robinson, comb. nov. Eupatorium pseudarboreum Hieron., Engl. Bot. Jahrb. 36:469. 1905. Peru.

Aristeguietia salvia (Colla) R.M.King & H.Robinson, comb. nov. Eupatorium salvia Colla, Mem. Acc. Tor. 38:8. 1835. Chile.

Aristeguietia tahonensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium tahonense Hieron. Engl. Bot. Jahrb. 40: 372. 1908. Peru.

Aristeguietia tatamensis (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium tatamense B.L. Robinson, Contr. Gray Herb. n.s. 77:41. 1926. Colombia.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXL.

A NEW GENUS, GROSVENORIA.

R. M. King and H. Robinson
Department of Botany
Smithsonian Institution, Washington, D.C. 20560

Among the Critonioid Eupatorieae of the Andes, especially those with broad style branches, a basic distinction seems to exist between those with scabrous or setiferous achenes versus those with glanduliferous achenes. In the latter group is a series of coarsely shrubby species distinguished by the rather broad flattened bases and the partially enlarged tips of the pappus setae. The latter species have similar large dense corymbose inflorescences with multistriate phyllaries. The dry mature heads shed extensively as a result of the deciduous inner phyllaries and the spreading of the pappus setae. The pappus setae have the outer surface smooth, a condition that is accentuated by the breadth of the setae bases. In each pappus some of the setae are enlarged apically with blunt apical cells. Further helpful distinctions of the group are the large carpopodium and the rather remotely serrate to entire leaves.

The genus here described ranges from central Ecuador into northern Peru. The few species show considerable diversity in spite of their clear relationship. The Ecuadorian element has solid pith in the stems and more ovate nearly entire leaves, and the leaves are pubescent below with distinctive matted hairs having bulging thin-walled cells. Of these species it is notable that G. rimbachii is characteristically white-flowered unlike its congeners. The species of northern Peru, G. coelocaulis is named for the distinctly fistulose stems and has narrowly elliptical more serrate and essentially glabrous leaves.

The new genus is named after the Grosvenor family known for their many contributions to the National Geographic Society, Washington, D. C.

Grosvenoria R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae frutescentes erectae multo ramosae, ramis flexuosis. Caulis fistulosi vel non fistulosi. Folia opposita petiolata, laminis anguste ovatis vel anguste ellipticis base rotundatis vel cuneatis margine integris vel remote

serratis subtus glanduliferis, glandulis sessilibus. Inflorescentiae corymbosae. Squamae involucri 12-15 imbricatae 3-5-seriatae valde inaequales obscure multicostatae interiores facile deciduae, receptacula plana vel leniter convexa glabra. Flores 5-10 in capitulo; corollae anguste infundibulares, lobis triangularibus laevibus extus glanduliferis vel glabris; filamenta in parte superiore mediocriter incrassata, cellulis plerumque breviter oblongis inferne quadratis, parietibus aliquantum transverse annulatis; cellulae exotheciales subquadratae, appendicibus longioribus quam latioribus; styli inferne glabri non nodulosi, ramis elongatis late linearibus leniter mamillosis. Achaenia prismatica 5-costata glandulifera; carpopodia prominentia superne subabrupte demarcata, cellulis multiseriatis breviter oblongis vel subquadratis, parietibus mediocriter incrassatis; pappus setiformis uniseriatus, setis ca. 30-40 sensim patentibus extus planis glabris margine irregulariter scabris superne interdum incrassatis, cellulis apicalibus acutis vel obtusis. Grana pollinis sphaerica ca. 25μ diam. spinulosa.

Species typica: Eupatorium rimbachii B.L.Robinson

Our studies of the genus indicate that it contains the following three species.

Grosvenoria coelocaulis (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium coelocaule B.L. Robinson, Proc. Amer. Acad. 55:8. 1919. Peru.

Grosvenoria hypargyra (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium hypargyrum B.L. Robinson, Proc. Amer. Acad. 55:19. 1919. Ecuador.

Grosvenoria rimbachii (B.L. Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium rimbachii B.L. Robinson, Contr. Gray Herb. n.s. 96:21. 1931. Ecuador.

Acknowledgement

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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXLI.

A NEW GENUS, ASPLUNDIANTHUS.

R. M. King and H. Robinson
Department of Botany
Smithsonian Institution, Washington, D.C. 20560

The previously unresolved Eupatorian elements of the northern Andes include a group of Critonioid species having narrow style branches, slender pappus bristles, mostly scarious subimbricate phyllaries and 6-10 flowers per head. The group differs from most other Critonioid genera in the northern Andes by the narrower style branches and by the smaller sized pollen. The shorter-lobed usually gland-bearing corollas, the finer pappus setae and the lack of areolar lacticifers distinguish the genus from the more wide-spread but lower elevation Critonia. The complete lack of enlarged tips on the pappus setae provide a further distinction from some genera such as Grosvenoria. The most closely related genus seems to be Critoniella also of the northern Andes but that differs by the extremely narrow essentially terete appendages on the style branches, by the presence of only large thin-walled cells in the carpopodium, and by the long petioles on the leaves. The distinct group of species is placed here in a new genus, Asplundianthus.

The new genus shows variation in habit with leaves usually trinervate but sometimes pinnately veined, inflorescences pyramidal to densely corymbose and plants nearly glabrous to tomentellous. There is a strong tendency toward glabrous achenes in the genus but some species especially A. scabrifolius and A. stuebelii are sparsely scabrid to setiferous or even sparsely glanduliferous on the upper part. Pollen size is also significant in the genus but shows some variation. The smaller pollen of ca. 20μ occurs in most species of Asplundianthus, in the related Critoniella and actually in most members of the Eupatorieae. Among the Critonioid genera of the Andes, however, pollen sizes near 25μ are unusually common. One species of Asplundianthus, A. arcuans tends to have larger pollen and is also unusual in the genus by the long narrow base on the corolla, and by the more enlarged tips and more papillose shafts on the style appendages. The species, while not differing particularly in habit, is probably worthy of a separate subgenus. One other case of larger pollen in a specimen of A. stuebelii proved to

involve Type II pollen which was intermixed with some normal-sized Type I grains. One other useful feature of the genus is the detailed structure of the carpopodium having many rows of small moderately thick-walled cells. The cells form the stopper-shaped base which usually tapers gradually into the body of the achene above.

The genus is named for Erik Asplund, pre-eminent field collector of Ecuadorian plants.

Asplundianthus R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae suffrutescentes vel frutescentes erectae pauce vel multo ramosae. Caules teretes vel leniter angulati. Folia opposita plerumque breviter petiolata, laminis ovatis vel lanceolatis laevibus vel aliquantum bullatis base plerumque rotundatis margine subserrulatis vel serratis. Inflorescentiae plerumque paniculatae, ramis primariis plerumque oppositis. Squamae involucri subimbricatae ca. 2-25 multiseriatae valde inaequales plerumque scariosae et straminae 2-4-costatae interiores facile deciduae; receptacula plana glabra. Flores 6-10 in capitulo; corollae anguste infundibulares, lobis breviter triangularibus laevibus extus glanduliferis vel glabris; filamenta in parte superiore subangustata, cellulis quadratis vel oblongis, parietibus aliquantum transverse annulate ornatis; cellulae exotheciales subquadratae, appendices parum longiores quam latiores; styli inferne glabri non nodulosi, ramis anguste linearibus leniter mamillosis. Achaenia prismatica 5-costata glabra vel superne pauce setifera raro pauce glandulifera; carpopodia obturaculiformia superne non abrupte demarcata, cellulis inferioribus multiseriatis parvis quadratis, parietibus mediocriter incrassatis; pappus setiformis uniseriatus, setis ca. 30-40 uniformiter scabris base angustatis superne non incrassatis, cellulis apicalibus acutis. Grana pollinis sphaerica plerumque 20-23μ diam. minute spinulosa.

Species typica: Eupatorium pseudoglomeratum Hieron.

Our studies of the genus indicate that it contains the following nine species.

Aspludianthus arcuans (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium arcuans B.L. Robinson, Proc. Amer. Acad. 54: 237. 1918. Syn. Eupatorium gongorae Cuatr., Trab. Mus. Madrid Bot. 29: 17. 1935. Colombia.

Asplundianthus densus (Benth.) R.M.King & H.Robinson, comb. nov. Eupatorium densum Benth., Pl. Hartw. 200. 1845. Colombia.

Asplundianthus pseudoglomeratus (Hieron. ex Sod.) R.M.King & H.Robinson, comb. nov. Eupatorium pseudoglomeratum Hieron. ex Sod., Engl. Bot. Jahrb. 29: 8. 1900. Ecuador.

Asplundianthus pseudostuebelii R.M.King & H.Robinson, sp. nov. Plantae frutescentes usque ad 3 m altae. Caules dense hirtelli. Folia breviter petiolata, petiolis ca. 1 cm longis, laminis anguste ovatis usque ad 14 cm longis et 6 cm latis base rotundatis fere ad basem trinervatis margine dense crenulatis vel remote serrulatis apice sensim anguste acuminatis supra parum bullatis hispidulis subtis tomentellis. Inflorescentiae late corymbosae, ramis dense hirtellis vel hirsutis. Capitula ca. 9 mm altae; squamae involucri ca. 20 ovatae vel lineares 1-7 mm longae glabrae bicostatae apice rotundatae; receptacula plana glabra. Flores 10 in capitulo; corollae lavandulae ca. 5 mm longae, lobis extus glanduliferis; filamenta antherarum in parte superiore ca. 300μ longa; thecae antherarum ca. 1.5 mm longae. Achaenia ca. 2 mm longa sparse glandulifera superiore in costis sparse minute setifera; carpopodia prominentia, cellulis superioribus inflatis, parietibus veteribus inferioribus mediocriter incrassatis; setae pappi ca. 35.

Type: COLOMBIA: Cundinamarca: Eastern Cordillera, ca. 15 kms north-northwest of Facatativá. Elev. ca. 2330 m. July 14, 1965. R.M.King, A.E.Guevara & E.Forero G. 5923 (US, holotype; NY, isotype). Paratypes: COLOMBIA: Caldas: Cordillera Central, Salento to "Laguneta" Old Quindio Trail, alt. 2500-2800 m. Killip & Hazen 9106, 9146 (US); "Pinares" above Salento, alt. 2600-2900 m. Pennell 9208 (US); Cauca: Río Vinagre, 3400 m. Dryander 1783 (US); "Calaguala," Coconuco, alt. 2500-2800 m. Pennell 7180 (US); Entre Puracé y su páramo; matrorrales en Chiquín, 3100-2700 m. Arbeláez & Cuatrecasas 5967 (US); Cundinamarca: Tequendama, about 2500 m alt. Haught 6487 (US); Bogota, 2680 m. Triana 1207 (US); Nariño: 3 km n. of Victoria, Río Chingual drainage, 2680-2840 m ele. Ewan 16184 (US, NY).

The new species is what has been called Eupatorium stuebelii in Colombia. The Ecuadorian A. stuebelii differs most obviously in its shorter more ovate more abruptly acuminate leaves, but it also differs

by the lack of glands on the achene and by the smaller thicker-walled cells of the carpopodium. The carpopodium of the new species has larger cells and thinner walls than most members of the genus. The cell walls of the carpopodium do not become noticeably thickened until fully mature. The collection from Nariño may represent a distinct subspecies on the southern extremity of the range. The plant is described as being subscandent and the stems and branches are more coarsely hirsute. The leaves are trinervate from the base of the blade and the margins are rather remotely serrulate. Leaves of other collections are trinervate from distinctly above the base of the blade and the margins are more closely crenulate.

Asplundianthus scabrifolius (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium scabrifolium B.L.Robinson, Contr. Gray Herb. n.s. 77: 36. 1926. Peru.

Asplundianthus smilacinus (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium smilacinum H.B.K., Nov. Gen. et Sp. 4: 87. 1818. ed. folio. Colombia.

Asplundianthus stuebelii (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium stuebelii Hieron., Engl. Bot. Jahrb. 21: 329. 1895. The concept of A. stuebelii is restricted here to Ecuadorian material lectotypified by Stübel 272. The Colombian material represented by the cotype Stubel 164 is here excluded. Ecuador.

Asplundianthus toroi (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium toroi B.L.Robinson, Contr. Gray Herb. n.s. 104: 28. 1934. Colombia.

Asplundianthus trachyphyllus (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium trachyphyllum Hier n., Engl. Bot. Jahrb. 36: 467. 1905. Peru.

Immature material (J.A.Steyermark & G.C.K. & E.Dunsterville 100752) may represent an additional undescribed species from the State of Tachira in Venezuela.

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Asplundianthus pseudostuebelii R.M.King & H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

Asplundianthus pseudostuebelii R.M.King & H. Robinson, enlargement of heads.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXLII.

A NEW GENUS, BADILLOA.

R. M. King and H. Robinson
Department of Botany
Smithsonian Institution, Washington, D.C. 20560

The Critonioid Eupatorieae of the northern Andes include one group showing a combination of broad style branches, larger pollen, mostly deciduous inner phyllaries, glands on the achenes and sharply demarcated carpopodia. In most of the species in the group the leaves are pinnately veined and the heads usually contain only about ten flowers. The inflorescence tends to have prominent spreading pairs of primary branches. The group resembles the genera Aristeguietia and Grosvenoria which have similar broad styles and larger pollen. The former differs by the less deciduous phyllaries, the often glabrous corollas, the strictly non-glandular achenes, the indistinct carpopodia, the less spreading pappus, the larger number of flowers per head and the generally more ascending less opposite branches of the inflorescence. Relationship to Grosvenoria is closer but the latter has multistriate phyllaries, more prominent but less sharply demarcated carpopodia and generally flatter pappus setae with some enlarged tips. The distinct group is described here as a new genus, Badilloa.

The genus Badilloa shows uniformity in most of its characters but the concept has been extended to include one rather anomalous related species. The Venezuelan B. steetzii differs from other members of the genus by its more prominently trinervate leaves and by the greater number of flowers per head (15-23). The species shows some resemblance to Asplundianthus pseudostuebelii R.M.King & H.Robinson of Colombia which is anomalous in its genus by the presence of some glands on the achene. In B. steetzii the pointed phyllaries, the larger number of flowers per head, the densely glanduliferous achenes, the more sharply demarcated carpopodia, the broader styles and the larger pollen indicate the species is remote from the genus Asplundianthus and related closely to other species of Badilloa.

The genus is named for Dr. Victor M. Badillo, author of numerous papers dealing with the Asteraceae

of Venezuela.

Badilloa R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae frutescentes erectae ramosae. Caules teretes. Folia opposita breviter petiolata, laminis oblongis vel lanceolatis interdum minute bullatis glanduliferis, nervis secundariis plerumque pinnatis. Inflorescentiae corymbosae, ramis saepe late patentibus. Squamae involucri valde subimbricatae multiseriatae valde inaequales bicostatae interiores facile deciduae; receptacula plana vel leniter convexa glabra. Flores 9-23 in capitulo; corollae anguste infundibulares, lobis triangularibus laevibus extus glanduliferis; filamenta in parte superiore aliquantum incrassata, cellulis quadratis vel oblongis, parietibus valde annulate ornatis; cellulae exotheciales subquadratae, appendicibus parum longioribus quam latioribus; styli inferne glabri non nodulosi, ramis late linearibus leniter mamillosis. Achaenia prismatica 5-costata dense glandulifera; carpopodia distincta superne abrupte limitata, cellulis subquadratis multiseriatis, parietibus vix vel mediocriter incrassatis; pappus setiformis uniseriatus, setis ca. 30-35 scabris superne non vel vix incrassatis, cellulis apicalibus acutis. Grana pollinis sphaerica ca. 25μ diametro minute spinulosa.
Species typica: Eupatorium salicinum Lam.

Our studies indicate the genus contains the following nine species.

Badilloa drepanoides (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium drepanoides B.L. Robinson, Proc. Amer. Acad. 55: 12. 1919. Peru.

Badilloa helianthifolia (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium helianthifolium H.B.K., Nov. Gen. et Sp. 4: 99. 1818. ed. fol. Peru.

Badilloa herrerae (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium herrerae B.L.Robinson, Contr. Gray Herb. n.s. 80: 20. 1928. Peru.

Badilloa procera (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium procerum B.L.Robinson, Contr. Gray Herb. n.s. 73: 17. 1924. Peru.

Badilloa salicina (Lam.) R.M.King & H.Robinson, comb. nov. Eupatorium salicinum Lam., Encyc. 2: 409. 1786. Colombia, Ecuador.

Badilloa sonsonensis R.M.King & H.Robinson, sp. nov.
Plantae usque ad 2 m altae. Caules dense breviter purpureo-hirsuti. Folia opposita, petiolis 5-8 mm longis, laminis ellipticus 4-6 cm longis et 1.5-3.0 cm latis base cuneatis margine multo crenulatis apice breviter acutis vel obtusis supra vix bullatis sparse scabridis et glanduliferis subtus dense glanduliferis et in nervulis tomentellis, nervis secundariis pinnatis, nervulis subtus dense reticulatis prominentibus. Inflorescentiae ca. 6 cm altae et 10 cm latae. Capitula ca. 7 mm altae; squamae involucri ca. 16 subimbricatae ca. 4-seriatae ca. 1-6 mm longae ovatae vel lineares apice anguste rotundatae extus sparse hirtellae; receptacula leniter convexa sparse hirtella. Flores ca. 10 in capitulo; corollae rufescentes ca. 5 mm longae anguste infundibulares solum extus in lobis glanduliferae; lobis parum longioribus quam latioribus; filamenta in parte superiore ca. 300 μ longa; thecae ca. 1.5 mm longae. Achaenia ca. 2 mm longa prismatica plerumque in costis dense glandulifera; carpopodia brevia, cellulis ca. 6-seriatis ca. 12-15μ diametro; setae pappi ca. 35. Grana pollinis 25-27μ diametro.

Type: COLOMBIA: Antioquia: Cordillera Central, Páramo de Sonsón, above Sonsón, at 2930 m. Shrub 2 m high, not common, in paramillo thicket; fls. lilac. May 23, 1944. J.A.Ewan 15705 (US, holotype). Paratype: COLOMBIA: Antioquia: "Paramo de Sonson" along or near carretera between Sonson and Narino, elev. 9000-9600 ft. (not actually paramo -"paramillo"). Shrub 5 ft. high; flowers pink or violet; leaves firm; dark beneath. May 23, 1944. E.L.Core 736 (US).

The new species is most like Badilloa venezuelensis but has coarser pubescence on the stems and leaves, firmer corollas, more uniformly narrow-based pappus setae and the achenes with glands more restricted to the ribs.

Badilloa sphagnophila (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium sphagnophilum B.L. Robinson, Contr. Gray Herb. n.s. 73: 18. 1924. Peru.

Badilloa steetzii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium steetzii B.L.Robinson, Proc. Amer. Acad. 55: 36. 1919. Venezuela.

Badilloa venezuelensis (Badillo) R.M.King & H.Robinson, comb. nov. Eupatorium venezuelense Badillo, Bol. Soc. Venez. Cienc. Nat. 9: 131. 1944. Venezuela.

Acknowledgement

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Badilloa sonsonensis R.M.King & H.Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

Badilloa sonsonensis R.M.King & H.Robinson, Enlargement of heads.

BOOK REVIEWS

Alma L. Moldenke

"SOURCE BOOK OF MEDICAL HISTORY: Compiled with Notes" by Logan Clendening, M.D., xiv & 685 pp. Facsimile Edition by Dover Publications Inc., New York, N. Y. 10014. 1960. $5.00 paperbound.

This is a new reprinting of the 1960 unaltered republication of the original published in 1942 and is dedicated to the memory of that wonderful medical teacher-scientist-health publicist, Dr. Clendening, 1884--1945.

For young people interested in or possibly entering any medical or medically related field and also for their folks this book, even though dated before their time, offers excellent orientation through cursory reading and excellent study material through careful reading.

For those of botanical interests there are the expected references to scurvy-controlling citrus fruits, ague fever or malaria-controlling Peruvian bark, the many herbs or botanicals for no end of physical ailments from the earliest of times.

"A NARRATIVE OF TRAVELS ON THE AMAZON AND RIO NEGRO" by Alfred Russel Wallace, xxxiii & 363 pp., illus., Facsimile Edition by Dover Publications Inc., New York, N. Y. 10014. 1972. $3.50 paperbound.

This unaltered republication is of the second edition of 1889. It is without the appendix of Indian language vocabularies of the original 1853 edition. A new introduction by historian H. Lewis McKinney mentions how the young naturalists, Wallace and Henry Walter Bates, inspired by William Henry Edwards' "A Voyage up the River Amazon" (1847), spent the next two years exploring from Belém to Manaus where Bates set off along the Upper Amazon and Wallace set off along the Rio Negro and Rio Uaupés. Bates returned to England almost a decade later with vast collections, especially of new insects. Wallace's return trip in 1852 included a flaming shipwreck, ten days in a lifeboat before rescue 200 miles off Bermuda with only his first and last journal, river maps and some new fish sketches. For the first time here is printed a poem that Wallace wrote for his daughter Violet: The Loss of the "Helen" August 1852.

As Darwin's experiences recorded in the "Voyage of the Beagle" provided ample material to start him thinking about speciation, so did these similar experiences recorded from memory and from his remaining journals start Wallace wondering.

It is wonderful to have this book available again and so inexpensively for the general intelligent reader, a wide range of

students, scientists and historians.

"STUDENTS' FLORA OF EGYPT" Second Edition by Vivi Täckholm, 888 pp.& 16 color plates, illus., Cooperative Printing Company of Beirut for Cairo University. 1974.

About half a century ago this author went to Egypt with her husband, the late Prof. Gunnar Täckholm, who served as the first professor of botany at the Faculty of Science of the Egyptian University and ever since then she has been deeply involved as a student, then teacher, field specialist, herbarium director, and writer with M. Drar of the 4-volumed "Flora of Egypt". Somehow or other she has been endowed with and cultivated many times over the superb and persistent intelligence, enthusiasm, learning, energy, helpfulness and graciousness that are so rarely developed all in one human being.

To the first edition of 1956, stock now depleted, have been added 64 beautifully printed color photographs, 400 more fine line drawings, some updated name-changes and a rearrangement of the plant families according to the latest edition of Engler's Syllabus. The text is clearly printed and well presented for students.

The author dedicated this book "to all my beloved Egyptian students" and hopes "that this flora, although very modest, will contribute to making the students of Egypt and the Middle East interested in nature.....and will appreciate and protect what they see around them. Egypt is not only a land of deserts, it is also a land of flowers and green beauty."

"PHENOLOGY AND SEASONALITY MODELING" edited by Helmut Lieth, xv & 444 pp., illus., ECOLOGICAL STUDIES: Analysis and Synthesis Volume 8, Springer-Verlag, Heidelberg, Berlin & New York, N. Y. 10010. 1974. $47.80.

This important, but overly expensive, work is Contribution No. 85, Eastern Deciduous Forest Biome US - IBP. The U.S./I.B.P. Phenology Committee has distilled this definition: "Phenology is the study of the timing of recurrent biological events, the causes of their timing with regard to biotic and abiotic forces, and the interrelation among phases of the same or different species".

Including the editor, 44 author-members of this committee have presented excellent papers here covering such topics as: international phenology gardens in Indiana and in Europe, phenology and remote sensing, seasonality of nitrogen fixation and of decomposers, plant development in mediterranean climates, modeling of the annual cycle of soil moisture, etc.

"Phenology clearly has great value in environmental education and can be used at all levels of sophistication from grade school to college. It promotes observation and self-discipline and forces the observer to consider the interrelatedness of events. In what other area can we combine education and pleasure so happily?"

"PEATLANDS" by P. D. Moore & D. J. Bellamy, viii & 221 pp., illus., Springer-Verlag, Heidelberg, Berlin, & New York N. Y. 10010. 1974 (previously published in England by I. Elek Scientific Books Ltd.) $12.00.

The world's peatlands, exceeding 230,000,000 hectares, are mostly located in circumboreal and holarctic regions but do appear also in northern and southern temperate regions. In the latter the cushion-plants belonging to the genera Restio and Melaleuca (misspelled in text and index) replace some of the Sphagnum species. Peatlands intrinsically are ecologically unbalanced systems because their rates of organic material production by the living organisms exceeds that of respiration and degredation, leaving the organic deposit of peat or mires which, of course, are dynamically and constantly changing by growth, spreading and erosion over great periods of time -- as checked by core samples and dating with their valuable record of succession.

Peat has long been used as home fuel in Eire and in the Soviet Union which now also runs 70 power stations on it. Its other main economic use, other than land formation, is related to it on a refined minuscule scale and is in horticulture because it retains water and nutrients for soil and subsequent crop improvement.

The book reads so interestingly and easily that after a while one has to stop, take stock and only then realize that an excellent, well documented, effectively illustrated treatise is involved. Its appeal is certainly thereby increased.

"THE VINCA ALKALOIDS: Botany, Chemistry and Pharmacology" edited by William I. Taylor & Norman Farnsworth, xx & 357 pp., illus., Marcel Dekker Inc., New York, N. Y. 10017. 1973. $32.75.

This is a highly valuable -- but far too expensively priced -- book offset-printed directly from neat manuscript and collating information on pertinent aspects of botany, phytochemistry, chemistry, pharmaceutical studies of over 80 alkaloids, and biological activities of Vinca species in folklore, in patients and in test-tubes on a worldwide scanning of laboratories so rapidly advanced in the last score of years.

The first editor writes the chapter on the chemistry of Vinca alkaloids, while the second editor does the one on the phytochemistry of Vinca species; three scientists from Prague report their still incomplete chemotaxonomic studies; two scientists from Budapest report on the feasibility of commercial cultivation of Vinca minor, usually from runners, yielding at least twice as much vincamine as is taken from the best wild forest colonies, and its pharmacology. As a decidedly new trend in biochemical treatments, the whole first chapter is "a synopsis of the genus Vinca including its taxonomic and nomenclatural history" by an outstanding leader in the field of systematic botany, William T. Stearn.

The whole study is really an interim report, needed to steer future studies which will be reported as more learning and/or more problems perhaps a decade hence.

"MEDICINE AND THE ARTIST: 137 Great Prints Selected with Commentary" Third Enlarged Edition by Carl Zigrosser, xiii & 177 pp., illus., Facsimile Edition of Dover Publications Inc., New York, N. Y. 10014. 1970. $3.75 paperbound.

This is an enlarged and slightly altered republication of the second revised edition (1959) of the "Ars Medica" catalogue originally published by the Philadelphia Museum of Art which curates this special and growing collection helpfully financed mainly by Smith Kline and French (pharmaceutical) Laboratories. One of the Dover Pictorial Archive Series, it is published with the permission of the Museum.

Zigrosser, formerly Curator of Prints at this Museum, in his new introduction to this interesting and inexpensive book, tells us that it "aims to portray, in a nutshell, the essential aspects of medical iconography as they have been reflected in graphic art through six centuries.....[and] represents, one might say, a happy conjunction of the Fine Arts with the Healing Arts." Therefore it has wide appeal.

The valuable notes accompanying each of these prints give pertinent data, both medical and artistic, upon the scene, the artist and the engraver or woodcutter. The prints themselves are well reproduced and are grouped topically as allegories of the healing arts (Rembrandt's Christ Healing the Sick), great names (Dunkarton's Carolus Linnaeus in his Lapp paraphenalia), apothecaries with their jars of botanicals, the practice of medicine (Daumier's Country Doctor) and of surgery, charts and diagrams (betony woodcut from Cube's 1485 herbal and corn poppy woodcut from Brunfels' Kräuterbuch 1532), caricature and charlatans, madhouses, the beginning and end of life, etc.

"BEAST OR ANGEL? Choices that Make Us Human" by René Dubos, xiii & 225 pp., Charles Scribner's Sons, New York, N. Y. 10017. 1974. $8.95.

This well known professor emeritus at the Rockefeller University, microbiologist, lecturer and scientific writer first produced this book in his native French for Paris publication as "Choiser d'Etre Humain" and then set out to translate it himself into his long used skilled English with very interestingly explained concommitant problems.

"The human species has evolved socially by developing behavioral patterns and aspirations that transcend those of animal life. The progressive passage from instinctive reactions, which are animal in nature, to willful actions has always involved pain-

ful choices and decisions.....[through which] humanity progressively emerged from animality."

Prehistory and history indicate that only fundamental principles may be permanent but not special forms of human life and that deliberate choices, often with severe tribulations, have been involved in these changes which provide "the environments in which humankind is constantly reborn". Will peoples run into one of these confrontations if they breed faster than tolerable food supply and its distribution or if they press too closely onto the habitable limits of our earth? With what results? "Like the tendency to kill, the tendency to waste and to foul the nest seems to be inscribed in the genetic code of the human species."

Thought-provoking essays well worth reading and pondering.

"CELLULAR DEVELOPMENT" by D. R. Garrod
"FUNCTIONS OF BIOLOGICAL MEMBRANES" by M. Davies
"CELL DIFFERENTIATION" by J. M. Ashworth
"BIOCHEMICAL GENETICS" by R. A. Woods

Each in the 'Outline Studies in Biology' edited by T. W. Goodwin & J. M. Ashworth, 64 pp., illus., Chapman & Hall Publishers Ltd., London EC4P 4EE or Halsted Press of John Wiley & Sons Inc., New York, N. Y. 10016 as U.S.A. distributor. 1973. $2.75 paperbound.

Until recently and fortunately for only a few years in almost any of the undergraduate science courses (except for our intellectually selective ones) were to be found for each registrant (1) a lavishly illustrated text, (2) a lab book with mostly repetitive but condensed text and printed diagrams and some student-supplied answers that often missed the points in question and often with unorthodox orthography, (3) a deficient personal notebook that may or may not be incorporated into the "lab" book and (4) one or more topical books perhaps entitled somewhat like those listed above. This was a hideous waste because the material was repetitive in content and level, not explained constructively and ill used!

But there are some of these topical booklets that are very good and helpful in conscious simplification or in subject matter enrichment. The "Scientific American" separates and these above-listed booklets make excellent examples.

Except for size, the pages resemble those of "Endeavour". In each the illustrations and explanations are clear cut. Maybe in both the United States and in England these booklets should be exchanged so as to reap mutual benefits.

"HOW WE GOT OUR FLOWERS", by A. W. Anderson, 283 pp., illus., Facsimile Edition of Dover Publications Inc., New York, N. Y. 10014. 1966. $2.50 paperbound.

This new reprinting is of the unabridged republication of the London published "The Coming of the Flowers", as it was first en-

titled in 1950. A new index by the author has been added, making the contents much more readily available to those readers looking for specific items either before or after reading the whole book. It will horticulturally interesting and informative in a most delightful way to many readers.

"THE FAMILIES OF FLOWERING PLANTS - Arranged According to a New System Based on Their Probable Phylogeny" Third Edition by J. Hutchinson, xix & 968 pp., illus., Oxford University Press, London WIX 4AH & New York, N. Y. 10016. 1973. £19.50 or $62.50.

Ever since the first edition of 1926, its reprinting in 1934, the second edition in 1959, and for the years that the new third edition will hold sway, primarily systematic botanists and surely other botanists, diverse scientists, and serious naturalists and horticulturists have had and will have their perspectives widened and/or honed considerably because of Dr. John Hutchinson's professional studies centered at Kew as recorded in these books.

He died at the age of 88 shortly before the Clarendon Presses started rolling. On the last page, after Zygotritonia in the index, the new family 27. Idiospermaceae is added with a description of its monotypic genus for what used to be known as Calycanthus australiensis.

The introductory chapters are important for careful reading, especially for the comparisons with other widely accepted systems of plant classification which still differ from the primary divisions on down to the significance of the Lignosae climaxing in the Verbenales versus the Herbaceae climaxing in the otherwise so similar Lamiales.

Family names adopted by Hutchinson all end in -aceae and it is therefore most unfortunate that he chose the name Herbaceae for a non-familiar group. Only a few of the new family names appearing in Engler's 12th Syllabus are accepted by Hutchinson. The Lythraceae is placed in a different cubbyhole. The text indicates monophyletic origin for the monocots but the diagram on page 641 leaves a hedging interpretation open.

The line drawings in the previous editions have been outstandingly clear, detailed and accurate. This statement is even more valid for this third edition because 67 new ones of similar high calibre have been added. Several of the geographic distribution maps have been revised. Additional keys and notes add to the usefulness of this book for teaching purposes.

Because of the great importance of this study all taxonomic students, scholars and aficionados should have easy access to it. But how can they if they are not in "big" institutions or well endowed financially? Paperbound copies seen by the reviewer in Asia help a bit. The U.S.A. price asked is proportionately worse than the pound price asked in the British Isles.

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AUSTRAL HEPATICAE V. STUDIES ON SCHISTOCHILACEAE*

R. M. Schuster and John J. Engel

Department of Botany, University of Massachusetts, Amherst, Massachusetts 01003, and Donald Richards Assistant Curator of Bryology, Department of Botany, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605.

We are, in part jointly, in part separately, in the process of monographing the Schistochilaceae of the so-called subantarctic regions: the alpine areas and regions with subantarctic beech forests of Australasia and South America. In conjunction with such monographic studies several new entities have been found. In order to have the convenience of being able to cross-refer to these in several papers currently being prepared, and to avoid using nomina nuda, the following diagnoses of new taxa are offered. Details of these taxa and illustrations appropriate to them, will appear in the several projected publications.

Schistochila altissima subsp. polystratosa Schust. & Engel, subsp. nov.

Subsp. altissimae similis, sed differt 1) foliis crassioribus, usque ad 5-6-stratosis in areis prope carinam; 2) amphigastriis angustioribus, lingulatis vel elongato-ovatis.

Holotypus: Chile, Prov. Magallanes, Isla Desolación, Puerto Angosto, ca. 700 m, 1 April 1896, Dusén 226 sub S. splachnophylla (M!).

Plants presumably green alive, olive green to light brown in herbarium; erect to ascending; shoots 3.0-4.0 mm wide. Branches sporadic to common, basiscopic, of Radula type. Stems thick and fleshy for plant size. Rhizoids in rather small fascicles at underleaf bases; colorless (with age brownish); the tips occasionally ± branched, but no septations seen.

Leaves opaque, polystratose, the lamina 5-6 stratose near keel, becoming 3-4 stratose and then 2 stratose, margins unistratose for 2-4 cell rows; in cross section outermost cells averaging slightly smaller in diameter than median 2-3 cells rows; leaves transverse to weakly succubously inserted; fleshy, rigid, vertical, stiffly later-

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* The junior author would like to thank Dr. Rolf Singer for assistance with the Latin diagnoses.

ally patent, suborbicular to suboblate, concave and rather saucer-like; not complicate, in cross section with the 2 halves forming a faintly lunate continuum; keel short, single, fleshy, often low except distally, where often abruptly subauriculate, mostly extending from at or near base to 0.55-0.65(0.70) distance to sinus, never attaining sinus; leaves subequally 0.10-0.25 bifid; dorsal and ventral surfaces smooth, elamellate. Ventral and dorsal lobes broadly triangular, apices bluntly acute to subapiculate, occasionally blunt, mostly ending in a single, nonelongated cell, lobe margins entire; dorsal lobe usually slightly larger than the ventral; lamina margins entire. Leaf cells with walls equally somewhat thick-walled, trigones absent; median leaf cells 13-25 μ wide, (18)22-36(40) μ long; cuticle smooth. Underleaves ca. 0.50X stem width, elongate-ovate to lingulate; typically stiffly spreading from stem to squarrose or reflexed, appearing substipitate from a fleshy, 3-5 stratose base, the lamina distally becoming unistratose; apex retuse or bifid to 0.15-0.20; lobe apices blunt or subacute; sinus a mere notch usually; lamina margins entire.

Androecia and gynoecia not seen.

This taxon is allied only to S. altissima Hodgs. subsp. altissima, of New Zealand (for which see Schuster, 1971, fig. 3). In the latter plant, as presumably in subsp. polystratosa, bracteolar antheridia are absent. Subsp. altissima is distinct in (a) the somewhat collenchymatous leaf cells, sometimes with slightly bulging trigone (see fig. 3:17-18, 20 in Schuster, loc. cit.); (b) the more nearly oblong to obovate underleaves, never widest basally, and typically somewhat more deeply bifid; and (c) the much thinner, less fleshy leaves which are only 2-3-stratose, even approaching the keel. When the patterns of variation of this complex are better understood, and more material comes to hand, it may prove necessary to separate the New Zealand and South American taxa specifically; on the basis of the known material, to do so now would be wholly premature.

One of the very distinctive features of the present plant are the often fleshily stipitate and squarrose underleaves. In typical S. altissima we have seen no such fleshy bases. In the latter, rhizoids often occur at leaf bases as well; we have seen them only at underleaf bases in subsp. polystratosa. In the type of S. altissima a few of the rhizoids are lobate-septate at the apices; we have not found such in subsp. polystratosa.

Schistochila caudata Schust. & Engel, sp. nov.

Plantae parvae (usque ad 4.3 mm lata), pallide virentes, rhizoideis rufis; foliis angustis, complanatis, multum longioribus latitudine, unistratosis, levibus, elamellatis, asymmetrice bifidis; lobus ventralis liber et triangularis ad apicem, apice caudatus, cilio 4-5 cellulari usque ad 305-425 μ longo (cellulis 5-9:1) praeditus; marginibus foliorum longiciliatis, ciliis gracilibus, basiangustatis;

amphigastriis reducta et caule multum angustioribus (eis prope gynoecia exceptis).

Holotypus: Falkland Islands, Mt. Adam, 700 m, 13 December 1907, Halle & Skottsberg s. n. (hb. Schuster).

Plants subhyaline, pale green; apparently loosely prostrate and/or caespitose when crowded; shoots 2-4(4.3) mm wide; complanate. Branches not seen. Rhizoids scattered along ventral surface of stem with a slight concentration at underleaf bases; magenta; tips occasionally feebly branched.

Leaves with lobes unistratose throughout; laterally wide spreading; keel in part bearing 2 unistratose wings, ventral wing conspicuous, 0.60-0.70 the length of ventral lobe, wing margins sparingly spinose dentate; dorsal wing inconspicuous, extending for varying distances from distalmost point of keel, at most 1/2 length of ventral wing. Ventral lobe ellipsoidal to sublingulate-obovate, dorsal and ventral surfaces smooth, elamellate; apex long apiculate, terminating in a cilium of 3-5 superposed elongated, rather thick-walled cells; margins bearing ca. 8-15 sharp, spinose teeth or cilia or laciniae, but the basal half of ventral margin sparingly armed or entire. Dorsal lobe 0.75-0.85 length of ventral lobe, free for 0.15-0.25 its length; dorsal surface smooth, elamellate; apex nearly like the ventral lobe apex; terminating in a conspicuous caudate, ciliiform, stiff or somewhat tortuous process which is longer than armature of dorsal or ventral lobe, process often (260)305-425 μ, made up of 4-6 superposed elongated cells (ca. 5-8:1, the terminal cell often 100-125 x 14-18 μ [6-9:1]); dorsal margin rather copiously armed with long cilia made up of mostly 2-3 rather thick-walled cells (mostly 4-6:1, terminal cells 6-9:1), basal portion of margin entire. Ventral lobe cells thin-walled, trigones medium to large; median lobe cells 23-36 μ wide, 35-58 μ long; cuticle smooth. Underleaves, except distally on gynoecial shoots, very small to almost vestigial, 0.40-0.50X stem width, rather polymorphous, subrectangular to ovate-triangular to sometimes ± ligulate; bifid to 0.50-0.65; lamina margins entire; underleaves near gynoecial areas larger.

Androecia and mature gynoecia not seen.

Schistochila caudata has been given its name because of the abrupt and long, slender cilia terminating the dorsal and, to a less extent usually, ventral leaf lobes. Plants are much more ciliate than those of any other American Schistochilae in which leaf surfaces are unarmed. This, linked with the pale green color and vinaceous rhizoids, the translucent, hyaline, elongated leaves, and the often vestigial underleaves easily separate the species from all other New World taxa.

This species is closely related only to the New Zealand S. pseudokirkiana Schust. (S. kirkiana of Schuster, 1971, fig. 16), which is briefly described below. The two taxa differ as follows:

1. Flattened leaf not distinctly ovate (dorsal lobe at base not or hardly ampliate), much longer than broad, copiously ciliate; cilia formed of strikingly elongated cells (terminal cells often 100-125 x 14-18 μ [6-9:1]), those of dorsal lobe apex longest, of usually 4-6 superposed cells. Falkland Islands . . . . . S. caudata Schust. & Engel

1. Flattened leaf ovate to broadly ovate, slightly longer than wide to wider than long, spinose-ciliate to spinose-dentate; teeth more tapered, 2(3) cells wide in basal part, uniseriate only for distal 2-3(4) cells, the cells of the uniseriate sector 50-70 μ long (2-4:1). New Zealand. . . . . S. pseudokirkiana Schust.

Schistochila pseudokirkiana Schust., sp. nov.

Species S. caudatae similis, sed foliis latioribus, plerumque ovatis vel late ovatis, lobo dorsali ad basem dilatato; debilius dentatis, dentibus apicem versus angustatis, eius basi e 2-3 cellulas efformata, apicibus uniseriatis, e cellulis pro medio 2-4X longioribus latitudine efformatis.

Holotypus: New Zealand, South Island, Earland Falls, Humboldt Mts., Fiordland Natl. Park, Schuster 67-377a (hb. Schuster).

Similar to S. caudata Schust. & Engel, but differing in the following features: (a) leaves broader, typically distinctly ovate when flattened, with the dorsal lobe quite ampliate near base; and (b) leaves with dentition much less ciliiform, with the teeth typically 2-3 cells wide at base and tapered into the uniseriate sector, which is formed of 2-3(4) cells that average only 2-4X as long as wide.

This species, illustrated in Schuster (1971, fig. 16), will be dealt with in detail in another account. It is highly plastic in New Zealand but all extremes agree with each other, and differ from S. caudata, in the broader leaves, with less distinct ciliation. This is especially true near the gynoecia, which in S. caudata have the lobes quite caudate-ciliate with uniseriate cilia abruptly arising from a base 2-3(4) cells broad. New Zealand plants tend to vary in the direction of having no cilia (or only 1-3 small teeth) of the ventral lobes in some populations (e.g., RMS 48538, RMS 67-221c), and in the direction of having wider than long leaves that are distinctly broad-ovate in outline (RMS 52601). The pattern of variation suggests S. pseudokirkiana and S. caudata are adequately differentiated at the species level. Both differ from true S. kirkiana (which has large underleaves, wider than the stem) in the highly reduced underleaves, always much narrower than the stem, which are often reduced to mere lanceolate lamellae.

Schistochila reflexistipula Engel & Schust., sp. nov.

Plantae parvae, usque ad 2.8 mm latae, pallide virentes vel olivaceae, rhizoideis hyalinis vel pallide fuscis, ramosis apice septatis; foliis subverticalibus, 4-5-stratosis prope carinam, elamellatis, margine integris; amphigastriis maximis, imbricatis, eius latitudine usque ad 2.0X caulis diametri, orbicularibus vel suboblatis, margine plerumque reflexis.

Holotypus: Argentina, Terr. Tierra del Fuego, Río Harubre Valley, 2-3 km S of Paso Garibaldi, Rte 3, ca. 600-650 m, 25 February 1961, Schuster 59422 (hb. Schuster).

Plants light green or light olive green; suberect, shoots 2.0-2.8 mm wide; subisophyllous. Branches rather common, usually of lateral-intercalary type, Frullania- and Microlepidozia-type branching very rare. Rhizoids at underleaf and frequently also ventral lobe bases, occasionally at base of dorsal lobe; colorless or very pale brown, often branched at the tips, branches frequently septate.

Leaves with dorsal and ventral lobes 4-5 stratose near carina; ± transversely oriented, ventral lobe insertion ± transverse, dorsal lobe insertion incubous to transverse; leaves often ± vertical, obliquely spreading, bearing 1 unarmed wing 0.75-0.80 the length of ventral lobe. Ventral lobe very wide ovate to suborbicular, dorsal and ventral surfaces smooth, elamellate; apex narrowly rounded or broadly triangular or broadly rounded and with or without a broad-based terminal tooth, apex otherwise entire; ventral margin deflexed and lending lobe rather deeply convex, entire; dorsal margin entire. Dorsal lobe 1.3-1.5 the length of ventral lobe, free for 0.40-0.50 its length; moderately to strongly erect, sometimes recurved; dorsal surface smooth, elamellate; apex acutely or obtusely triangular, usually apiculate; dorsal margin entire-3 dentate in median portion, occasionally 1-2 dentate at the base. Ventral lobe cells with walls thin, trigones small; median lobe cells 19-32 μ wide, 23-36 μ long; cuticle smooth. Underleaves 1.25-2.0X stem width, moderately to strongly spreading, margins usually reflexed lending underleaf concave to subnavicular iform; orbicular to suboblate; apex retuse or bifid to 0.15; lamina margins entire.

Androecia and gynoecia not seen.

This species is related to S. leucophylla of southern South America, but may be distinguished from it by (a) the orbicular to suboblate underleaves which are ca. 1.25-2.0X the stem width, retuse or bifid to 0.15 and with margins usually reflexed lending the underleaf concave to subnavicular iform; and (b) the transverse insertion and orientation of the ventral lobes.

Schistochila subhyalina Schust., sp. nov.

Species formis minoribus S. colensoanae similis, plantae ca. 5-9 mm latae, sed foliis ubique unistratosis; lobi ventrales elliptico-oblongi, usque ad 3-4 mm longi, marginibus integris vel repando-sinuatis.

Holotypus: New Zealand, South Island, S of Earland Falls, Humboldt Mts., on track from Lake Howden to Lake MacKenzie, Fiordland Natl. Park, Schuster 67-377 (hb. Schuster); mixed with Triandrophyllum falcifolium and Schistochila kirkii).

Plants pure green, chlorophyllose but rather pellucid, closely prostrate and firmly attached to substrate, 5-9 mm wide x 12-30 (35) mm long, often essentially unbranched; branches basiscopic, of Radula type. Rhizoids colorless to pale brownish with age. Leaves contiguous to weakly imbricate, laterally stiffly, widely patent (the moist plant appearing rather dorsiventrally compressed), sharply complicate-bilobed, when flattened ovate, clearly longer than broad (2450-2750[2850] μ broad x 3000-3200[3400] μ long), margins entire but often varyingly sinuous to repand-sinuate, exceptionally with an isolated, low, blunt tooth. Ventral half (including wing) narrowly elliptical-oblong, ca. 1780-1950 μ broad x 3000-3200 μ long to 2100 μ broad; wing 450-635(650) μ wide, single, arched, entire-margined; apex of ventral lobe variable, blunt to acute to, often, obliquely bluntly subtruncate to rounded. Dorsal lobe only moderately ampliate towards base, 1125-1430 μ broad x 2250-2450(2750) μ long. Leaves everywhere unistratose, juncture of lobes and keel excepted. Cells smooth, without thickened lenticular papillae; cells thin-walled, with medium-large, often moderately bulging trigones; apical cells 35-42 μ up to 40-48 μ; median cells (34)36-48(50) x 42-55 μ; median cells with oil-bodies relatively numerous, (10)12-22(25) per cell, finely granular-botryoidal, ellipsoidal and 4 x 5-8(10) μ to 5 x 8 μ, a few spherical and 4.5-5.5 μ. Underleaves remote to contiguous, never appreciably wider than stem, almost all with dense rhizoid fascicles at base, oblong to subquadrate, to 875 μ wide and long, 0.5-0.65 bifid, lobes lanceolate, often acuminate, distally, at least, of strongly elongated cells. Known only sterile.

This relatively vigorous species exhibits close affinities to two other taxa of Pachyschistochilae: (1) S. virescens, to which S. subhyalina shows an approach in the essentially entire leaves, their unistratose form, and in cell size and form. S. subhyalina is at once distinct from S. virescens in the closely adnate, rather than erect and caespitose, mode of growth; in the narrower leaves, both lobes of which are pointed to obtuse, rather than rounded, and in the smaller, much more elongate underleaves. (2) S. colensoana (sensu Schuster); S. subhyalina differs from this in the unistratose leaves, the somewhat larger size, and the somewhat larger leaf cells.

Diagnostic features for S. subhyalina are (a) the rather flat

shoot form; and (b) the considerable malleability in form of the leaf lobes: the dorsal lobe may be quite blunt, so much so that the actual apex may be hard to discern; in other cases it may be sharply pointed. Almost the same variability characterizes the ventral lobe.

Schistochila subimmersa Engel & Schust., sp. nov.

Plantae pallide virentes, semi-immersae in substrato, 3-5 mm latae; rhizoideis hyalinis vel brunneolis, apice septatis; carnosae, rigidae, fragiles; lobus ventralis 2-4-stratosus prope carinam, levis, elamellatus, margine integer vel 1-dentatus apicem versus; lobus dorsalis 4-6-stratosus prope carinam, levis, elamellatus; amphigastriis subabsconditis inter rhizoidea, 0.15-0.45 bilobis, lobis integris, lamina integris.

Holotypus: Chile, Prov. Magallanes, E side of Puerto Bueno, Schuster 69-4223 (hb. Schuster).

Plants light green; adnate, ± immersed in substratum; shoots 3-5 mm wide; leaves antically assurgent. Branches rare, basiscopic, of Radula type. Stems 14-21 cells in diameter. Rhizoids rather dense, in fascicles from stem at underleaf and ventral lobe bases, often also from base of underleaf and ventral lobe; light brown; tips sometimes branched, the branches pluriseptate.

Leaves polystratose, the ventral lobe of fewer strata than the dorsal, ventral lobes 2-4-stratose in basal portion, ca. distal 1/3-3/4 of lobe unistratose, sometimes unistratose nearly to base and with a few local bistratose areas; dorsal lobe 4-6-stratose in basal portion, distal 1/10-1/4 (or distal 4-8 cells) of lobe unistratose; leaves obliquely spreading, ± navicullariform, bearing 1 unarmed, polystratose wing 0.75-0.90 the length of ventral lobe. Ventral lobe asymmetrically ovate-subelliptic, moderately concave, dorsal and ventral surfaces smooth, elamellate; apex narrowly rounded or obtusely triangular, often apiculate, entire except for tooth very often present at extreme apex; ventral margin entire or 1-dentate toward apex. Dorsal lobe 0.75-0.95 the length of ventral lobe, as long as or slightly shorter than carina; strongly elevated, plane or slightly concave; dorsal surface smooth, elamellate; apex truncate, occasionally rounded and with no discernable truncation, dorsal lobe then appearing half-circular in outline; apical tooth well defined; dorsal margin entire to sinuate to few dentate. Ventral lobe cells with walls thin, trigones medium to large and bulging; median lobe cells 42-56(65) μ wide, (46)50-74(78) μ long; cuticle smooth. Underleaves rather inconspicuous among rather dense rhizoids, ca. 0.30-0.75X stem width, strongly spreading, usually broad-ovate, bifid to 0.15-0.45; lamina margins plane, entire or 1 dentate.

Dioecious; ♂ not seen. Coelocaule maximally developed, bearing 4 pairs of bracts, uppermost bracts with size and shape as in

leaves; perianth rudiments absent.

Capsule walls 78-104 μ thick, of (2)3-5 layers; outer layer of cells 38-52 μ thick, radial walls with obscure to thin, continuous sheets of red-brown wall material, the angles where 3-4 cells meet without nodules; inner layer of cells 22-28 μ thick, with semiannular bands and several weak nodular thickenings. Spores 20-23 μ, exine with narrow, rather long, irregular vermiform ridges which often anastomose and lend exine a + reticulate appearance; spores averaging 2.1X elater diameter. Elaters tortuous, nonrigid, (8)10-12 μ wide, bispiral.

The closest affinities of S. subimmersa appear to be with Australasian taxa, with specifically, the New Zealand plant referred to as "S. splachnophylla" by Hodgson (1941), which is referred to as "S. cf. paucistipula Rodway" by Schuster (1971).

Schistochila virescens Schust., sp. nov.

Plantae pure virides, magnitudine mediocres, 5-7 mm latae, rhizoideis hyalinis; erectae et caespitosae; foliis unistratosis, parte basali excepta, margine integris; lobus ventralis perfecte fere ovatus vel ellipticus, apice late rotundatus; lobus dorsalis late dimidiato-ovatus, apice obtusus vel late rotundatus.

Holotypus: New Zealand, South Island, N of Earland Falls, on track from Lake Howden to Lake MacKenzie, Humboldt Mts., ca. 3500 ft, Fiordland Natl.Park, Schuster 67-372 (hb. Schuster).

Plants pure green, erect or ascending, usually caespitose and in tufts or patches, 5-7 mm wide x 15-30 mm tall, sporadically to rarely branched (branches seemingly all Radula type, issuing, in antical aspect of plant, behind the keel of the leaf lying distad to branch). Rhizoids colorless. Leaves remote to contiguous, stiffly, widely, laterally spreading, loosely conduplicate, rather rigid, subsymmetrically bifid for ca. 0.1-0.15 their length, subhyaline and unistratose except for a small basal field, where 2-stratose, nonpapillose and nonlamellate, insertion subvertical, anticallly and positically somewhat decurrent; ventral "half," including the wide single wing, almost perfectly ovate to elliptical (ca. 1250 μ long), the contours smooth, without trace of dentition, the apex regularly broadly rounded; wing and ventral half forming a continuous whole, the dorsal "half" seemingly inserted on ventral half and keel not extended to apex of leaf; dorsal half broadly dimidiate-ovate, ca. 1525 μ wide x 2000 μ long, somewhat elevated (leaf in cross section V-shaped), the basal half strongly ampliate, wider than ventral half (minus wing), entire-margined or rarely with a stalked slime papilla of tooth near base, the apex blunt to broadly rounded. Underleaves rather large, broader than stem, distant, each with a pale rhizoid-fascicle at base with maturity, broadly orbicular-ovate to broadly rounded-quadrate, to 1225-1250 u wide x 1015-1050 μ long, sides arched, 0-1 bluntly dentate on each side, apex 0.25-0.35 bilobed by a broad and V-shaped to U-shaped

sinus with rounded base; lobes acute to subacute or blunt; margins of lobes often locally with tangentially elongated cells. Cells smooth everywhere, median ca. 35-45 x 36-55 μ, thin-walled and with concave-sided trigones; chloroplasts very small; oil-bodies (3-4)5-12(13) per cell, colorless, weakly botryoidal, ellipsoidal and 5-5.5 x 7-8 μ to 6-7 x 7.5-9 u, a few spherical and 5-6.5 μ, present in all cells.

Coelocaule rigid, thick, with 2-3 pairs of leaflike bracts inserted on it, the upper reduced and variously malformed. Capsule cylindrical, wall 3-4-stratose; valves to 3400 x 550-600 μ. Epidermal cells almost hyaline, only corners with thickenings, forming (jointly) subrotund corner posts; epidermal cells ca. 20-28(32) x 52-78 μ. Innermost cells less regular, 15-25(32) x 70-105 μ, with numerous, often oblique, complete semiannular bands, well defined on tangential walls. Elaters 14 μ (bispiral) to 16-17 μ (trispiral); spirals ca. 4-4.8 μ broad. Spores under 22 μ, with dome-shaped brown papillae to 3-4.5 μ in diameter. ♂ Plant unknown.

Diagnostic for this species is the combination of (a) pure green color; (b) erect growth; (c) moderate size; (d) the uniformly entire-margined leaves, nonlamellate, subequally, shallowly bifid, with uniformly rounded ventral lobes (which, with the wide, arched keel, make an almost perfect ellipse) and blunt to rounded dorsal lobe apices; (e) unistratose leaves; (f) small, bilobed underleaves; (g) 2-3-spiral elaters and (h) spores covered with low to hemispherical, tumid papillae to 3-4.5 μ in diameter.

The senior author has seen a single old capsule; the valves, when not undergoing secondary splitting, were linear, ca. 3400 x 550-600 μ, 3-4-stratose; epidermal cells had conspicuous brown, local nodular thickenings of the angles where 3-4 walls intercept, but the walls were hyaline elsewhere and lacked distinct pigmentation or thickenings; epidermal cells varied in size, were oblong, mostly 20-28(32) x 52-78 μ. Inner cells were even less regular, mostly 15-25(32) x 70-105 μ, with numerous, often oblique, semiannular bands. A few post-mature spores, already beginning germination, were seen; they ranged to 22 μ in diameter (but were probably smaller prior to germination-swelling), and bore scattered, domelike, brown, coarse papillae (but no conspicuous, minute granulae between). Bispiral elaters were 14 μ, trispiral ones 16-17 μ in diameter; spirals were 4-4.8 μ wide.

New Synonyms of South American *Schistochila* Species

1. *Schistochila aberrans* Steph. Sp. Hep. 4: 93. 1909 = *S. carnosa* (Mitt.) Steph.

2. *Schistochila diptera* Herz. Revue Bryol. Lichén. 21: 257. 1952 = *S. quadrifida* Evans.

3. Schistochila lamellistipula Steph. Bih. K. Svenska VetenskAkad. Handl. 26 (III, 6): 59. 1900 = S. lamellata (Hook.) Dum.

4. Schistochila lanceolata Steph. K. Svenska VetenskAkad. Handl. 46 (9): 79. 1911 = S. splachnophylla (Hook. f. & Tayl.) Steph.

5. Schistochila parvula (Ångstr.) Steph. [bas.: Gottschea parvula Ångstr. Öfvers. K. VetenskAkad. Förh. 29 (4): 9. 1872] = S. reflexa (Mont.) Steph.

6. Schistochila planifolia Steph. Bih. K. Svenska VetenskAkad. Handl. 26 (III, 17): 29. 1901 = S. quadrifida Evans.

7. Schistochila reicheana Steph. Bih. K. Svenska VetenskAdad. Handl. 26 (III, 6) 59. 1900 = S. lamellata (Hook.) Dum.

8. Schistochila savatieri Steph. Sp. Hep. 4: 94. 1909 = S. lamellata (Hook.) Dum.

9. Schistochila skottsbergii Steph. K. Svenska VetenskAdad. Handl. 46 (9): 80. 1911 = S. stratosa (Mont.) Evans.

10. Schistochila spinosissima Gola, Nuovo G. Bot. Ital. 29: 170. 1923 = S. laminigera (Hook. f. & Tayl.) Evans.

11. Schistochila subintegerrima Steph. K. Svenska VetenskAkad. Handl. 46 (9): 81. 1911 = S. leucophylla (Lehm.) Steph.

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Hodgson, E. A. 1941. Review of the New Zealand species of Schistochila, with notes on Colenso's species. Trans. Roy. Soc. N. Z. 71: 181-194.

Schuster, R. M. 1971. Studies of Antipodal Schistochilaceae and Scapaniaceae. Bull. Natl. Sci. Mus., Tokyo 14: 609-660.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LV

Harold N. Moldenke

PAEPALANTHUS PILOSUS (H.B.K.) Kunth

Additional bibliography: Moldenke, Phytologia 30: 108 & 122—125. 1975.

Macbride (1936) cites also Lechler s.n. from Puno, Weberbauer 4416 from Amazonas, and Weberbauer 5182, 6826, and s.n. [Monzón] from Huánuco, Peru. Ruhland (1903) cites Hartweg 1445, Humboldt & Bonpland s.n., Lehmann 6666, Linden 751, and Stübel 137 from Colombia and Lechler s.n. from Peru.

Additional citations: COLOMBIA: Antioquia: Barkley & Saldarriaga C. 43018 (Ld); Gallo s.n. [Daniel 2700] (W—1804249). Boyacá: Fassett 25629 (N, N, Ws), 25633 [Herb. U. S. Nat. Arb. 217440] (Be—44055, N, W—2166184, Ws). Cauca: Barclay & Juajibioy 5730 (N), 5847 (N); Cuatrecasas 23654 (F—1360958); Hartweg 1445 (B). Cundinamarca: Apollinaire & Arthur 26 (W—603108); Bonpland s.n. (B); E. L. Core 5 (N); Garcia-Barriga 11658 (W—1952196); M. L. Grant 9525 (W—2166093); Grant & Fosberg 9238 (W—2166074); Humboldt & Bonpland s.n. [Herb. Willdenow 2371] (B—type, Z—isotype); F. W. Pennell 1997 (Er, F—485439); Perez & Garcia O'Chardon 5155 (W—1740869); M. Schneider 599 (S); R. E. Schultes 18788 (Z). Norte de Santander: Garcia Barriga 10301 (W—1798460); Garganta Fábrega 1209 (F—1277108). Putumayo: Cuatrecasas 11866 (N). Santander: Araque Molina & Barkley 18S351 (N); F. A. Barkley 38C164 (Ld); Fassett 25929 [Herb. U. S. Nat. Arb. 217372] (W—2166225, Ws); Killip & Smith 16064 (N, W—1351838). VENEZUELA: Mérida: Ruiz-Terán & López-Figueiras 771 (Mi). PERU: Puno: Lechler 2206 (Br, S). LOCALITY OF COLLECTION UNDETERMINED: Lejeune s.n. [Am. aequin.] (Br). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B, B).

PAEPALANTHUS PIRESI Moldenke, Résumé 101 & 489, nom. nud. (1959); Bol. Mus. Para. Emil. Goeldi, n. s., Bot. 3: 2. 1960.

Synonymy: Paepalanthus piresii Moldenke apud G. Taylor, Ind. Kew. Suppl. 13: 98. 1966.

Bibliography: Moldenke, Résumé 101 & 489. 1959; Moldenke, Bol. Mus. Para. Emil. Goeldi, n. s., Bot. 3: 2. 1960; Hocking, Excerpt. Bot. A.4: 284. 1962; Moldenke, Biol. Abstr. 37: 2453. 1962; Dau, Excerpt. Bot. A.7: 520. 1964; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 955. 1971.

This species is based on Murça Pires, Black, Wurdack, & Silva 6189 from the Serra do Cachimbo, at an altitude of 425 meters, Pará, Brazil, collected on December 12, 1956, and deposited in the

Britton Herbarium at the New York Botanical Garden.
Citations: BRAZIL: Pará: Murça Pires, Black, Wurdack, & Silva 6189 (N--type).

PAEPALANTHUS PLAGIOSTIGMA Alv. Silv., Fl. Mont. 1: 117--118, pl. 73. 1928.
Bibliography: Alv. Silv., Fl. Mont. 1: 117--118 & 411, pl. 73. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 956. 1971.
Illustrations: Alv. Silv., Fl. Mont. 1: pl. 73. 1928.
This species is based on A. Silveira 834, collected "In campis humidis inter Serrinha et Itacambira", Minas Gerais, Brazil, in July of 1926 and is deposited in the Silveira herbarium. On page 411 of his work (1928) Silveira cites "Serrinha" as the type locality. In his description he states that the leaves are "2-4 cm medio lata", but surely this is a misprint for 2--4 mm. since the leaves are only 3--4 cm. in length! Thus far the species is known, at least to me, only from the original collection.

PAEPALANTHUS PLANIFOLIUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 413, pl. 52. 1863.
Synonymy: Eriocaulon planifolium Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 629. 1831. Paepalanthus monticola Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 10. 1835. Paepalanthus iridifolius Kunth, Enum. Pl. 3: 502. 1841. Eriocaulon iridifolium D. Dietr., Syn. Pl. 5: 259. 1852. Eriocaulon iridifolium Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855. Eriocaulon monticola Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 278. 1855. Paepalanthus planifolius var. major Körn. in Mart., Fl. Bras. 3 (1): 413--414. 1863. Paepalanthus planifolius var. minor Körn. in Mart., Fl. Bras. 3 (1): 413--414. 1863. Dupatya planifolia (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon monticolum Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878, in syn. 1893. Paepalanthus monticolus Mart. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879. 1893. Paepalanthus planifolius Körn. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402, in syn. 1894. Dupatya planifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Eriocaulon vaginans Pavon ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 208 & 288, in syn. 1903. Eriocaulon iridifolium Steud. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 208 & 286, in syn. 1903. Eriocaulon monticola Steud. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 208, in syn. 1903. Paepalanthus planifolius var. typica Beauverd, Bull. Herb. Boiss., ser. 2,

8: 295. 1908. Paepalanthus monticola var. α Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus monticola var. Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus planifolius (Bong.) Ruhl. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus planifolium (Bong.) Körn. ex Angely, Fl. Anal. Paran., ed. 1, 200, sphalm. 1965.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 629. 1831; Bong., Ess. Monog. Erioc. 29. 1831; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 10. 1835; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 502, 508, 575, 576, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 259, 260, & 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 278, 279, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 281, 393, 413--414, 499, & 507, pl. 52. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and pr. 1, 2: 402. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 30--31. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Chod. & Hassler, Bull. Herb. Boiss., ser. 2, 3: 1033 & 1034. 1903; Chod. & Hassler, Plant. Hassler. 2: 255 & 256. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 2, 201, 208--211, 286, 288, 290, & 291, fig. 30. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295 & 297. 1908; Alv. Silv., Fl. Mont. 1: 241 & 411. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Stapf, Ind. Lond. 4: 518. 1930; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 491 & 493. 1936; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5, 7, 14, 29, 30, 36--38, 41, 47, 49, & 51--53. 1946; Moldenke, Alph. List Cit. 1: 223 (1946), 2: 612 (1948), 3: 833 & 903 (1949), and 4: 1301. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 73, 86, 210, 211, & 214. 1949; Moldenke, Phytologia 3: 142 (1949) and 4: 201. 1953; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 236--237, 266--267, & 276--277. 1956; Reitz, Sellowia 7: 124. 1956; Angely, Fl. Paran. 10: 14. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 84, 99, 101, 117, 220, 281, 289--291, 293, 326, 327, 487, & 489. 1959; Moldenke, Résumé Suppl. 1: 6, 21, 22, & 26. 1959; Reitz, Sellowia 11: 31 & 119. 1959; Soukup, Biota 5: 302. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. 71. 1960; Angely, Fl. Paran. 16: 66 (1960) and 17: 24. 1961; Reitz, Sellowia 13: 53, 72, & 90. 1961; Moldenke, Résumé Suppl. 3: 34 (1962) and 4: 12. 1962; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; Teague, Anal. Mus. Hist. Nat. Urug., ser. 2, 7 (4): 47. 1965; Moldenke, Résumé Suppl. 13: 3 (1966), 17: 9--11 (1968), and 18: 4 & 13. 1969; Moldenke, Phytologia 18: 277. 1969; Reitz, Sellowia 22: 104. 1970; Moldenke, Fifth Summ. 1: 142, 165, 187, 366, & 484 (1971) and 2: 503, 506, 508, 515, 584, 586, 588, & 956. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 12 & 20. 1972; Moldenke, Phytologia 23: 418 (1972), 26: 28, 236, & 460 (1973), 28: 439 (1974), 29: 306 (1974),

and 30: 81 & 112. 1975.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 52. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 209, fig. 30. 1903.

This species is apparently based on L. Riedel 395 from Minas Gerais, Brazil, deposited in the Leningrad herbarium. Bongard's "Pl. 58", sometimes cited as illustrating this species, was apparently never published, according to Kunth (1841) and Ruhland (1903). It probably exists only in the library or herbarium at Leningrad.

Paepalanthus planifolius var. major, P. iridifolius, and Eriocaulon iridifolium are all based on a Sellow collection from Serra do Vento -- probably his no. 840 and/or C.264 in the Berlin herbarium. Paepalanthus monticola is based on a Martius collection from "In montibus Provinciae Minarum", very probably the specimen labeled Martius 840 & 1334 from "In montibus altis ad Villa Rica et Tejuco minar. generalium" in the Munich herbarium, which appears also to be the type of P. monticola var. α Körn.

The Martius (1835) original publication of the accepted name for the taxon here discussed is sometimes cited as "1833", but this was the date of its submission to the Academy as a manuscript. According to the late Dr. John H. Barnhart, unsurpassed as a botanical bibliographer, the work wasn't actually published until 1835. Incidentally, Jackson (1894) accepts P. monticola as the valid name for the species, reducing P. planifolius to its synonymy.

The Chodat & Hassler (1903) reference, cited in the bibliography above, is sometimes erroneously cited as "11: 256".

Recent collectors describe P. planifolius as a tufted herb, 0.2--1 m. tall, rhizomatous, with "a short trunk", a large rosette of leaves, the flower-heads "radiating from the leaves", grayish or white (sometimes turning black in drying), and the individual florets white during anthesis. Fosberg found it to have "a stem some cm. long but mostly down in peat".

Collectors have encountered the plant on campos, wet campos, grassy campos, wet sandy campos, on sandy river margins and steep sandy slopes with sandstone outcrops at the summit, in wet sand, wet soil bordering brooks, swamps, and wet sandy places in disturbed slope forests near outcrops, along creeks, and in "banhado fora da água", at altitudes of 5 to 1870 meters, flowering from February to December, and fruiting in February, August, October, and November. Anderson and his associates found it in sandy meadows in an area of rocky campo and cerrado sloping down to a wet-sand meadow adjacent to gallery forest along a stream, with sandy soil and sandstone outcrops, and in summit vegetation mostly to 1 m. tall or less with a mossy groundcover in organic soil overlying sandy soil on limestone rocks.

Reitz & Klein describe the plant as an "erva, flôr branca" or "flôr cinza". Fosberg found it to be "common in open grassy bogs" in São Paulo. The Eitens found it growing "in open marshy ground with scattered low shrubs and low treeferns, periodically burned" and "in wet open rolling terrain with small groves and individu-

als of shrubs and small trees (the original vegetation of this area was probably continuous subalpine rainforest) in open soaking marsh soil". Silva reports it as "frequent" on wet campos in Minas Gerais, while Imaguire and Dombrowski both refer to it as frequent in Paraná. Vernacular names recorded for the plant are "botão", "capim manso", "capipoatinga", "co quebra coque", "gravatá manso", "quebra coque", "sempreviva do campo", and "semprevivas do campo".

Bongard's original (1831) description of Eriocaulon planifolium is "Acaule; foliis pedunculos subaequantibus, late linearilanceolatis, acuminatis, glabris, glaucescenti-nitentibus; pedunculis compressis, striatis, glabris; vaginis truncatis. In umbrosis humidiusculis montis Itacolumi. 4. Bracteae capitula involucrantes fuscescentes. Proxima E. compresso Lam. et fortasse non diversum." Kunth (1841) adds "Forsan species legitima?" Actually, Paepalanthus planifolius bears not even the slightest resemblance to Eriocaulon compressum Lam., a species of the southeastern United States!

The description of P. monticola, as given by Kunth (1841), is "Acaulis; caespitosus; glaber; foliis lanceolatis, acutis, e rhizomate villoso, quam scapi simplices compressi brevioribus; vaginis truncatis; capitulis numerosis, in apice scaporum capitato-sessilibus; flosculis albo-lanatis; involucris plumbeo-fuscis ....In montibus Provinciae Minarum."

Kunth (1841) gives a detailed secription of his P. iridifolius, of which the essential characters given are "Acaulis; foliis rigidis, lineari-subensiformibus, acutiusculis, glabris; pedunculis folia superantibus, compressis vaginisque glabris; his apice oblique truncatis, imberbibus; capitulis subglobosis, albovillosis, tardius glabrescentibus; bracteis ciliato-hirsutis; sepalis exterioribus glabratis (primum hirsutis?): fructiferis induratis; stigmatibus longissimis, apice bifidis. -- Brasilia meridionalis. (Serra do Vento). Sellow legit."

Ruhland (1903) cites for the typical form of P. planifolius Clausen 266, Glaziou 15524, 15525, & 16397, Langsdorff s.n., Martius s.n., Mendonça 324, Mosén 766, Pohl 2033, Riedel 395, Sellow C.264 & s.n., A. Silveira 1563, and Widgren s.n. from Minas Gerais, Brazil, and Pavon s.n. from Huánuco, Peru. He comments that the "Species valde variabilis. Varietates a cl. Koernicke collocate: minor et major gradu modo diversae atque formis intermediis conjunctae, melius excludendae sunt, var. alpestris autem foliis glaberrimis et bracteis involucrantibus fere acutis satis diversa."

Silveira (1928) cites A. Silveira 229 from Serra de Treituba, Minas Gerais, collected in 1897; Teague (1965) cites Teague 160. Macbride (1936) cites from Peru the following: Amazonas: Weberbauer 4531. Cajamarca: Raimondi s.n. [Cutervo]. Huánuco: Pavon s.n. [Pillao]; Weberbauer 3535.

Material of P. planifolius has been misidentified and distrib-

uted in some herbaria under the names Eriocaulon kunthii Körn., Paepalanthus globulifer Alv. Silv., and P. planifolius var. conduplicatus Ruhl. On the other hand, the Hassler 9428, distributed as P. planifolius, is actually Eriocaulon magnum Abbiatti; Mexia 5745 is P. planifolius var. conduplicatulus Ruhl.; A. Gehrt s.n. [Herb. Inst. Biol. S. Paulo 5766] is P. planifolius var. consanguineus (Körn.) Ruhl.; Anderson, Stieber, & Kirkbride 36204, Brade 6587, G. Gardner 5269, Hatschbach 24944, F. C. Hoehne 5475, Irwin, Maxwell, & Wasshausen 20184, Maguire, Mendes Magalhães, & Maguire 49092, Reitz 5432, and Reitz & Klein 3924 & 5376 are P. planifolius var. globulifer (Alv. Silv.) Moldenke & Smith; and Mexmüller 25560 is P. planifolius var. puberulus (Körn.) Ruhl.

Additional citations: BRAZIL: Amazônas: Eiten & Eiten 5042 (Ld). Distrito Federal: Irwin & Soderstrom 5785 (N); Irwin, Souza, & Reis dos Santos 7902 (Ac, N); Maguire, Murça Pires, Maguire, & Silva 57056 (Ld). Minas Gerais: Anderson, Stieber, & Kirkbride 35770 (Ld, N, W—2709828); Andrade 1015 [Emmerich 976] (Bd—16653); Duarte 10543 [Herb. Brad. 47760] (Ld); Dusén 255 (S); Hatschbach, Smith, & Ayensu 28870 (Ac); Irwin, Maxwell, & Wasshausen 20775 (Ac, N); Macedo 2754 (S, S), 2851 (N); Magalhães Gomes 2813 [Herb. Jard. Bot. Belo Horiz. 26704] (N); Maguire, Mendes Magalhães, & Maguire 49145 (N, N), 49300 (N); Martius 840 (Mu), 1334 (Mu); Mendes Magalhães 482 [Herb. Jard. Bot. Belo Horiz. 34501] (N), 1982 (Be—14655, W—2124237), 2319 [Herb. Jard. Bot. Belo Horiz. 43365] (N), 2547 [Herb. Jard. Bot. Belo Horiz. 43830] (N); Mosén 766 [25/10/1873] (Mu, S, S, S), 766 [5/10/1875] (S); Princess Therese s.n. [Itacolumy, VIII.1888] (Mu); L. Riedel 395 (B—isotype, Ut—373—isotype); Sellow 1056 (B), C.264 [840] (B, B), s.n. (B); J. B. Silva 556 [Herb. Set. Lag. 693] (Ba); Tryon & Tryon 6783 (Ac); Widgren s.n. [1845] (S, S, W—936260), s.n. (S). Paraná: Dombrowski 1982 [Kuniyoshi 1707] (Ld), 2933 [Kuniyoshi 2413] (Ld), 3757 (Z); Dusén 2621 (S), 6947 (Mu, N, S), 13260 (S, S, W—1280826), 15571 (S, W—1470490); Hatschbach 5063 (Sm), 8261 (Ca), 25430 (Ft), 26328 (Ac, S), 27168 (Ld); Imaguire 221 (Ld); Pabst 6787 [E. Pereira 6946; Herb. Brad. 22003] (Lw). Rondônia: Maguire, Murça Pires, Maguire, & Silva 57056 (N). Santa Catarina: Reitz 5417 (N), 5604a (Ld); Reitz & Klein 10169 (Ac), 10560 (Ld); Smith, Reitz, & Klein 7959 (Ok). São Paulo: Brade 5529 (S), 12224 (S); G. Eiten 6384 (Ld); F. R. Fosberg 43330 (Ld); Guillemin 523 (P); Moldenke & Moldenke 19638 (N, Qu), 19646 (B, Fy, Rs, Ss); Pabst 4851 (Bd—11043), 5776 [E. Pereira 5949; Herb. Brad. 21959] (Lw); Segadas-Vianna 2690 [Lev. Fitosociol. 510430-0104] (Ja), 3124 (Ja), 3126 (Sm), 3188 (Sm); Viégas, Franco, & Lima s. n. [Herb. Inst. Agron. S. Paulo 5457] (Be—35545); Zerny s.n. [30 October 1927] (V—10783). State undetermined: Herb. Schwägrichen

s.n. [Brasilia] (Mu). PARAGUAY: Hassler 5163 (Ca--944899, N, S); T. Rojas 12939 (S). CULTIVATED: Brazil: Widgren 15 (S), 20 (S). MOUNTED ILLUSTRATIONS: drawings of specimens from Villa Riva and Tijuco (B); drawings & notes by Körnicke (B); Körn. in Mart., Fl. Bras. 3 (1): pl. 52 (B, B, B, N, Z); Pohl, Pl. Bras. ined. (B).

PAEPALANTHUS PLANIFOLIUS var. ALPESTRIS Körn. in Mart., Fl. Bras. 3 (1): 413. 1863.

Synonymy: Paepalanthus planifolius f. alpestris Körn. ex Moldenke, Phytologia 26: 375, in syn. 1973.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 413 & 414. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 209 & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295. 1908; Alv. Silv., Fl. Mont. 1: 411. 1928; Moldenke, Known Geogr. Distrib. Erioc. 5 & 52. 1946; Moldenke, Alph. List Cit. 2: 612 (1948) and 3: 833 & 903. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 61, 86, & 211. 1949; Moldenke, Phytologia 3: 142 (1949) and 4: 152 & 201. 1953; Moldenke, Résumé 68, 101, & 489. 1959; Moldenke, Résumé Suppl. 18: 4. 1969; Moldenke, Fifth Summ. 1: 118 & 165 (1971) and 2: 956. 1971.

According to Ruhland (1903) this variety "Differt a forma typica foliis glaberrimis, bracteis involucrantibus acutiusculis". He cites only the type collection, Schlim 554, from páramos in "Prov. Ocana", Antioquia, Colombia, at 3000--3330 meters altitude, flowering in May. Core found it to have a "thick woody root in Sphagnum and a close rosette of many stiff leaves". He describes the flowers as white. It has also been encountered in woodland bogs and collected in anthesis in March, May, July, and August and in fruit in July and August.

The Brade 7194 [Herb. Inst. Biol. S. Paulo 6587], distributed as var. alpestris, is actually var. globulifer (Alv. Silv.) Moldenke & Smith. Silveira cites (1928) a Collector undetermined 230 from Itacolumni de Ouro Preto, Minas Gerais, Brazil, collected in 1896, but it is extremely doubtful to me that this is correctly identified.

Additional citations: COLOMBIA: Antioquia: Barkley & Saldarriaga C. 43036 (Ac, Gz, Ld); E. L. Core 386 (W--2059695, We). Cundinamarca: F. A. Barkley 38962 (Ld, Z). MOUNTED CLIPPINGS: Ruhl. in Engl., Pflanzenreich 13 (4-30): 209. 1903 (B, N).

PAEPALANTHUS PLANIFOLIUS var. CONDUPLICATULUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 210 [as "conduplicatula"]. 1903.

Synonymy: Paepalanthus planifolius var. conduplicatula Ruhl. in Engl., Pflanzenreich 13 (4-30): 210. 1903. Paepalanthus planifolius var. conduplicata Ruhl. ex Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295, sphalm. 1908. Paepalanthus planifolius var. conduplicatus Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 14 & 52, sphalm. 1946. Paepalanthus planifolium var. conduplicatulus Ruhl. ex Angely, Fl. Anal. Paran., ed. 1, 200, sphalm. 1965. Paepalan-

thus planifolium var. conduplicatus Ruhl. ex Moldenke, Fifth Summ. 2: 588, in syn. 1971.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 414. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 210 & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40 & 53. 1930; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Alph. List Cit. 4: 1301. 1949; Moldenke, Phytologia 3: 142 (1949) and 4: 201. 1953; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 101, 327, & 489. 1959; Angely, Fl. Paran. 16: 66 (1960) and 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; Moldenke, Résumé Suppl. 18: 13. 1969; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 580, 588, & 956. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 21. 1972; Moldenke, Phytologia 26: 28 & 236 (1973) and 29: 306. 1974.

According to Ruhland (1903) this variety "Differt a forma typica foliis angustioribus glabris, subconduplicatis" and is based on P. Clausen 267a from Pico d'Itabira, Minas Gerais, Brazil, deposited in the herbarium of the Jardin Botanique National de Belgique in Brussels. He cites only this original collection.

Miss Mexia describes the plant as a "frequent perennial herb" with white flowers, and found it growing in clumps on open sandy banks at riversides, at 1150 meters altitude, flowering and fruiting in May.

Material has been misidentified and distributed in some herbaria under the names P. kunthii Körn. or typical P. planifolius (Bong.) Körn. On the other hand, the P. Clausen 267, distributed as this variety, is actually P. conduplicatus Körn., while Magalhães Gomes 2813 [Herb. Jard. Bot. Belo Horiz. 26704] and Moldenke & Moldenke 19638 are typical P. planifolius (Bong.) Körn.

The Mexia 5745 collection seems to be a mixture of var. conduplicatulus and var. globulifer; Killip in 1935 noted on the U. S. National Herbarium sheet of this number: "Paep. near conduplicatus (Glaz. 15525) at Paris".

Additional citations: BRAZIL: Minas Gerais: Mexia 5745, in part (N, S). Paraná: Dusén 15650 (S, S).

PAEPALANTHUS PLANIFOLIUS var. CONSANGUINEUS (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 210 [as "consanguinea"]. 1903.

Emended synonymy: Paepalanthus consanguineus Körn. in Mart., Fl. Bras. 3 (1): 411—412. 1863. Platycaulon consanguineum Körn. ex V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 292. 1888. Dupatya consanguinea (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya consanguinea Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus planifolius var. consanguinea (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 210. 1903. "Paepalanthus planifolius var. consanguinea (Körn.)" ex Beauverd, Bull.

Herb. Boiss., ser. 2, 8: 295. 1908. Eriocaulon consanguineum Ruhl. ex Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 242--243. 1956 [not E. consanguineum Kunth, 1841]. Paepalanthus consanguinens Körn. ex Rennó, Levant. Herb. Inst. Agron. 70, sphalm. 1960.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 411--412 & 506. 1863; V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 292. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 210, 211, [283], 289, & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295. 1908; Alv. Silv., Fl. Mont. 1: 405. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 29, 47, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Phytologia 4: 201. 1953; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 242--243. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 101, 279, 324, 327, 335, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Résume Suppl. 3: 34 (1962) and 17: 9. 1968; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 160, 174, & 189. 1969; Moldenke, Fifth Summ. 1: 165 & 479 (1971) and 2: 497, 580, 588, 604, & 956. 1971; Moldenke, Phytologia 30: 112. 1975.

According to Ruhland (1903) this variety "Differt a forma typica foliis subtus glabris, supra pilis longiusculis praeditis, bracteis involucrantibus ovatis, acutis, laetius quam in praecedente [var. puberula (Körn.) Ruhl.] fuscis". The variety is based on Sellow s.n. from somewhere in Minas Gerais, Brazil, and deposited in the herbarium of the Botanisches Museum in Berlin. Silveira (1928) cites A. Silveira 231 from the Serra do Cipó, Minas Gerais, while Ruhland (1903) cites the type collection and W. Schwacke 11989 from the Serra do Ouro Preto, Minas Gerais, "an Bächern.....blühend im September 1893: 'specierum omnium frequentissima'". Mendes Magalhães (1956) asserts that it blooms from August to October.

The Eriocaulon consanguineum of Kunth, referred to in the synonymy above, is a synonym of Eriocaulon sexangulare L.

My wife and I encountered P. planifolius var. consanguineus growing in handsome profusion in a wet, sandy, fog-enshrouded campo at 800 meters altitude in São Paulo. The plant has been collected in anthesis in September and October and in fruit in September.

Material of this variety has been distributed and even previously cited by me as typical P. planifolius (Bong.) Körn. or as P. planifolius var. puberulus (Körn.) Ruhl.

Citations: BRAZIL: Minas Gerais: Santos & Machado 260 [N. Santos 5951] (Ja); Schwacke 11989 (B); Sellow s.n. (B--type, Z--isotype). São Paulo: A. Gehrt s.n. [Herb. Inst. Biol. S. Paulo 5766] (N); Moldenke & Moldenke 19637 (B, Es, F, Fy, Lg, Mg, Mr, N, No, Or, S,

Sm, Ss). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS PLANIFOLIUS var. GLOBULIFER (Alv. Silv.) Moldenke & Smith ex Moldenke, Phytologia 26: 355. 1973.

Synonymy: Paepalanthus globulifer Alv. Silv., Fl. Mont. 1: 240--241, pl. 160. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 240--241 & 407, pl. 160. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 476. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 12 & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84 & 209. 1949; Moldenke, Résumé 98 & 487. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 70. 1960; Moldenke, Fifth Sjmm. 1: 162 (1971) and 2: 952. 1971; Moldenke, Phytologia 25: 229 (1973), 26: 355 (1973), 28: 439 (1974), and 29: 306. 1974.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 160. 1928.

According to Silveira (1928) this taxon "cum P. planifolio affinis esse videtur, sed pedunculis gracilibus, vaginis folia subaequantibus et statura humiliore diversa". It is based on Silveira 551, collected "In campis humidis in serra do Cipó", Minas Gerais, Brazil, in April of 1909 and is deposited in the Silveira herbarium.

Collectors describe the plant as a tufted herb, the inflorescences to 50 cm. tall, and the flower-heads and flowers white. They have found it growing in fields, on campos, wet or marshy campos, wet places in general, in wet sand of grassland and sedgeland (with shrubby areas) with sandstone and quartzite rocks and derived soils, in open marshy ground with scattered low shrubs and low treeferns, periodically burned, and in areas of steep sandy slopes with sandstone outcrops at the summit, at altitudes of 200 to 1300 meters, flowering and fruiting from January to April, August, and October, flowering also in November. Anderson and his associates encountered it in a sandy meadow in an area of rocky campo and cerrado sloping down to wet-sand meadows adjacent to a gallery forest along a stream, in sandy soil and sandstone outcrops. Reitz & Klein found it growing "beira rio" and describe it as an "erva, flôr branca".

Material of this variety has been misidentified and distributed in some herbaria under such names as typical P. planifolius (Bong.) Körn., P. planifolius f. alpestris Körn., P. planifolius var. alpestris Körn., and P. planifolius var. puberulus (Körn.) Ruhl. On the other hand, the Mendes Magalhães 2319, distributed as this taxon, is actually typical P. planifolius (Bong.) Körn., while Mexia 5745 seems to consist of a mixture of var. globulifer and var. conduplicatulus Ruhl.

Citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36204 (Ac, N, W--2709844); Irwin, Maxwell, & Wasshausen 20184 (Ld, N); Macedo 2973 (N, S); Maguire, Mendes Magalhães, & Maguire 49092 (N); Mendes Magalhães 2319 [Herb. Jard. Bot. Belo Horiz. 43365] (N),

2549 [Herb. Jard. Bot. Belo Horiz. 43834] (N); Mexia 5745, in part (W--1571900); Murça Pires & Black 2802 (N); Tryon & Tryon 6766 (Z). Paraná: Hatschbach 24944 (Ld, S), 32597 (Ld). Santa Catarina: Reitz 5432 [HBR. 63441] (N, N, N); Reitz & Klein 3924 (Ld), 5376 (N, Ok), 10060 (Ld), 10368 (Ac). São Paulo: Brade 6587 (Mu), 7194 [Herb. Inst. Biol. S. Paulo 6587] (N); G. Eiten 6384 (W--2688337); A. Gehrt 5766 (Mu); F. C. Hoehne 5475 (Mu). State undetermined: G. Gardner 5269 (N).

PAEPALANTHUS PLANIFOLIUS var. PUBERULUS (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 209 [as "puberula"]. 1903.

Synonymy: Paepalanthus puberulus Körn. in Mart., Fl. Bras. 3 (1): 410--411. 1863. Dupatya puberula (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya puberula Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus planifolius var. puberula (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 209. 1903. "Paepalanthus planifolius var. puberula (Körn.)" ex Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295. 1908. Paepalanthus puberulus var. α Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Platycaulon intermedium Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 410--411 & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 209, 211, 212, 284, & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 295. 1908; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14, 31, 52, & 53. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Alph. List Cit. 4: 1301. 1949; Moldenke, Phytologia 4: 201. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 101, 281, 327, & 489. 1959; Moldenke, Résumé Suppl. 1: 22. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Phytologia 20: 368. 1970; Moldenke, Fifth Summ. 1: 165 & 484 (1971) and 2: 588, 589, 604, & 956. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159 & Ind. 21. 1972; Moldenke, Phytologia 30: 112. 1975.

According to Ruhland (1903) this variety "Differt a forma typica foliis puberulis, bracteis involucrantibus latioribus, acuminatis vel acutis, dorso puberulis". It is based on Sellow s.n., collected "bei Rio das Pedras und anderwärts", Minas Gerais, Brazil, flowering in October, and is deposited in the Berlin herbarium. The names P. puberulus var. α and Platycaulon intermedium are both apparently based on Sellow 22a, also in the Berlin herbarium.

The species has been collected at 2450 meters altitude, flowering in March, April, September, October, and December, and fruiting in December. Ruhland (1903) cites also A. Silveira 2064 [probably

a misprint for "2964"] from Minas Gerais, and Burchell 3797, Glaziou 11631, and Schwacke 654 from São Paulo. Collectors report the plant growing in damp places on campos.

The Brade 7194 [Herb. Inst. Biol. S. Paulo 6587], previously cited by me as representing this variety, seems better regarded as var. globulifer (Alv. Silv.) Moldenke & Smith.

Additional citations: BRAZIL: Minas Gerais: Mexmüller 25560 (Mu); A. Silveira 2964 (B); Sellow 22a (B, B), s.n. [Rio des Piedras] (B--type, B--isotype); Strang 25410 [Herb. Cent. Pesq. Florest. 4218] (Z). São Paulo: Brade 5527 (S). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B).

PAEPALANTHUS PLANIFOLIUS var. VILLOSUS Moldenke, Phytologia 29: 503. 1974.

Bibliography: Moldenke, Phytologia 29: 503. 1974.

This variety differs from the typical form of the species and from all other described varieties in having its short (10—15 cm. long) leaves puberulent above and densely long-villous beneath with weak, soft, gray, irregularly disposed hairs which are quite conspicuous and persistent on dried specimens.

Citations: BRAZIL: São Paulo: F. R. Fosberg 43331 (Z--type).

PAEPALANTHUS PLANTAGINEUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 369—370. 1863.

Synonymy: Eriocaulon plantagineum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625. 1831. Paepalanthus zosterifolius Kunth, Enum. Pl. 3: 504. 1841. Eriocaulon zosteraefolium (Kunth) D. Dietr., Syn. Pl. 5: 259—260. 1852. Eriocaulon zosteraefolium Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855. Paepalanthus breviscapus Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 370, in syn. 1863. Paepalanthus radicans Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 370, in syn. 1863. Paepalanthus plantagineus Körn. in Mart., Fl. Bras. 3 (1): 369. 1863; V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 306. 1888. Paepalanthus plantagineus var. α Körn. in Mart., Fl. Bras. 3 (1): 370. 1863. Paepalanthus plantagineus var. β Körn. in Mart., Fl. Bras. 3 (1): 370. 1863. Dupatya plantaginea (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus zosteraefolius Kunth apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 625 & 880. 1893. Eriocaulon zosterifolius Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 880, in syn. 1893. Paepalanthus breviscapus Körn. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894. Dupatya plantaginea Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Eriocaulon breviscapum Mart. ex Moldenke, Résumé 286, in syn. 1959 [not E. breviscapum Körn., 1856].

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 625. 1831; Bong., Ess. Monog. Erioc. 25 (1831) and 68—69 & 231--232, pl. 17. 1832; Bong., Mém. Acad. Imp. Sci. St. Pétersb.,

ser. 6, 2: 231--232, pl. 17. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 504, 574, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 259--260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 369--370 & 507. 1863; V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 306. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 & 880 (1893) and pr. 1, 2: 401 & 402. 1894; N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 71. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 124, 133--134, 136, 284, 286, 289, 291, & 292. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 287. 1908; Alv. Silv., Fl. Mont. 1: 411. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 & 880 and pr. 2, 2: 401 & 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 14, 30, 38, 45, 52, 53, & 55. 1946; Moldenke, Alph. List Cit. 1: 106 (1946), 2: 412 (1948), and 3: 710 & 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 86 & 211. 1949; Moldenke, Phytologia 4: 201--202. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 101, 281, 286, 291, 294, 323, 327, 329, & 489. 1959; Moldenke, Résumé Suppl. 1: 22. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 & 880 (1960) and pr. 3, 2: 401 & 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas. 71. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 147, 174, & 189. 1969; Moldenke, Phytologia 20: 7. 1970; Moldenke, Fifth Summ. 1: 165 & 484 (1971) and 2: 495, 508, 517, 518, 578, 588, 589, 592, 593, & 956. 1971; Moldenke, Phytologia 25: 158 (1973) and 29: 390. 1974.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: [Ess. Monog. Erioc.] pl. 17. 1832.

Bongard's original (1831) description of this species is "subacaule; foliis lineari-lanceolatis acutis, subtus albicantibus; pedunculis vaginisque albicantibus glabris. Tab. XVII. Habitat in umbrosis saxosis montis Itacolumni. Floret Augusto. 4 ." The type appears to be L. Riedel 439 and is deposited in the Leningrad herbarium.

Kunth (1841) based his Paepalanthus zosterifolius on a Sellow collection from "Brasilia meridionalis", which is probably the Sellow s.n. -- and probably also Sellow 1086 — in the Berlin herbarium. In describing it he indicated doubt as to its distinctness from Eriocaulon plantagineum Bong.: "Probabiliter a planta Bongardiana haud distincta, sed folia subtus vix pallidiora, nec albicantia".

Körnicke (1863) divided P. plantagineus into two unnamed varieties. The typical variety he called var. α and it is based on the Riedel collection (L. Riedel 439), described as "foliis superne levissime puberulis; bracteis involucrantibus miticis". His var. β is based on Paepalanthus zosterifolius Kunth "(excl. synom.)" and is described as "foliis superne glabris; bracteis involucrantibus breviter apiculatis". He cites Sellow s.n. [in Brasilia orientali], Martius & Clausen 170 from "in prov. Minarum arenosis

mudiusculis ad Pires, Mariana, Cachoeira do Campo", and Clausen 67 from "in monte Itaculumni".

Paepalanthus breviscapus Mart. and P. radicans Mart. are both based on Martius 892 in the Munich herbarium, where it was photographed by Macbride as his type photograph number 18717.

Ruhland (1903) does not keep Körnicke's two varieties apart and cites for the species as a whole the Sellow s.n. from "Brasilia orientalis" and, from Minas Gerais, P. Clausen 67, Glaziou 15526, Magalhães Gomes 2992 & 3029, Martius & Clausen 170, L. Riedel 439, Sena s.n. [Herb. Schwacke 14322], A. Silveira 1509, and Ule 2716.

Collectors have found this plant growing in shady places, on rocky or damp rocky ground, between sandstone boulders, and on damp sandy ground among boulders, at 1100 meters altitude, flowering from February to April and in July and August. Ruhland (1903) notes the resemblance in habital aspect between this species and P. brunnescens Ruhl.

Jackson (1893) places Eriocaulon paludosum Bong. in the synonymy of P. plantagineus, but I feel that it is better placed in that of P. freyreysii (Billb.) Körn.

Silveira (1928) cites A. Silveira 244, collected at Itacolumni, Minas Gerais, in 1896.

Material of P. plantagineus has been misidentified and distributed in some herbaria under the name P. strictissimus Mart., which actually is a synonym of Syngonanthus nitens var. hirtulus Ruhl.

Additional citations: BRAZIL: Bahia: Glocker 333 (S). Minas Gerais: P. Clausen 13 [Herb. Kunth 67] (P), 43 [P.20] (N), s.n. (B, Br); Glaziou 15526 (W--1194907); Magalhães Gomes & Silveira 3029 [Herb. Jard. Bot. Belo Horiz. 26702] (N); L. Riedel 439 (B--isotype); Williams & Assis 6864 (S). State undetermined: Martius 892 [Macbride photos 18717] (B, Br, Mu, Mu, N--photo, W--photo, Z), 897 (Mu); Schenck s.n. [Brasilia] (B); Sellow 1086 (S), s.n. [Brasilia meridionalis] (B). MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 2: 231--232, pl. 17. 1832 (N, Z); drawings & notes by Körnicke (B).

PAEPALANTHUS PLANTAGINEUS f. LUXURIANS Beauverd, Bull. Herb. Boiss., ser. 2, 8: 287. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 287. 1908; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 956. 1971.

Beauverd (1908) describes this form as follows: "differt a typo habitu robustiore; caule longiore; foliis latioribus basi 7--8 mm. medio 5--6 mm. lat.), pedunculis numerosissimis (circa 28 cm.), foliis duplo longioribus (17--20 cm.); capitulis majoribus (5--6 mm. diam.)." It is based on L. Damazio 1844a from "Sur les rochers,

Serra do Fresão", Minas Gerais, Brazil, collected on March 26, 1907, and deposited in the Herbier Boissier at Geneva. He observes that "Cette forme intéressante de beaucoup la plus luxuriante de toutes celles que nous avons examinées dans L'herbier Boissier, n'offre pas de caractères suffisants pour être distinguée comme variété: sauf la longeur des péduncles, tous les autres organes végétatifs conservent, avec des dimensions plus fortes les mêmes proportions que chez le type. -- Celui-ci, du reste, a été signalé dans la même Serra de Fraso, au sommet de la montagne, c. 1100 m. d'altitude."

Thus far it is known only from this original collection.

PAEPALANTHUS PLANTAGINIOIDES (Desv.) Körn. in Mart., Fl. Bras. 3 (1): 470 [as "plantaginoides"]. 1863.

Synonymy: Eriocaulon plantaginioides Desv. ex W. Hamilt., Prod. Ind. Occ. 16. 1825. Eriocaulon plantaginoides Hamilt. ex Kunth, Enum. Pl. 3: 572. 1841. Paepalanthus plantaginoides Körn. in Mart., Fl. Bras. 3 (1): 470 & 507. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya plantaginodes (Hamilt.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya plantaginodes Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus plantaginoides (Hamilt.) Körn. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 279 & 291. 1903. Dupatya plantaginoides Kuntze ex Ruhl. in Engl., Pflanzenreich 13 (4-40): 279 & 284, in syn. 1903. Eriocaulon plantaginioides Hamilt. ex Moldenke, Known Geogr. Distrib. Erioc. 38, in syn. 1946. Paepalanthus plantaginoides Desv. ex Moldenke, Known Geogr. Distrib. Erioc. 52, in syn. 1946. Eriocaulon plantaginoides Desv. ex Moldenke, Résumé Suppl. 17: 10, in syn. 1968.

Bibliography: W. Hamilt., Prod. Pl. Ind. Occ. 16. 1825; Kunth, Enum. Pl. 3: 572 & 613. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Körn. in Mart., Fl. Bras. 3 (1): 470 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 279, 284, 286, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 6, 30, 38, & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 281, 291, 327, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 17: 10 (1968) and 18: 9. 1969; Moldenke, Phytologia 20: 297. 1970; Moldenke, Fifth Summ. 1: 130 & 484 (1971) and 2: 508, 509, 588, & 956. 1971.

Hamilton's original (1825) description of this taxon is "Surcul. brevi erecto folioso; fol. patentibus lineari-lanceolatis margine ciliatis; scap. fasciculato-patulis; cal. commun. argenteo-scari-

oso. E. plantaginioides. Herb. Prof. Desv. Guyana. (S. v.)". Nothing else is known to me of this plant.

PAEPALANTHUS PLATYCAULIS Alv. Silv., Fl. Mont. 1: 27—28, pl. 11. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 27—28 & 411, pl. 11. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 956. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 11. 1928.

This species is based on A. Silveira 807 from "In campis prope Itacambira", Minas Gerais, Brazil, collected in July, 1926, and deposited in the Silveira herbarium. Silveira (1928) comments that the "Species a P. eriophaeo Ruhl. ob pedunculos foliis breviores, capitula minora et alios acharacteres differt". It is known thus far only from the original collection.

PAEPALANTHUS PLUMIPES Alv. Silv., Fl. Mont. 1: 201—203, pl. 133. 1928.

Synonymy: Paepalanthus maximus Macedo ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Alv. Silv., Fl. Mont. 1: 201—203 & 411, pl. 132. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 14 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 586 & 956. 1971; Moldenke, Phytologia 25: 157 (1973), 28: 439 (1974), and 29: 307. 1974.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 132. 1928.

This species is based on A. Silveira 594 from "In pratis arenosis siccisque in Serra do Cabral", Minas Gerais, Brazil, collected in June, 1910, and deposited in the Silveira herbarium. On page 411 of his work (1928) Silveira cites the year of collection as "1920", but whether this is intended as a correction of the date given in the original description or is a typographic error, is not clear. Paepalanthus maximus is based on Macedo 2950 in the Stockholm herbarium.

Paepalanthus plumipes is obviosly very closely related to P. polyanthus (Bong.) Kunth and perhaps should, rather, be reduced to varietal rank. In P. plumipes, which seems to be confined to the Serra do Cabral and Serra do Cipó, the cauline leaves are mostly strictly erect and rather closely appressed to the branches, rather bluntish at the apex, not attenuate-elongate nor abruptly spreading, and the hairs on the peduncles are very dense, very conspicuous, almost twice as long and very wide-spreading at about right angles to the peduncles. In P. polyanthus the cauline leaves

are mostly conspicuously attenuate-acuminate to the spreading or even widely divergent apex, not appressed for their entire length, and the hairs on the peduncles are half as long, not as conspicuous, and mostly subappressed or ascending at an acute angle.

Paepalanthus plumipes has been found growing in campos and on campo slopes in areas of sandy campo with outcrops, at altitudes of 1200 to 1300 meters, flowering from December to February and in April. Recent collectors describe it as having stems about 1 meter tall.

Material of P. plumipes has been misidentified and distributed in some herbaria as P. robustus Alv. Silv. On the other hand, the Irwin, Maxwell, & Wasshausen 20701, distributed in at least some herbaria as P. plumipes, is actually P. coutoënsis Moldenke, while Belém 3544 & 3840, Irwin, Maxwell, & Wasshausen 20046 & 20662, Irwin, Reis dos Santos, Souza, & Fonsêca 22026, and Maguire, Maguire, & Murça Pires 44763 are P. polyanthus (Bong.) Kunth and Irwin, Maxwell, & Wasshausen 20532 and Tryon & Tryon 6782 are P. robustus Alv. Silv. The Irwin, Maxwell, & Wasshausen 20031, cited below, is a mixture with P. bromelioides Alv. Silv.

Citations: BRAZIL: Minas Gerais: Irwin, Maxwell, & Wasshausen 20031, in part (Ld, N); Macedo 2950 (S, S), s.n. [Serra do Cipó, 15-I-951] (N); Maguire, Maguire, & Murça Pires 44706a (N, N); Mello Barreto 2518 [Herb. Jard. Bot. Belo Horiz. 10676; Herb. U. S. Nat. Arb. 236372] (W--2109987); Murça Pires & Black 2713 (N, N); Smith, Segadas-Vianna, Egler, Dau, Lopez da Silva, Ormond, & Machline 6834 [L. B. Smith 6834] (N, N).

PAEPALANTHUS PLUMOSUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 337—338. 1863.

Synonymy: Eriocaulon plumosum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 632. 1831. Eriocaulon stellare Guill. in Deless., Icon. Select. 3: 59--60, pl. 97. 1837. Paepalanthus stellaris (Guill.) Kunth, Enum. Pl. 3: 525. 1841. Paepalanthus mollis Kunth, Enum. Pl. 3: 507. 1841. Eriocaulon molle Kunth ex D. Dietr., Syn. Pl. 5: 260. 1852 [not E. molle Mart., 1863]. Paepalanthus plumosus Körn. in Mart., Fl. Bras. 3 (1): 337. 1863. Paepalanthus plumosus var. α Körn. in Mart., Fl. Bras. 3 (1): 337—338. 1863. Paepalanthus plumosus var. β Körn. in Mart., Fl. Bras. 3 (1): 337—338. 1863. Paepalanthus plumosus var. γ Körn. in Mart., Fl. Bras. 3 (1): 338. 1863. Paepalanthus plumosus var. δ Körn. in Mart., Fl. Bras. 3 (1): 337—338. 1863. Paepalanthus nigritella Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 337. in syn. 1863. Paepalanthus caryophyllus Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 337, in syn. 1863. Eriocaulon molle Steud. apud Körn. in Mart., Fl. Bras. 3 (1): 337, in syn. 1863. Dupatya plumosa (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus

stellaris Kunth apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya plumosa Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus leontopodium Mart. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus stellaris var. α Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus stellaris var. β Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus stellaris var. γ Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus stellaris var. δ Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 632. 1831; Bong., Ess. Monog. Erioc. 32. 1831; Guill. in Deless., Icon. Select. 3: 59—60 & 67, pl. 97. 1837; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 507, 525, 577, 613, 614, & 625. 1841; Hook. f., Niger Fl. 548. 1849; D. Dietr., Syn. Pl. 5: 260, 262, & 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 281, 282, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 337—339, 502, & 507, pl. 57 IV. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and pr. 1, 2: 401 & 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 9, 214, 219—220, 284, 286, 287, 289, 291, & 292. 1903; Alv. Silv., Fl. Mont. 1: 411. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 53. 1930; Stapf, Ind. Lond. 3: 91 (1930) and 4: 519. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, 37, 38, 40, 46, 51, 52, & 54. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 401 & 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87, 88, & 211. 1949; Moldenke, Phytologia 4: 141 (1952) and 4: 202. 1953; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 236—237 & 276—277. 1956; Moldenke, Résumé 101, 102, 281, 290, 291, 293, 323, 324, 326—328, 489, & 490. 1959; Moldenke, Résumé Suppl. 1: 6, 18, 21, 22, & 26. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and pr. 3, 2: 401 & 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Résumé Suppl. 12: 11. 1965; Moldenke, Phytologia 17: 494 & 495. 1968; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 166, 174, & 189. 1969; Moldenke, Fifth Summ. 1: 165 & 484 (1971) and 2: 506, 509, 514, 579, 585, 586, 591, & 956. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1159—1160 & Ind. 12 & 21. 1972; Moldenke, Phytologia 26: 251, 476, & 477. 1973.

Illustrations: Guill. in Deless., Icon. Select. 3: pl. 97. 1837; Körn. in Mart., Fl. Bras. 3 (1): pl. 57 IV. 1863.

The original description of this taxon by Bongard (1831) is "Acaule; foliis vaginis brevioribus, erectis, lanceolatis, acuminatis, obtusis, subglabris; pedunculis vaginisque pilosis. Bong. — In saxosis Serra da Lapa (Brasilia.) — Squamae capituli extus atro-fuscae, intus albo-plumosae." The type is probably L.

Riedel 1046, deposited in the Leningrad herbarium. Paepalanthus mollis Kunth is apparently based on Sellow B.1294 C.268, deposited in the Berlin herbarium, although in his original description (1841) Kunth says only "Sellow" in citing the type. He gives a detailed description and then comments that "Habitu hic alienus, P. helichrysoidi affinior?; similis quoque P. macrorrhizo et pilifero". Körnicke (1863) regards this Berlin specimen as representing his P. plumosus var. δ, citing it as Sellow s.n. "in montibus Caraça et Itacolumni".

Paepalanthus stellaris is apparently based on a collection from the Serra do Frio, Minas Gerais, Brazil, in the Berlin herbarium, which Ruhland (1903) seems to regard as the same L. Riedel 1046 collection. Kunth (1841) comments that it is "Ab Eriocaulone elychrysoide Bong., cui valde similem dicit amic. Guillemin, longe diversus". Steudel (1855), on page 334 of his work, refers to Eriocaulon stellare as his species no. "194", but this is an error -- it is actually species no. 195 on page 282.

According to Körnicke (1863) his P. plumosus var. β is based on Sellow s.n. from Monte Caraça, Minas Gerais, flowering in December. He also annotated Schwacke 8499 in the Berlin herbarium as representing this variety. His var. γ and P. caryophyllus Mart. are both based on P. Clausen 172 in the Berlin herbarium and he also annotated Ule 2729 in that herbarium as representing this variety. Paepalanthus nigritella is based on Martius s.n. in the Munich herbarium where it was photographed by Macbride as his type photograph number 18718.

The Eriocaulon molle of Martius, referred to in the synonymy above, is a synonym of Eriocaulon crassiscapum Bong. The name Paepalanthus leontopodium Mart. was used by Körnicke on a drawing numbered "10.IV.H.30" in the Berlin herbarium and also labeled by him there as P. plumosus var. α.

Collectors have encountered P. plumosus growing on campos or dry campos, on mountain summits, in rocky places, on sandstone, and in wet sand, at 1400--2500 meters altitude, flowering from February to April, in June, October, and December. Mendes Magalhães (1956) avers that it blooms from April tp November. Mrs. Chase found it "in wettish sand by a tiny streamlet near summit of open serra".

Jackson (1893) and other authors cite a plate "62" in the original work by Bongard (1831), but Kunth (1841) asserts that this plate was never actually published and it is not cited by Stapf (1930). It probably exists only in the Leningrad library or herbarium. The specific epithet of P. caryophyllus is often written with a capital initial letter.

It is probably worthwhile to repeat here the descriptions given by Körnicke (1863) for his infraspecific taxa under P. plumosus. His var. α is described as having "foliis lanceolatis vel lanceolato-linearibus, acutiusculis vel obtusis, utrinque glabriusculis

ciliolatis crassiusculis, subtus nervo laterali marginatis, 1--3 poll. longis, medio 1 1/4 — 2 lin., basi 2--4 lin. latis; pedunculis 5—12 pollicaribus; capitulis 5—12 lin. latis." This is obviously what he regarded as the typical variety of the species, citing for it as synonyms: Eriocaulon plumosum Bong., E. stellare Guill., Paepalanthus stellaris Kunth, and P. nigritella Mart. (the initial letter of the specific epithet of the last-mentioned name is uppercased by him), and citing as specimens examined: "in Brasilia: Princ. Neovid.; in prov. Minarum ad Serro Frio, in saxosis Serra da Lapa: Riedel no. 1046."

His var. β is described as having "foliis linearibus, acutis, subtus glabriusculis, supra levissime puberulis, 1--2 poll. longis, medio 3/4 — 1, basi 1--2 lin. latis; pedunculis inferne pilosis supra pubescentibus, 6--8 pollicaribus; capitulis 5--6 lin. latis", citing no synonyms and as specimens seen only "in monte Caraça, Decembri: Sellow."

His var. γ is described as having "foliis lanceolati-linearibus, acutis, subtus puberulis, supra pilis brevioribus pubescentibus, 1 1/2 — 2 poll. longis, medio 2 lin. latis, basi latioribus; pedunculis pilis arrectis pubescentibus 2 1/2 — 3-pollicaribus et paullo longioribus; capitulis 4 lin. et quod excedit latis", citing P. caryophyllus Mart. as a synonym and as specimens seen only "in prov. Minarum, inter m. Augusti et Aprilis: Claussen no. 172."

His var. δ is described as having "foliis linearibus obtusiusculis vel acutis, subtus puberulis vel subpubescentibus, supra molliter denseque pubescentibus 3/4 — 1 3/4 poll. longis, medio 3/4 — 1 1/4 lin. latis, basi paullo latioribus; pedunculis pilis arrectis dense pubescentibus 3--5-pollicaribus; capitulis 3--4 lin. latis", citing as synonyms Eriocaulon molle Steud. and Paepalanthus mollis Kunth, and as specimens seen only "in montibus Caraça et Itacolumni: Sellow."

In regard to these proposed varieties of Körnicke, Ruhland (1903) says: "Cl. Koernicke.....hujus speciei varietates 4, praesertim foliis latioribus aut longioribus, indumento plus vel minus evoluto, capitulorum magnitudine distinctas constituit. Multis speciminibus examinatis non est dubium, quin varietates illae formis multis intermediis conjunctae sint. Species huius subgeneris variabilissima." He cites from Minas Gerais: P. Clausen 172; Glaziou 15540, 15551, 15552, 15553, & 19969; Magalhães Gomes 631; L. Riedel 1046; Schwacke 8499; Sellow 1315 & s.n. [Itacolumni]; Sena s.n. [Herb. Schwacke 14250 & 15145]; Ule 2729; and Wied-Neuwied s.n. Silveira (1928) cites Collector undetermined 261 from Ouro Preto, Minas Gerais, collected in 1895.

The Foster & Mello Barreto 10841 cited by me in 1953 is now regarded by me as representing P. senaeanus Ruhl., a very similar species. The Martius 877, distributed in some herbaria as P. plumosus, is actually P. elongatus var. ciliatus Körn., while Martius s.n. [arenosis apricis ad Vao do Paruán et alibi] is a mixture of

P. elongatus (Bong.) Körn. and its var. ciliatus Körn.

Additional citations: BRAZIL: Minas Gerais: M. A. Chase 10359 (W--1495691); Glaziou 19969 (W--1194906); F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 4950] (Mu, N); Magalhães Gomes 956 (N); Martius s.n. [Herb. Monac. 176; Macbride photos 18718] (Mu, N--photo, W--photo); Mello Barreto & Brade 1048 [Herb. Jard. Bot. Belo Horiz. 10740; Herb. U. S. Nat. Arb. 236381] (W--2109962); Mendes Magalhães 1983 [Herb. Jard. Bot. Belo Horiz. 42101] (Be--14075, N); Schwacke 8499 (B); Sellow 1315 (B), 1319 (B, B), B.1294 C.268 (B); Smith, Segadas-Vianna, Egler, Dau, Lopes da Silva, Ormond, & Machline 6834 [L. B. Smith 6834] (S); Ule 2729 (B). São Paulo: Glaziou 15553 (N). State undetermined: J. E. Pohl s.n. [in Brasilia] (Mu). MOUNTED ILLUSTRATIONS: drawings by Körnicke (B); Körn. in Mart., Fl. Bras. 3 (1): pl. 57 IV. 1863 (B, N, Z).

PAEPALANTHUS POLYANDRUS Alv. Silv., Fl. Mont. 1: 140--142, pl. 88. 1928.

Synonymy: Paepalanthus polyandros Alv. Silv., Fl. Mont. 1: 411. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 140--142 & 411, pl. 88. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 588 & 956. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 88. 1928.

This species is based on A. Silveira 646, collected "In campis arenosis in Serra do Cabral", Minas Gerais, Brazil, in November, 1918, and deposited in the Silveira herbarium. On page 411 of his work Silveira (1928) gives the date of collection of the type specimen as "1917". If this is a misprint or is intended to be a correction of the date given in the original description is not clear.

The species is known thus far only from the original collection, and Silveira (1928) comments that "A P. variabili Alv. Silv. cum quo magnam affinitatem habet, foliis ab initio fere glabris et bracteis involucrantibus lineari-lanceolatis praecipue differt."

PAEPALANTHUS POLYANTHUS (Bong.) Kunth, Enum. Pl. 3: 516. 1841.

Synonymy: Eriocaulon polyanthum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 622, pl. 2. 1831 [not E. polyanthum Mart., 1841]. Paepalanthus polyanthos Kunth, Enum. Pl. 3: 625. 1841. Paepalanthus speciosus G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: pl. 512. 1843 [not P. speciosus (Bong.) Körn., 1863, nor Körn., 1863]. Eriocaulon gardneri Steud., Syn. Pl. Glum. 2: [Cyp.] 274. 1855. Eriocaulon speciosum Gardn. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334, sphalm. 1855. Paepalanthus polyanthus Kunth apud

Körn. in Mart., Fl. Bras. 3 (1): 335. 1863. Paepalanthus polyanthus var. α Körn. in Mart., Fl. Bras. 3 (1): 335—336. 1863. Paepalanthus polyanthus var. β Körn. in Mart., Fl. Bras. 3 (1): 335—336. 1863. Actinocephalus polyanthus Kunth ex V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 278. 1888. Dupatya polyantha (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya polyantha Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus polyanthus var. Körn. ex Alv. Silv., Fl. Mont. 1: 411. 1928. Eriocaulon polyanthes Mart. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Paepalanthus polyanthus var. alfa Körn. ex Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960. Paepalanthus polyanthus var. γ Körn. ex Moldenke, Fifth Summ. 2: 588, in syn. 1971. Paepalanthus polyanthus var. δ Körn. ex Moldenke, Fifth Summ. 2: 588, in syn. 1971. Paepalanthus polyanthos (Bong.) Kunth ex Moldenke, Phytologia 28: 460, in syn. 1974. Paepalanthus polyanthus Ktz. ex Moldenke, Phytologia 28: 461, in syn. 1974.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 339 & 622, pl. 2. 1831; Bong., Ess. Monog. Erioc. 22 & 39—41, pl. 2. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 516, 572, 614, & 625. 1841; Mart., Flora 24, Beibl. 2: 35 & 36. 1841; G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: vi & viii, pl. 512. 1843; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 274, 334, & 342. 1855; Körn. in Mart., Fl. Bras. 3 (1): 324, 326, 335—336, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; V. A. Pouls., Bot. Tidsskr. 18: 285 & 291, pl. 20 B. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and pr. 1, 2: 402. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 27. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 10, 190, 197—199, 284, 285, 287, & 291, fig. 27. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 294—295. 1908; Alv. Silv., Fl. Mont. 1: 200, 222, & 411. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41, 42, & 52. 1930; Stapf, Ind. Lond. 3: 91 (1930) and 4: 519. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, 35, 38, 52, & 54. 1946; Moldenke, Alph. List Cit. 1: 223 (1946), 3: 710 (1949), and 4: 1203, 1210, & 1288. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Rambo, Anais Bot. 2: 128. 1950; Moldenke, Phytologia 4: 202. 1953; Rambo, Sellowia 6: 130. 1954; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 293, 298, & 299, fig. 9 & 10. 1956; Reitz, Sellowia 7: 124. 1956; Angely, Fl. Paran. 10: 14. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 101, 227, 281, 288, 291, 327, 328, & 489. 1959; Moldenke, Résumé Suppl. 1: 6, 17, & 22. 1959; Reitz, Sellowia 11: 31 & 119. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and pr. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Angely, Fl. Paran. 16: 66

(1960) and 17: 24. 1961; Reitz, Sellowia 13: 72 & 90. 1961; Moldenke, Résumé Suppl. 3: 34. 1962; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 159-161, 166, 167, 172, 189, & 190. 1969; Moldenke, Fifth Summ. 1: 165, 377, & 484 (1971) and 2: 501, 509, 513, 588, 590, & 956. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1160, map 1780, & Ind. 12 & 21. 1972; Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 25: 155 & 229 (1973), 26: 202, 228, & 229 (1973), 28: 439, 460, & 461 (1974), 29: 307 (1974), and 30: 23. 1975.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 2. 1831; Bong., Ess. Monog. Erioc. pl. 2. 1831; G. Gardn. in Hook. f., Icon. Pl. 6 [ser. 2, 2]: pl. 512. 1843; V. A. Pouls., Bot. Tidsskr. 18: pl. 20 B. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 198, fig. 27. 1903; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 298 & 299, fig. 9 & 10. 1956.

This species was originally described by Bongard (1831) as "caulibus caespitosis simplicibus; foliis radicalibus e basi perlata longe-lanceolatis obtusis; caulinis minoribus amplexicaulibus adpressis planis; pedunculis pilosis; vaginis bifidis glabris. t. 2. Hab. in pratis humidis glareosis Serra da Lapa. Floret Novembri. ♃. Obs. Differt ab E. Maximiliani: caulibus caespitosis simplicibus; foliis radicalibus lato-lanceolatis (nec lineari-lanceolatis), caulinis adpressis planis (nec patentibus canaliculatis); pedunculis duplo brevioribus pilosis; vaginis bifidis." The type is apparently L. Riedel 2065 from the Serra do Lapa, Minas Gerais, Brazil, deposited in the Leningrad herbarium. Kunth (1841) has provided a much more ample description. The Eriocaulon polyanthum Mart., referred to in the synonymy above, is a synonym of Paepalanthus claussenianus Körn.

Recent collectors have found P. polyanthus growing on stony hilltops in areas of sandy campo with outcrops, in wet places with quartz outcrops, on wet or dry campos, restinga, "restinga arenosa", mountain slopes and peaks, alpine or wet pebbly meadows, grassy campos, wet places in general, and in wet ground among rocks in an area of grassy meadows and adjacent sandy campos, at altitudes of 3 to 2000 meters, flowering from September to July and fruiting from January to March and in November. They describe the plant as an erect herb, 0.5—2 m. tall, the stems stout and branched, the inflorescences "borne in globular umbels" sordid-white or white, the flower-heads themselves white or light-gray, and "flôr branca", "flôr creme", or "flôr côr de palha". The cauline leaves are usually more or less ascending-spreading — rather attenuate-acuminate to the apex, to 13 in. long and 2.5 cm. wide at the base, sometimes very widely divergent above the base. They are well depicted in Fig. 27 B of Ruhland's work (1903). The hairs on the peduncles are abundant, mostly erect or ascending at an acute angle with the peduncle, and rather short. They are very accurately portrayed in Fig. 27 C of Ruhland's illustration.

Irwin and his associates encountered this species on upper

shrub-covered slopes with iron-rich rocks and gravel, the soil restricted to crevices and pockets, in wet places on campos, in sandy places in an area of rocky summits and intervening gallery forest, and in cerrado on rocky slopes. Deslandes describes it as a "planta de terreno pura areia, seco, quasi esteril".

Rambo (1950) states that "Segundo Ruhland.....teria sido encontrado 'em lugares húmidos no RGS' [Rio Grande do Sul, Brazil] por Sellow, levando o número 1.934. Como os números Sellowianos 1293-1503 são duma excursão ao Rio Pardo no centro do Rio Grande; e como esta espécie posteriormente jamais foi vista por outro botânico em tal região, tenho as minhas dúvidas a respeito desta indicação." Similarly, it should be noted here that the printed labels accompanying Glaziou 7992 are inscribed "Rio de Janeiro", but the collection was actually made in São Paulo.

Common names reported for the species are "capim manso", "capipoatinga", "gravatá manso", and "semprevivas do campo".

Körnicke describes his var. α, the typical variety, as having "ramis glabriusculis" and as synonyms cites P. polyanthus Kunth, P. speciosus G. Gardn., Eriocaulon polyanthum Bong., and E. gardneri Steud., giving L. Riedel s.n. [Minas Gerais] and G. Gardner 5244 as representative collections ("in prov. Minarum pratis humidis glareosis Serra da Lapa, Decembri: Riedel; in declevibus montium petrosorum districtus adamantini, Julio: Gardner n. 5244"). Ruhland (1903) cites the same G. Gardner 5244 and a Riedel 2065.

Körnicke's var. β is described as having "ramis tomentoso-hirtis", represented by two unnumbered collections of Sellow and of Martius ["in prov. Minarum campis ferruginosis ad Pires, Capão et in Serra do Caraça: M.; Octobri: Sellow"]. The Martius collection is cited by Ruhland, but the only Sellow collection he cites is Sellow 1394 from Rio Grande do Sul.

Körnicke's P. speciosus var. β, sometimes cited as a synonym of P. polyanthus, is characterized by him in notes accompanying a drawing in the Berlin herbarium as having "foliis in caulo elato inferioribus utrinque dense pubescentibus" and thus probably belongs in the synonymy of P. polyanthus var. tomentosus Alv. Silv.

Material of P. polyanthus has been widely confused with P. plumipes Alv. Silv., a very similar species apparently confined to the Serra do Cabral and Serra do Cipó (where, however, P. polyanthus seems also to occur), with the cauline leaves mostly shorter, blunter, strictly erect, rather closely appressed to the stems or branches, not acuminate-attenuate at the tip, and not at all widely divergent and with the hairs on the peduncles twice as long, very dense and conspicuous, and standing out at right angles to the peduncles. In addition to being closely related to P. plumipes, P. polyanthus is also related to and may be confused with P. bifrons Alv. Silv., P. brasiliensis (Mart.) Mart., P. ciliatus (Bong.) Kunth, and P. rigidus (Bong.) Kunth.

Material of P. polyanthus has been misidentified and distribu-

ted in some herbaria under the names Eriocaulon ciliatum Bong., E. ithyphyllum Mart., E. maximiliani Bong., Paepalanthus claussenianus Körn., P. ithyphyllus Mart., and P. plumipes Alv. Silv. On the other hand, the P. Clausen s.n. [1840] and Martius 879, distributed (and in the case of the latter also previously cited by me) as P. polyanthus, are actually P. claussenianus Körn.; Irwin, Maxwell, & Wasshausen 20701 is P. coutoënsis Moldenke; G. Gardner 5243, Hatschbach 23211, Herb. Rio Jan. 77002 & 126563, Herb. Saldanha 6587, F. C. Hoehne s.n. [3-11-28], Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 27952, Koyama, Hatschbach, Koyama, & Lima 13846, Merxmüller 25580, Rambo 49611, Reitz & Klein 17478, Sacco 2373, Santos 2167, Schwacke 2485, and Vidal III-64 [Vidal & Silva Araujo s.n.], III-65 [Vidal & Silva-Araujo s.n.; Herb. Rio Jan. 77001], & III-508 [Herb. Rio Jan. 76039] are P. polyanthus f. villosus (Beauverd) Moldenke & Smith; and P. Clausen 3 & s.n. and Martius s.n. are P. ramosus (Wikstr.) Kunth. It is quite possible that some of the specimens cited below may represent other taxa than typical P. polyanthus since in many cases they are represented in herbaria by only small fragmentary portions of the plant which may or may not exhibit the diagnostic characters separating closely related taxa. Intensive field work is required to settle these points.

Silveira (1928) cites A. Silveira 265 from Serra da Treituba, collected in 1897, while for what he calls "P. polyanthus var. Koern." he cites A. Silveira 538 from the Serra do Cipó, collected in 1909.

Ruhland (1903) cites the following: Minas Gerais: G. Gardner 5244, Glaziou 5712 & 6743, Martius s.n. [Serra do Caraça], Mendonça 322, Regnell III.1271, L. Riedel 2065, Ule 3768. Rio Grande do Sul: Sellow 1394. São Paulo: Lund s.n. [Araraguara], Schwacke 1903. Santa Catarina: Schwacke 2458. These are probably all deposited in the Berlin herbarium. He comments that the "Species generis maxima. Umbellis pulcherrimis, multiscapis, regularibus et pedunculorum indumento insignis."

Additional citations: BRAZIL: Bahia: Belém 3544 (Ac, N). Espirito Santo: Belém 3840 (Ld, N). Minas Gerais: Damazio 705 (B); G. Gardner 5244 (B, N); Glaziou 5712 (B); Héringer 4345 (N); Héringer & Castellanos 6156 (B); Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 27952 (Ac, N), 28345 (Ld, N); Irwin, Harley, & Onishi 30388 (Ld, N); Irwin, Maxwell, & Wasshausen 20046 (Ac, N), 20662 (Ac, N); Irwin, Reis dos Santos, Souza, & Fonsêca 22026 (Ac, N); Maguire, Maguire, & Murça Pires 44763 (N, N, N); Martius 990 (Mu); Mendes Magalhães 6019 (Z); Regnell III.1271 [30/3/1844] (Mu, S, S, S, W--936261), III.1271 [20/3/1974] (Er, S, S, W--200759); L. Riedel 2065 (B--isotype, Ut--374--isotype); Weddell 1867 [no. 47] (Br); Williams & Assis 5799 (Ca--744440), 6980 (W--

1932870); Zikán s.n. [Herb. Inst. Biol. S. Paulo 5389] (N). Paraná: Angely 1039 (N); Brade 19628 (Ja--65773); A. Castellanos s.n. [7-I-1957] (Ja--126562); Dombrowski 1249 [Herb. Inst. Def. Pat. Nat. 8951] (Ld), 2274 [Kuniyoshi 2017] (Ac), 2751 [Kuniyoshi 2093] (Ld); Dusén 7278 (Mu, S), 7359 (N, S, W--1280828), 9486 (S), 13442 (S), 15647 (S, S, S), s.n. [Martio 12 a. 1904] (S); Hatschbach 6030 (Mi), 23211 (Ac, N); Jönsson 1182a (S); Klein 4580 (Ld); Koyama & Koyama 13846 (N); Mattos 4390 (N, Rd--14857); Reitz & Klein 17478 (Ac, N); Smith, Klein, & Hatschbach 14441 (Ac). Rio de Janeiro: Brade & Tamandaré 6577 (Mu); Holway & Holway 1868 (W--1188357); Rose & Lutz 27 [Herb. Mus. Nac. Rio Jan. 52478] (Gg--366810); Segadas-Vianna 10 (Ja), 5034 [Brade 20372] (Ja). Rio Grande do Sul: Sehnem 5454 (B); Sellow 1394 [46] (B, B, B, B); J. Vidal IV-618 (W--2639607). Santa Catarina: Rambo 49611 (N, S); Ramiz Galvão s.n. [XII.1884; Herb. Saldanha 8806] (Ja--43990, Ja, Ja); Reitz 4687 (Le, S), 4900 (Ac, N), C.863 (Ja--55280, Ja, N); Reitz & Klein 14074 (Ld); Smith & Klein 10634 (W--2248758); Smith & Reitz 8630 (Ok), 10072 (Ok); J. Vidal IV-618 (Ca--1169392). São Paulo: Glaziou 7992 (B); Guimares 1707 (Sf); Löfgren 1127 (P, S); A. Lutz 308 (Ja); Lutz & Lutz 1608 [Herb. A. Lutz 1608] (Ja). Marinheiros Island: Deslandes s.n. (Sp--25260). Santa Catarina Island: Klein & Bresolin 6392 (Ac). State undetermined: P. Clausen s.n. (Br); J. E. Pohl s.n. [Brasilia] (Br); Scheidweiler s.n. (Br, N). MOUNTED ILLUSTRATIONS: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 2. 1831 (N, Z); drawings by Körnicke (B).

PAEPALANTHUS POLYANTHUS var. TOMENTOSUS Alv. Silv., Fl. Mont. 1: 222 & 411 [as "tomentosa"]. 1928.

Synonymy: Paepalanthus speciosus var. β Körn. in Mart., Fl. Bras. 3 (1): 315 & 316. 1863. Paepalanthus polyanthus var. tomentosa Alv. Silv., Fl. Mont. 1: 222 & 411. 1928.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 315 & 316. 1863; Alv. Silv., Fl. Mont. 1: 222 & 411. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Résumé Suppl. 1: 22. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 956. 1971; Moldenke, Phytologia 28: 461. 1974.

Körnicke's original (1863) description of this variety is "foliis in caulo elato inferioribus utrinque dense pubescentibus", based on a Sellow collection from "Brasilia meridionali" and two Martius collections from "in Minis Novis et in Serra de S. Antonio prov. Minarum", while Silveira's original (1928) is "foliis caulinis et illis ramorum utrinque tomentosis. In campis prope Diamantina, Minas Gerais: Alv. Silveira. Apr. 1908: n. 503 in herbario Silveira." While I have not actually seen any of the type or cotype material, I am tentatively assuming that they represent

the same taxon and not f. villosus (Beauverd) Moldenke & Smith.

As far as known to me at this time, the taxon is known only from these original collections.

PAEPALANTHUS POLYANTHUS f. VILLOSUS (Beauverd) Moldenke & Smith in Moldenke, Phytologia 25: 431. 1973.

Synonymy: Paepalanthus polyanthus var. villosus Beauverd, Bull. Herb. Boiss., ser. 2, 8: 294--295. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 294--295. 1908; Moldenke, Known Geogr. Distrib. Erioc. 15 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Phytologia 4: 202. 1953; Moldenke, Résumé 101 & 489. 1959; Moldenke, Résumé Suppl. 1: 6. 1959; Moldenke, Fifth summ. 1: 165 (1971) and 2: 956. 1971; Moldenke, Biol. Abstr. 56: 3000. 1973; Moldenke, Phytologia 25: 431. 1973.

This taxon is based on an unnumbered collection of E. Gounelle from "Sitio de Ramos altitude 2000 et 2300 m., Itatiaya", Minas Gerais, Brazil, collected in February, 1899, and deposited in the Herbier Boissier at Geneva. Beauverd (1908) comments: "Comparée aux 2 échantillons typiques conservés à l'herbier Boissier (Gardner No. 5244, parois de rochers des montagnes du district de Diamantina; Riedel No. 2065, prairies marécageuses de la Serra de Lapa), cette plante s'en distingue a première vue par l'indument laineur recouvrant les deux pages des feuilles caulinaires et plus encore les hampes raméales florifères; examinées au microscope ces différences s'accentuent et se trouvent renforcées par la présence de petits poils à base tuberculeuse recouvrant les deux pages des feuilles ainsi que la face externe des écailles des capitules: chez les échantillons typiques les aiguillons miscroscopiques des feuilles caulinaires ne sont pas tuberculeux à la base mais, au contraire, sont décurrents sur le limbe foliare; en outre le sommet des écailles des capitules est orné de poils terminés en tête de massue, tandis que ceux de notre nouvelle variété représentent des cils flexueux très acuminés au sommet. -- Ces différences d'un intérêt anatomique important ne sauraient toutefois suffire pour distinguer spécifiquement la nouvelle forme récoltée par M. Gounelle: les caractères essentiels notament ceux tirés des organes floraux, sont identiques à ceux de échantillons typiques que nous avons examinés. -- Notions toute fois dans la Monographie de Ruhland p. 199, l'indication du No. 3768 de Ule provenent également de l'Itatiaia a l'altitude de 2000 m., et qui pourrait fort bien appartenir à notre nouvelle variété?"

Recent collectors describe this plant as an herb, 0.5--0.75 m. tall, the heads white, and the flowers cream-colored. They have found it growing in sandy soil, on campos, and in wet depressions on campos, at altitudes of 900--2450 m., flowering from November to April. The Segadas-Vianna 2864 & 3125 collections, cited below, are immature. Irwin and his associates encountered the plant in "sandy places in are of rocky summits and intervening gallery forest"; Anderson and his associates found it "in cerrado, area of rocky sandstone cerrado and open rocky hillsides with white sandy

soil sloping down to grassy brejo, creek, and adjacent gallery forest"; and Rambo encountered it "in rupestribus graminosis humidis" and says of it "species vere magnifica, scapo 0,75 metrali, foliis iam siccis. Inflorescentiae rami partiales hic appomuntur."

In many herbaria this taxon is united with typical P. polyanthus (Bong.) Kunth. On the other hand, the Moldenke & Moldenke 19600, previously cited by me as P. polyanthus var. villosus, is actually P. ramosus var. affinis(Bong.) Ruhl.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35370 (N, Z); Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 27952 (N); Dusén 300 (S), 431 (S), s.n. [14/7/1902] (S); Mexmüller 25580 (Mu, Mu). Paraná: Hatschbach 23211 (N); F. C. Hoehne s.n. [3-11-28] (Sp--23359); Koyama, Hatschbach, Koyama, & Lima 13846 (N); Reitz & Klein 17478 (N); Santos 2167 [Sacco 2373] (Ja--126563); Schwacke 2485 [Herb. Saldanha 6587] (Ja--47866); Vidal III-508 [Herb. Rio Jan. 76039] (W--2639609); Vidal & Silva Araujo III-64 [Herb. Rio Jan. 77002] (Ld), III-65 [Herb. Rio Jan. 77001] (W--2639608). Rio de Janeiro: Brade 12757 [Herb. Rio Jan. 25389] (B); H. Santos 811 [750] (La), 5038 (Ja). Santa Catarina: Rambo 49611 (N). São Paulo: Segadas-Vianna 2864 [Lev. Fitosociol. 510430-0210] (Ja), 3125 (Ja). State undetermined: G. Gardner 5243 (N).

PAEPALANTHUS POLYCLADUS Alv. Silv., Fl. Mont. 1: 189--190, pl. 122--124. 1928.

Synonymy: Paepalanthus polyclados Alv. Silv. ex Moldenke, Résumé 327, in syn. 1959.

Bibliography: Alv. Silv., Fl. Mont. 1: 189--190 & 411. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 165 (1971) and 2: 588 & 956. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 122--124. 1928.

Silveira (1928) says that the type of this species was collected "In arenosis in serra do Chapadao, Minas: Alvaro da Silveira, Apr, 1925: n. 742 in herbario Silveira", but on page 411 of his same work he cites the type locality as "Serra da Babylonia (Passos)". The species is known thus far only from the original collection.

PAEPALANTHUS POLYGONUS Körn. in Mart., Fl. Bras. 3 (1): 393--394. 1863.

Synonymy: Dupatya polygona (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya polygona Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 280--282, 299, 393--394, & 507. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1022 & 1023. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 12, 167, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 134. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40 & 51. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Phytologia 4: 202. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 101, 281, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158. 1969; Moldenke, Fifth Summ. 1: 165 & 484 (1971) and 2: 956. 1971; Moldenke, Phytologia 29: 487. 1974.

Recent collectors have found this species growing at 3800 feet altitude, flowering in December. Ruhland (1903) says of it "Speciem illius sectionis Actinocephali similem esse jam cl. Koernicke affirmavit".

Additional & emended citations: BRAZIL: Minas Gerais: G. Gardner 5245 [Macbride photos 10636] (B--type, N--isotype, N--photo of type, N--photo of type, W--photo of type); Maguire, Maguire, & Murça Pires 44746 (N, N), 44747 (N, N). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS POLYTRICHOIDES Kunth, Enum. Pl. 3: 504--505. 1841 [not P. polytrichoides Ruhl., 1938].

Synonymy: Eriocaulon tenue Poepp. ex Kunth, Enum. Pl. 3: 505 & 614, in syn. 1841 [not E. tenue Buch.-Ham., 1832, nor Hamilt., 1959, nor Humb. & Bonpl., 1817, nor H.B.K., 1816, nor Humb. & Kunth, 1841, nor Kunth, 1826]. Eriocaulon polytrichoides (Kunth) D. Dietr., Syn. Pl. 5: 260. 1852. Eriocaulon polytrichoides Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 275 & 334. 1855. Paepalanthus polytrichoides var. α Körn. in Mart., Fl. Bras. 3 (1): 359. 1863. Paepalanthus polytrichoides var. β Körn. in Mart., Fl. Bras. 3 (1): 359. 1863. Dupatya polytrichodes (Kunth) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon polytrichoides Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 275, in syn. 1893. Paepalanthus macaranus Huber, Bol. Mus. Para. 2: 500--501. 1898. Dupatya polytrichodes Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Dupatya polytrichoides Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 157, in syn. 1903.

Bibliography: Kunth, Enum. Pl. 3: 504--505, 614, & 625. 1841; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 275 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 359, 363, 505, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook.

f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and pr. 1, 2: 402. 1894; Huber, Bol. Mus. Para. 2: 500—501. 1898; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 157, 284, 287, & 291. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 131. 1904; Alv. Silv., Fl. Mont. 1: 411. 1928; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 490 & 493. 1936; Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelmus. 11]: 215, 216, & 219—220. 1938; Moldenke in Gleason & Killip, Brittonia 2: 158. 1939; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, 38, 41, 50, 52, & 60. 1946; Moldenke, Phytologia 2: 373 (1947) and 3: 80. 1949; Moldenke, Alph. List Cit. 3: 744 & 895 (1949) and 4: 985. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 67, 73, 87, 95, & 211. 1949; Moldenke, Phytologia 4: 202. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 68, 72, 77, 84, 101, 112, 281, 291, 293, 326, & 489. 1959; Soukup, Biota 5: 302. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 3: 12 & 13 (1962) and 5: 5. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Résumé Suppl. 12: 3. 1965; Schnell, Adansonia, ser. 2, 5: 343. 1965; Van Donselaar, Wentia 14: 70. 1965; Huinink, Wentia 17: 138-139. 1966; Lindeman & Görts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 331 & 333. 1968; Moldenke, Résumé Suppl. 18: 9. 1969; Teunissen & Wildschut, Verh. Konink. Nederl. Akad. Wet. Natuurk. 59 (2): 23 & 57. 1970; Moldenke, Fifth Summ. 1: 118, 125, 132, 142, 166, 180, & 484 (1971) and 2: 509, 514, 586, & 956. 1971; Teunissen & Wildschut, Meded. Bot. Mus. Utr. 341: 23 & 57. 1971; Moldenke, Phytologia 25: 229 (1973), 28: 461 (1974), 29: 317, 318, & 323 (1974), and 30: 35 & 37. 1975.

The type of this species was collected by Eduard Friedrich Poeppig along the Rio Pará in the state of the same name, Brazil, and is deposited in the herbarium of the Botanisches Museum in Berlin.

The Eriocaulon tenue accredited to Hamilton, referred to in the synonymy above, is a synonym of E. cinereum R. Br., while that credited to Humboldt, Bonpland, & Kunth is the name-bringing synonym of Syngonanthus tenuis (H.B.K.) Ruhl.; the Paepalanthus polytrichoides credited to Ruhland is a synonym of P. subtilis Miq. The last two mentioned species are indeed very closely related and similar in general appearance, but, according to Uittien & Heyn (1938), can be differentiated as follows:

Bracts yellowish, not pellucid, the outer ones ovate, acute or acuminate, the inner ones acute or subobtuse....P. polytrichoides

Bracts white, pellucid, the outer ones lanceolate, acuminate, the inner ones obovate-oblong, mucronate.....P. subtilis

[to be continued]

A NEW SPECIES OF RHYNCHOSTEGIOPSIS FROM COSTA RICA

(HOOKERIACEAE, MUSCI)

Harold Robinson
Smithsonian Institution, Washington, D.C. 20560.

Dana Griffin, III
Bryophyte and Lichen Herbarium, University of Florida,
Gainesville, Florida 32601.

The genus Rhynchostegiopsis is notable among the Hookeriaceae for its hypnoid habit with the species vegetatively resembling large specimens of Brotherella. The large leaf cells and coarse serrations are additional vegetative features. Distinctions from hypnoid genera and sematophylloid genera such as Brotherella include the lack of differentiated alar cells and the peristome teeth with a prominent median furrow. Rhynchostegiopsis is rather distinct among the Hookeriaceae by the calyptra which is conical in young material and which either falls early or may become cucullate (Welch, 1966). Such a calyptra is more reminiscent of families like the Leucomiaceae but the two genera presently placed in the latter family have entire leaf margins. Rhynchostegiopsis occurs in Mexico, Central America, the West Indies and western South America south to Bolivia.

Recently collected specimens of Rhynchostegiopsis from Costa Rica are distinctive in the prominent tufts of greenish to reddish propagula on the base of the abaxial surface of the upper leaves. The propagula are not on all leaves but are found somewhere on almost all stems of any length including those connected to fully developed capsules. There is a slightly differentiated area of cells at the leaf base from which the tufts arise and such an area is suggested in the illustration of R. complanata C.Müll. by Brotherus (1925), but there is no record of propagula in that species or in other described species of the genus. The tufts of propagula seem distinctive in the genus, but similar tufts have been seen in an unnamed species of Cyclodictyon from Mexico.

Rhynchostegiopsis costaricensis H.Robinson & D.Griffin, sp. nov.

Planta dioica mediocris flavo-viridis subnitida. Caules elongati prostrati irregulariter pauce ramosi, fasciculis centralis nullis, cellulis superficialibus paulum minoribus. Folia uniformia subimbricata falcato-secunda 1.0-1.5 mm longa 0.3-0.4 mm lata apice peranguste acuminata superne valde argute

serrata, parietibus apicalibus dentium incrassatis, cellulis mediis prosenchymatis 75-125 μ longis 10-15 μ latis, cellulis basilaribus latioribus 35-40 μ latis, parietibus pertenuis, cellulis alaribus distinctis nullis; folia ventralis in partibus discoideis juxta basem saepe propagulifera, fasciculis propagulorum prominentibus densis viridibus inferne sendim rubris; propadula longe fusiforme multicellularia uniserialia usque ad 500 μ longa 15-25 μ lata, cellulis 25-40 μ longis, parietibus exterioribus firmis. Perichaetia lateralia, folia abrupte longe acuminata. Calyptrae ca. 3 mm longae irregulariter fissae interdum subcucullatae glabrae. Setae ca. 15 mm longae glabrae rubescentes. Thecae inclinatae 1.0-1.5 mm longae oblongae ovales deoperculatae 1.5-2.0 mm longae; peristomium duplex, dentibus exterioribus 16 rubris ca. 450 μ longis extus dense transverse lamelliferis ad medium longitudinaliter exarata, peristomiis interioribus in partibus superioribus dentes non oppositis, membranis basilaribus altis, ciliis 1-2 brvibus vestigialibus, cellulis exothecialibus subquadratis cel breviter oblongis 25-40 μ longis ca. 25 μ latis, parietibus longitudinalibus crassioribus; opercula breviter rostrata ca. 1 mm longa. Sporae ovales diam. ca. 20-25 μ minute papillosae.

Type: COSTA RICA: Alajuela: Parque Nacional Volcán Poás, Clusia forest, east rim of crater. Plants on downed log. alt. 2450 m, 3 Sept. 1973. D.Griffin 92 (US, holotype; FLAS, isotype). Paratypes: COSTA RICA: Alajuela: Parque Nacional Volcán Poás, bosque pluvial montano bajo, bosque de Clusia, falda oriental del cráter, sobre tronco caído decorticado. alt. 2300-2700 m, Agosto, 1973. D.Griffin, M.I.Morales Z. D.Eakin & G.Canessa 92 (US, FLAS); San Jose: km. 73, Carretera Pan-americana sur. Sobre tronco caído. ca. 2300 m, 20 Sept. 1974. M.I.Morales Z. 21429 (FLAS).

At present the species is known only from the two separate localities in central Costa Rica.

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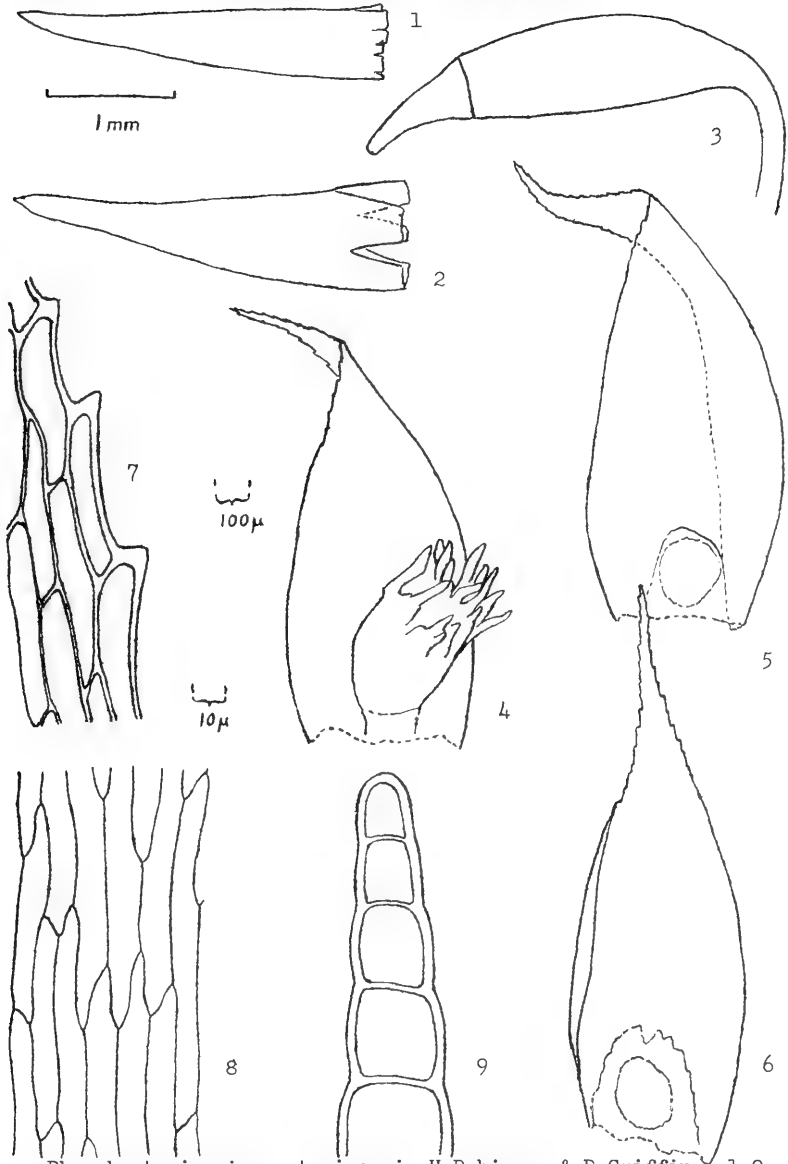

Rhynchostegiopsis costaricensis H.Robinson & D.Griffin. 1-2. Calyptrae. 3. Capsule. 4-6. Dorsal leaves. 7. Cells of upper leaf margin. 8. Median leaf cells. 9. Part of propagulum.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXXVIII.

A NEW GENUS, CRITONIELLA.

R. M. King and H. Robinson
Department of Botany
Smithsonian Institution, Washington, D.C. 20560

The name Critoniella is applied here to a new genus of four species native to the northern Andes of South America. The name is indicative of a superficial resemblance to the more widely distributed and more tropical genus Critonia which has similar narrow heads with often stramineous phyllaries. The more herbaceous and more pubescent Critoniella shares basic features with Critonia such as the simple style base and smooth corolla lobes, but actual relationship is closer to numerous other andean Eupatorieae.

The two most distinctive features of Critoniella are the very narrow style appendages and the indistinct carpopodium with thin-walled cells along the bases of the ribs. The style appendages are extremely narrow and no wider than thick. Such terete appendages occur elsewhere only in Hebeclinium, a genus with very different receptacle structure. The cells of the rib-bases are also reminiscent of Hebeclinium and the related Bartlettina but the strongly ornamented cells of the anther collars in Critoniella make close relationship to the Hebeclinium group seem unlikely.

Critoniella R. M. King & H. Robinson, genus novum Asteracearum (Eupatorieae). Plantae herbaceae vel suffrutescentes usque ad 3 m altae pauce ramosae glabrae vel breviter tomentosae. Folia opposita distincte longe petiolata, laminis ovatis vel late ovatis breviter acuminatis prope basin valde triplinerviis margine serratis vel serrulatis. Inflorescentiae laxe vel dense corymbosae, capitulis sessilibus in glomerulis congestis. Involucri squamae valde inaequilongae 4-5-seriatae imbricatae oblongae vel ovatae; receptacula plana glabra. Flores in capitulo; corollae anguste infundibulares 5-lobatae, lobis aequilateraliter triangularibus laevibus extus pauce glanduliferis; filamenta antherarum in parte superiore angusta, cellulis inferne exilibus sub-

quadratis superne oblongis vel longioribus, parietibus leniter annulate ornatis, cellulis exothecialibus subquadratis, appendicibus vix longioribus quam latioribus; styli inferne non nodulosi glabri, appendicibus filiformibus dense breviter papillosis; achaenia fusiformia 5-costata pauce vel multo setifera, superne distincte constricta; carpopodia inferne angustata, cellulis exilibus subquadratis multiseriatis, parietibus parum incrassatis, cellulis superioribus elongatis saepe inflatis; pappus setiformis uniseriatus, setis tenuibus ca. 40 contiguis scabris ad apicem laevioribus, cellulis apicalibus acutis.

Species typica: Eupatorium acuminatum H.B.K.

Our studies of the genus indicate that it contains the following four species.

Critoniella acuminata (H.B.K) R.M.King & H.Robinson, comb. nov. Eupatorium acuminatum H.B.K., Nov. Gen. et Sp. 4: 84. 1818. Ed. fol. Colombia, Venezeula.

Critoniella albertosmithii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium albertosmithii B.L.Robinson, Contr. Gray Herb. n.s. 80: 12. 1928. Colombia.

Critoniella lebrijensis (B.L.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium lebrijense B.L. Robinson, Contr. Gray Herb. n.s. 80: 24. 1928. Colombia.

Critoniella vargasiana (A.P.Decandolle) R.M.King & H. Robinson, comb. nov. Eupatorium vargasianum A.P. Decandolle, Prodr. 5: 155. 1836. Colombia, Venezeula.

Acknowledgement

This study was supported in part by the National Science Foundation Grant BMS 70-00537 A04 to the senior author.

BOOK REVIEWS

Alma L. Moldenke

"FOREST INFLUENCES: The Effects of Woody Vegetation on Climate, Water and Soil, with Applications to the Conservation of Water and the Control of Water and the Control of Floods and Erosion" by Joseph Kittredge, x & 394 pp., illus., Facsimile Edition by Dover Publications, Inc., New York, N. Y. 10014. 1973. $3.50 paper-bound.

This unaltered republication of the original 1948 classic is dedicated to the memory of the author (1890—1971) "as a tribute to his contribution to education and forest ecology in the United States." He effectively organized the scattered forestry studies begun in the United States about 1908 — almost forty years after the beginnings in European and Asian countries — into an integrated science with programs for the future. He must have been a superb teacher. Present-day foresters, wildlife management workers and students, as well as many persons with assorted interests in ecology, can learn much from this fine book.

"THE GASTEROMYCETES OF THE EASTERN UNITED STATES AND CANADA", by William Chambers Coker & John Nathaniel Couch, ii & 201 & 82 pp., illus., Facsimile Edition by Dover Publications, Inc., New York, N. Y. 10014. 1974. $5.00 paper-bound.

This is an unabridged republication of the 1928 still used, careful, definitive study from the University of North Carolina Press to which is appended "The Gasteromycetae of Ohio: Puffballs, Birds'-nest Fungi and Stinkhorns" by Minnie May Johnson, of similar fine quality, as an unabridged reprint from the Ohio Biological Survey Bulletin 22.

This work should be of considerable value to the professional as well as to the amateur mycologist and field naturalist because the keys, illustrations, descriptions and field notes are all well presented.

"The Boleti of North Carolina" by this same author, Coker, along with Beers, is a recent reprint by Dover that makes a fine companion volume.

"THE FRAGRANT GARDEN: A Book about Sweet Scented Flowers and Leaves" by Louise Beebe Wilder, viii & 407 pp., Facsimile Edition of Dover Publications, New York, N. Y. 10014. 1974. $3.50 paperback.

This is an unabridged republication of "The Fragrant Path" of 1932 welcomed now because of increased interest in gardens and gardening, the out-of-doors in general, and nature trails for the blind. For all such aficionados, horticulturists, and gardeners there are now readily available delightful and accurate descriptions by month, by flower, by foliage, and by location, for the orchard, for the berry patch and for honey making plants.

Not only are common names given, but also the scientific, and this makes for wider use of this fine work. Because of some bookkeeping error rather than a botanical confusion (other than what it creates) the honey mangrove tree of tropical America is equated with the entirely unrelated Averrhoa as "Averrhoa nitida" when obviously what was intended was Avicennia nitida [a species whose accepted name now is A. germinans].

There is a well chosen bibliography.

"VEGETATION OF THE EARTH in Relation to Climate and the Eco-Physiological Conditions" by Heinrich Walter, xiv & 237 pp., illus., English Universities Press Ltd., London ECH 4AH & Springer-Verlag, Heidelberg, Berlin & New York, N. Y. 10010. 1973. $5.90 paperback.

This is a translation by Joy Wieser from the second edition of "Vegetationszonen und Klima" and is number 15 in the fine Heidelberg Science Library series. "Ascertaining the factors responsible in nature for preserving the innermost integrity of the plant world [makes this careful presentation] fundamental for environmental studies, for nature conservancy and for the problems of the underdeveloped countries insofar as they involve utilization of the plant cover."

Along with all the highly technical and empirical diagrams the author always stresses field experiences. The individual vegetation zones of the biosphere are analyzed and the conclusion is reached that "more than 99 percent of the earth's biomass is phytomass.....[and the] total yearly potential primary production of the biosphere on the land, in the oceans, and in lakes and rivers is, according to today's best knowledge, 233×10^9 t/ha. yr."

A valuable book indeed.

"POLLEN: Development and Physiology" edited by J. Heslop-Harrison, xi & 338 pp., illus., Butterworth & Co. Publishers Ltd., Durban, Auckland, Wellington, Toronto, Sydney, Melbourne, Brisbane & London WC2B 6AB. 1973 second impression of 1971 first publication. £7.00 in U. K.

Under the following sections 36 papers are presented: nucleus and cytoplasm in microsporogenesis, pollen development and pollen grain wall, pollen and pollen tube metabolism, pistil-pollen interactions, incompatibility. The papers are reviews of the various aspects of the physiology, biochemistry, structure and genetics or else are extended abstracts of such research work.

This valuable book is much more than just a compendium of the three conferences at which such reports were submitted because they have been honed and/or amplified after interchange of ideas about them into a comprehensive survey of the field.

Making parts of this mass of information quickly available is the index divided into three parts: author, genera and subject.

"THE PHYSICAL BIOLOGY OF PLANT CELL WALLS" by R. D. Preston, xiv & 491 pp., illus., Chapman & Hall Ltd., London ECP 4EE & Halsted Press of John Wiley & Sons Inc., New York, N. Y. 10016. 1974. £12.00 in U. K. only, $35.00 in U. S. A.

Such neat and easily legible print, effective charts and diagrams, careful accrediting and full bibliography, as well as impressive electron micrographs add to the value of this excellent exposition, useful to assorted botanists, biochemists, biophysicists and related students.

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This book is an enviable summation of the author's professional career at the University of Leeds.

PHYTOLOGIA

Designed to expedite botanical publication

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Published by Harold N. Moldenke and Alma L. Moldenke

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NOTES ON BROMELIACEAE, XXXVII

Lyman B. Smith and Robert W. Read

In the hope of insuring continuity and gaining greater exactness we have combined operations without changing the enumeration of the senior author. We are dividing the present paper by subfamilies because of their relation to the overall monograph. The Pitcairnioideae were published as Monograph No. 14 of Flora Neotropica on October 14, 1974, and therefore it is too late to include anything there. The Tillandsioideae are not yet complete but the keys are done and frozen from further change because of their great size and complexity. However, it is still possible to add new species in an addendum and to indicate their position by an appropriate numeral and letter. The Bromelioideae for the monograph are barely begun and until further notice all species may be included in both descriptions and keys.

PITCAIRNIOIDEAE

5-24a. COTTENDORFIA LATERALIS L. B. Smith & R. W. Read, sp. nov. Ab omnibus speciebus adhuc cognitis inflorescentiis pluribus lateralibus vel inflorescentia singulare cum scapi bracteis et bracteis primariis foliaceis maximis differt.

PLANT flowering 1 m high (! Steyermark). LEAVES 4-5 dm long; sheaths suborbicular, inconspicuous; blades narrowly triangular, 4 cm wide, flat, coriaceous (! Steyermark), laxly serrulate toward base, appressed-white-lepidote beneath at base, elsewhere entire and glabrous. SCAPE (or stem ?) erect, leafy. INFLORESCENCES lateral in leaf-axils (! Steyermark) or branches (?) to 20 cm long, very laxly tripinnate, glabrous; primary (or secondary ?) bracts inconspicuous, shorter than the sterile bases of the better developed branches; axes slender. FLORAL BRACTS ovate, acuminate, 4 mm long; pedicels spreading, slender, to 11 mm long. SEPALS broadly ovate, obtuse, 4 mm long, dull lavender (! Steyermark); petals suborbicular, 7 mm long (immature). Pl. 1.

VENEZUELA-BRAZIL frontier: Headwaters of Cañon Grande, southeastern portion, Cerro de la Neblina, 1900 m alt, 16-17 October 1970, Steyermark 104014 (US, holotype; NY, VEN, isotypes).

6-1. DEUTEROCOHNIA LONGIPETALA (Baker) Mez, Mart. Fl. Bras. 3 (3): 506, pl. 95. 1894; L. B. Smith & Downs, Fl. Neotrop. Mon. 14: 233, fig. 86. 1974.

BRAZIL: BAHIA: Arid habitat between the Espirito Santo boundary and Feira de Santana or perhaps Salvador, but without exact locality, September-October 1965, R. G. & C. Wilson 65-690 (US), cultivated and flowered in Costa Rica in 1972; Read & Daniels 74-97, cultivated from Wilson 65-690 (US).

Wilson is positive of the origin of this specimen and although it is a tremendous disjunct range, the Peruvian disjunct of the species is considerable and there are other instances.

In an attempt to accurately identify this newly reported collection certain characters were given careful consideration as perhaps of specific importance. However, it was determined that sepal margins varied from serrulate in this specimen and those of Peru and Bolivia to completely entire in the Argentine specimens. Sepal length proved to be quite variable also, as did the relationship between sepal length and internodes. Considerably more field work is required in order to clarify the distinctions between D. longipetala and D. meziana.

8-163a. PITCAIRNIA REFLEXIFLORA André var. MINOR L. B. Smith & R. W. Read, var. nov. A var. reflexiflora sepalis subdimidio minoribus differt.

Sepals not more than 6 mm long.

ECUADOR: CAÑAR: Tropical cloud forest, km 110 from Duran, 1300 m alt, 15 January 1962, Dodson & Thien 2097 (WIS, holotype; US, isotype).

8-19a. PITCAIRNIA SASTREI L. B. Smith & R. W. Read, sp. nov. A P. platypetala Mez, cui verisimiliter affinis, foliorum laminis utrinque glabris, petalis angustioribus differt.

PLANT stemless, flowering 12-40 cm high. LEAVES rosulate, glabrous at least with age; sheaths ovate, entire, dark castaneous; some reduced to dark pectinate-serrate spines with filamentous entire apices, others green, linear, filiform-attenuate, narrowed toward base, ca. 1 m long and much exceeding the inflorescence but soft and pendent, to 25 mm wide, channeled, entire. SCAPE erect, slender, white-araneose; scape-bracts erect, exceeding the internodes but narrowly triangular and largely exposing the scape, filiform-attenuate, white araneose. INFLORESCENCE simple, lax, few-flowered, to 12 cm long, white-araneose except the petals; axis slender. FLORAL BRACTS like the upper scape-bracts, greatly exceeding the pedicels; flowers suberect; pedicels very slender, to 15 mm long. SEPALS narrowly lanceolate, acute, 20 mm long, equally carinate toward base with the keel decurrent on the ovary and pedicel; petals appendaged; ovary ca. 2/3 superior. SEEDS narrowly alate. Pl. 2.

BRAZIL: AMAPÁ: South slope of Cerro Paloulouiméempeu, Serra de Tumaque-Humaque, cliffs, 600 m alt, 2 Aug 1972, C. Sastre 1550 (US, holotype; P, isotype).

FRENCH GUIANA: At 1 km at 1° W-NW of Toukouchipann, wet shady vertical granite cliffs, very abundant, ca. 500 m alt, 20 Aug 1972, Granville 1316 (P, US photo).

8-35a. PITCAIRNIA SCHUNKEI L. B. Smith & R. W. Read, sp. nov. A P. corallina Linden & André et P. sprucei Baker, quibus affinis, foliorum majorum laminis late obovatis integris subtus dense lepidotis, bracteis florigeris parvis differt.

PLANT stemless. LEAVES polymorphic, the outermost with small orbicular densely castaneous-lepidote sheaths and short linear pectinate serrate blades, grading upward into entire bladeless elliptic sheaths, the innermost leaves photosynthetically

functional, 1-2.3 m long, much exceeding the inflorescence, entire; petioles distinct, elongate; blades broadly obovate, rounded and apiculate, 13 dm long, 15 cm wide, covered with white appressed scales beneath, glabrous above. SCAPE erect, 20 cm long, brown-lepidote; scape-bracts imbricate, ovate, mucronate, covered with pale brown-centered scales. INFLORESCENCE essentially simple (one pedicel appearing 2-flowered), sublax, 25 cm long; rhachis straight, brown-lepidote. FLORAL BRACTS ovate, acuminate, about equaling the upper pedicels, densely pale-lepidote before anthesis; pedicels rather stout, ca. 1 cm long; flowers divergent, arcuate at anthesis, deep orange-red (! Schunke). SEPALS oblong-lanceolate, acute, 23 mm long, ecarinate, strongly nerved, glabrous; petals 7 cm long, appendaged; ovary ca. 2/3 superior; ovules obtuse. Pl. 3.

PERU: SAN MARTIN: Mariscal Caceres: Tocache Nuevo: Deep shade of high riverbank forest, mouth of Río Mishollo, right bank of Río Huallaga, 6 September 1971, J. Schunke V. 4995 (US, holotype; F, isotype).

8-66a. PITCAIRNIA WILBURIANA Utley in Smith & Read, sp. nov. A P. dendroidea André, cui valde affinis, ramis elongatis laxe florigeris, sepalis omnino glabris differt.

PLANT cespitose (! Wilbur), flowering at least 1 m and probably nearer 2 m high. LEAF (only one known) over 15 dm long; sheath unknown; blade linear, attenuate to base and apex, 35 mm wide, entire, covered with white appressed scales but becoming glabrous. SCAPE straight, ca. 5 mm thick at apex, soon glabrous; upper scape-bracts ovate, acuminate, over 4 cm long, much shorter than the internodes, white-lepidote. INFLORESCENCE laxly compound, 66 cm long, soon glabrous; primary bracts like the upper scape-bracts, shorter than the sterile bases of the branches; branches simple, spreading-ascending, the lateral to 26 cm long, the terminal to 48 cm long. FLORAL BRACTS lanceolate, acute, distinctly shorter than the slender 7-12 mm long pedicels, thin, entire; flowers (upwardly ?) secund, lax, bright yellow (! Wilbur). SEPALS narrowly oblong, rounded and apiculate, 17 mm long, ecarinate; petals 4 cm long, appendaged; ovary ca. 2/3 superior; ovules long-caudate. Pl. 4.

GUATEMALA: BAJA VERAPAZ: common terrestrial, banks of stream bed with heavy deciduous woods about 3 miles north of Chilascó in mountains east of Salamá and San Geronimo, 23 May 1971, R. L. Wilbur 14783 (DUKE, holotype; US, photo).

TILLANDSIOIDEAE

TILLANDSIA SUESCANA L. B. Smith, U. S. Nat. Herb. 29: 441, fig. 45, a, b. 1951.

VENEZUELA: TÁCHIRA: El Cobre, Río Táchira Valley, 15 January 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28300, 28302 (US, VEN).

That this is a new record for Venezuela is not surprising since Táchira adjoins Norte de Santander of Colombia the previous eastern limit for the species.

VRIESEA HATSCHBACHII L. B. Smith & R. W. Read, sp. nov. A V. goniorachidi (Baker) Mez, cui in systemate artificiali valde affinis, scapo elongato subrecto, scapi bractearum laminis dissite lepidotis, bracteis florigeris ex sicco nervatis haud carnosis, floribus haud secundis differt.

PLANT known only from old fragments, flowering over 14 dm high. LEAVES unknown, but undoubtedly like the lower scape-bracts only larger. SCAPE erect, very slightly flexuous, glabrous at least in age; scape-bracts erect and closely enfolding the scape, sparsely and obscurely lepidote, the lower imbricate, with ovate sheaths ca. 7 cm long and very narrowly triangular blades to 75 cm long, the upper merely acute and shorter than the internodes. INFLORESCENCE simple, laxly and distichously many-flowered, over 30 cm long, ca. 3 cm wide, glabrous at least with age; rhachis 5-7 mm thick at base, slightly flexuous. FLORAL BRACTS erect or suberect, ovate, broadly rounded and apiculate, to 4 cm long, from shorter than the internodes to nearly twice as long, distinctly exceeded by the sepals, convex, ecarinate, thin-coriaceous and nerved when dry; pedicels distinct, ca. 7 mm long; flowers erect, not at all secund. SEPALS elliptic, obtuse (?), 25 mm long, ecarinate; petals and stamens unknown. Pl. 5.

BRAZIL: MINAS GERAIS: Mun. Gouveia: side of rock hill by Highway BR259, 21 January 1972, Hatschbach, Smith & Ayensu 29085 (US, holotype; Mus. Bot. Mun. Curitiba, isotype).

VRIESEA SUCREI L. B. Smith & R. W. Read, sp. nov. A V. biguassuense Reitz, cui in systemate artificiali affinis, bracteis florigeris angustis, subduplo majoribus et sepala multo excedentibus differt.

PLANT flowering at least 75 cm high. LEAVES many, rosulate, 50 cm long, obscurely punctulate-lepidote; sheaths ovate, to 10 cm long; blades ligulate, acute, contracted toward base, to 20 mm wide. SCAPE erect, slender; scape-bracts imbricate, ovate, the lower laminate, the upper apiculate. INFLORESCENCE simple, lax, oblong, 27 cm long, strongly complanate, very laxly and obscurely lepidote; axis slightly flexuous, slender, narrowly alate, purple. FLORAL BRACTS divergent, narrowly ovate, to 55 mm long, much exceeding the sepals, sharply carinate, incurved at apex, thin, nerved when dry, red; pedicels slender, ca. 10 mm long; flowers distichous, erect. SEPALS oblong, rounded and apiculate, 3 cm long, thin, nerved, the posterior carinate; petals and stamens unknown. CAPSULES about equaling the sepals. Pl. 6.

BRAZIL: RIO DE JANEIRO: Terrestrial in shade, swampy restinga (coastal thicket), Cabo Frio, 8 October 1968, Sucre 3808 (US, holotype). In cultivation by Ruby Braga.

BROMELIOIDEAE

×CRYPTBERGIA hort ex R. G. & C. Wilson. Pl. 7.

According to the International Code of Botanical Nomenclature (1971) intergeneric hybrids (i.e., hybrids between species of

two or more genera) are designated at the generic level by either a formula or, wherever it seems useful by a "generic name" (Art. H. 7). The formula, when used, consists of the name of the two or more parents connected by the multiplication sign (×). (e.g., Cryptanthus × Billbergia).

In order to understand the valid publication of botanical names in Latin form for hybrids, it must be clearly understood that the rules covering the "generic names" are distinct and different from those regulating names of specific or lower rank (Art. 40 ICBN).

If a "generic name" for the bigeneric hybrid is found to be useful or necessary, it is formed by combining the names of the two parent genera, i.e., the first part or the whole of one name and the last part or the whole of the other, into a single word (Art. H. 7), as in the cross between Cryptanthus (Crypt-) and Billbergia (-bergia), and preceded by the multiplication sign to form ×Cryptbergia, a condensed formula.

All hybrids (regardless of the species involved) between the same two genera bear the same "generic name".

In order to be validly published, the "generic name" of a hybrid with the rank of genus (which is a condensed formula or equivalent to a condensed formula) must be published with a statement of the names of the parent genera (Art. H. 9). No description or diagnosis is necessary, whether the name is in Latin or in any other language. Naturally, the Code provides that the earliest validly published name must be the one used, unless there is an earlier name, with the same spelling, for a different taxon.

The earliest mention found so far of a bigeneric hybrid between Cryptanthus and Billbergia was in an article by Mulford Foster (Brom. Soc. Bull. 2: 67) in 1952 where he stated, "It is believed that the first bi-generic cross [with Cryptanthus] was made by Theodore L. Mead when he succeeded in hybridizing C. beuckerii with Billbergia nutans." The cross was next mentioned by Victoria Padilla (Brom. Soc. Bull. 6: 47. 1956) as "Billbergia × Meadii". The following year "Cryptbergia Meadii" appeared in a listing of plants in a private collection by Peter Temple (Brom. Soc. Bull. 7: 52). In 1958 "×Cryptbergia Meadii" appeared in a caption to a photograph (Brom. Soc. Bull. 8:) on p. 34 and in lists of plants on pages 40 and 42 of the same fascicle. Almost a year later, in a listing of prizes awarded in a local combined bromeliad and orchid show, a prize was cited for "Mrs. C. S. Inman for her Cryptbergia meadii rosea . . ." (Brom. Soc. Bull. 9: 32. 1959).

In his "Zimmerpflanzen ..." (1962) Walter Richter listed both (p. 279) "Cryptbergia meadii" and "C. rubra", including the parentage of each and a description in German. We cannot accept this as valid publication of the "generic name" because the basic principles of the International Code of Botanical Nomenclature were not really met. The Code provides that a generic name (or one of generic rank) must be treated independently except in the case of monotypic genera, rather than being used incidentally as

part of invalid combinations in an enumeration of species. The following year (1963) "Bromeliads in Cultivation", by Bob and Catherine Wilson, included a chapter on hybrids (Vol. 1, p. 85) wherein they stated "Cryptbergia (sometimes referred to as "Billtanthus") is a hybrid genus of crosses made between Cryptanthus and Billbergia." Thereby satisfying for the first time (to our knowledge) all the requirements for valid publication of the bigeneric hybrid.

In not one of the previously cited examples is there a valid publication of the "species" (grex) or cultivar name. The International Code of Nomenclature of Cultivated Plants - 1969 (Art. 13) states that "names in Latin form for interspecific (and intergeneric) hybrids and their derivatives are governed by the Botanical Code" (see also Article 40 and H-9 of the Botanical Code). Article 17 of the ICNCP (International Code of Nomenclature of Cultivated Plants - 1969) clearly states that a collective epithet at the species or lower rank in Latin form of a hybrid must be published with a Latin diagnosis and in combination with a generic name. It is subject to the Botanical Code. The present authors have not found a case where these criteria are met.

There appears to have been considerable confusion (or little regard) for the distinction between a hybrid "collective name" (the name in Latin, or modern language, which applies to all progeny of a particular cross, be it interspecific or intergeneric) and a "cultivar" (the name which applies solely to a selected clone or an inbred line of seed-produced plants exhibiting characters by which they are differentiated from other cultivars). It seems not at all clear in much of the literature whether the intent is to give a collective name for the cross or to be naming a single plant or selection from the progeny of a particular cross. This distinction is rather important for purposes of citation and should be made perfectly clear on publication.

Collective epithets (ICNCP Art. 15) in Latin form are always to be preceded by the multiplication sign × . Those in modern language are not, but may be put in parentheses if followed by a cultivar name. They are not enclosed within 'single' quotes nor italicized whether Latin or in modern language. The use of the word grex (or g.) following the collective name would help to clarify the situation. Cultivars, on the other hand, are either enclosed within 'single' quotes or preceded by cv., the abbreviation for cultivar (Art. 29), but not by × . Capital initial letters must be used for all words of a cultivar name, except (ICNCP Art. 29) when linguistic usage demands otherwise. Double quotation marks " . " must not be used to distinguish cultivar names.

× Cryptbergia is known to have resulted from two different crosses; (Cryptanthus beuckeri × Billbergia nutans) and (Cryptanthus bahianus × Billbergia nutans). The first cross has been known in the literature as × Cryptbergia meadii, but since the epithet is in Latin form it was never validly

published, as it always lacked a diagnosis or description in Latin. Furthermore it is not entirely clear if the epithet, variously cited as meadii, × meadii, Meadii, and finally as 'Mead', was intended to be a collective epithet or a cultivar. It would seem they were attempts to cite the name of a cultivar or clone resulting from the original cross, plants of which are still recognizable in cultivation, or else they were attempts to treat the cross as is done in the Orchids. The junior author feels that the naming of crosses (collective epithets) does not have the same importance as in the Orchidaceae and therefore strongly suggests the naming of selected forms only as cultivars. Plants derived from the same cross which are not worthy of a separate cultivar name should be destroyed and not introduced into the trade.

The International Code of Nomenclature of Cultivated Plants - 1969 specifies that "A cultivar name published on or after 1 January 1959, must except as noted . . . be a fancy name, that is, one markedly different from a botanical name in Latin form." The publication of × Cryptbergia 'Mead' with the citation of its collective formula (parentage) and a representative description by Victoria Padilla in 1973 seems to fit all requirements for valid publication of the original cultivar; the citation of C. 'Rubra', in Latin form, does not. We would like to name the second cultivar 'Red Burst'.

× Cryptbergia hort. ex Wilson & Wilson, Bromeliads in Cultivation, Vol. I, p. 85. 1963.

× C. (Cryptanthus beuckeri × Billbergia nutans) 'Mead' Mead ex Padilla, Bromeliads, p. 126. 1973.

× C. (Cryptanthus bahianus × Billbergia nutans) 'Red Burst' L. B. Smith & R. W. Read, new cultivar.

A wide open, reflexed rosette of deep bronze-red leaves, producing numerous offsets, the leaves smooth and glossy above but gray scaly beneath. The bronze color intensifies in strong light. A short cluster of small flowers rises from the center of the rosette.

HOHENBERGIA GUATEMALENSIS L. B. Smith, Lilloa 6: 382. 1941.

Except for the original collections in April of 1939 by Paul C. Standley, in Guatemala, nos. 71169 (F, type; photos GH, US), 71364 (F; photos GH, US) only one other collection of this species has been known to the authors. The second collection was made in April 1957 by M. B. Foster and O. C. Van Hyning (no. 3003, US) in the state of Vera Cruz, Mexico. Recently Eloise Beach sent to us a specimen (74-107) which we have identified as this species. Since the original collection lacked certain critical information regarding flowers at anthesis the following is meant to emend the original:

PLANT flowering ca. 1 m high. LEAVES many, rosulate, 1 m or longer; blades acute or acuminate, lightly lepidote beneath, serrate with mostly antrorse 1 mm long teeth. SCAPE erect to curved, ca. 5 dm tall, densely tan-lanate; scape-bracts densely imbricate, with blades shorter than their bases, apparently disintegrating by anthesis. INFLORESCENCE erect to arching,

bipinnate or basally tripinnate, to 5 dm long; spikes 1-5 cm long. FLORAL BRACTS densely tan-lanate abaxially, becoming glabrous. SEPALS distinctly asymmetric, 5-8 mm long, at first lanate at apex; petals ca. 7 mm long, imbricate apically (blades), valvate to closely adherent in lower half (claw), but free basally and exposing the base of the filament ring, blue at anthesis, turning violet and then red with age, appendages absent or represented by inconspicuous folds in the basal to mid portion of the petal; stamens included, the anthers laterally to introrsely dehiscent about the stigma which is slightly lower than the apices of the anthers, the filaments connate basally and adnate basally to the petals; ovary lanate to glabrate basally especially at the junction with the axis; ovules apparently few, short-caudate at anthesis.

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

Plate 1

Cottendorfia lateralis Smith & Read

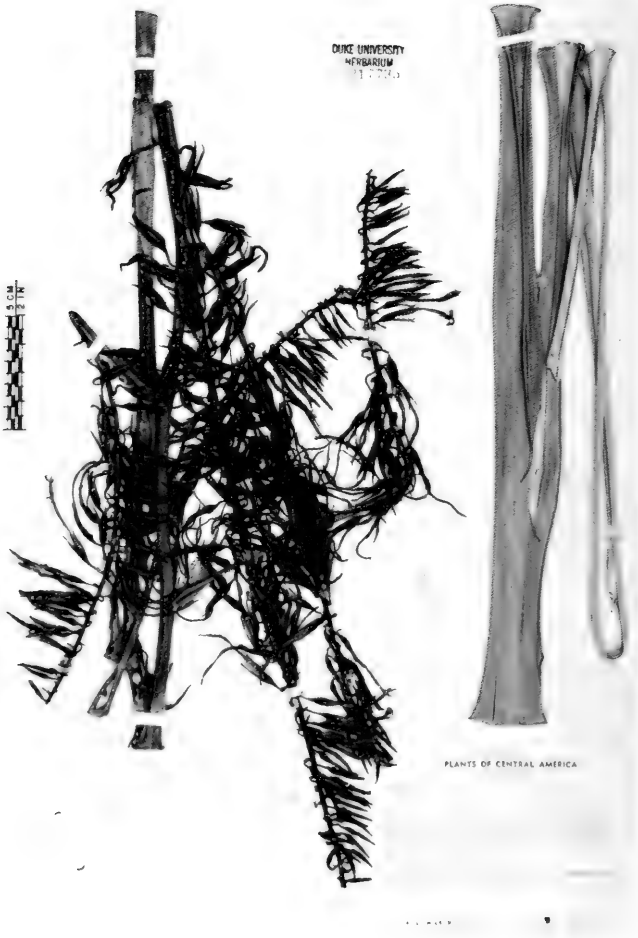
Plate 2

Pitcairnia sastrei Smith & Read

Plate 3

Pitcairnia schunkei Smith & Read

Plate 4



Pitcairnia wilburiana Utley

Plate 5

Vriesea hatschbachii Smith & Read

Plate 6

Vriesea sucrei Smith & Read

Plate 7

X Cryptbergia 'Mead' hort. ex Wilson

NEW SPECIES FROM SOUTH AMERICA. II.

Donald R. Simpson
Field Museum of Natural History

In the previous paper of this series[1] I described four new species whose status may now be reviewed. *Tabebuia schunkevigoi* has been examined by Dr. Alwyn Gentry of the Missouri Botanical Garden whose excellent studies in the Bignoniaceae are widely known to taxonomists interested in tropical plants. Dr. Gentry has found that *T. schunkevigoi* belongs to and is a synonym of a widespread, seldom collected, and previously poorly known species whose earliest valid name is probably *T. impetuginosa* Martius. The second species of that paper, *Demosthenesia dudleyi* is now represented by additional collections which have shown it to be one of the most distinctive species of the genus. Those additional collections are Dudley 11026 and 11102 both from the Cordillera Vilcabamba of southeastern Peru. Of the third species, *Erythroxylon pacificum*, no additional collections are known to me, and finally for *Pentagonia rubriflora*, an earlier collection distributed from the University of California at Los Angeles has proven to belong to this species. This collection (José Schunke Vigo 6287) is also from near the village of Sión in Prov. Mariscal Cáceres of Dept. San Martín. The collection number is not that of Mr. Schunke's own series but pertains to a separate number series for the project of botanical-pharmacological studies headed by Drs. Mildred Mathias and Dermot Taylor of U.C.L.A.

The following new species are, like those of the previous paper, all woody plants of the forested parts of Peru and serve to illustrate how fragmentary still is our knowledge of the plants of the western edge of the Amazon Basin. It is astonishing to encounter a tree on the wet eastern ramparts of the Andes whose close relatives are known only from the dry forests of Minas Gerais State, Brazil, a disjunction of over 2000 miles (see below under Styracaceae). Such disjunctions are not rare across great expanses of the Amazonian and Orinocan rain forests especially where the local climatic or edaphic conditions of two or more widely separated localities approximate each other, but the disparity in such conditions between the Vilcabamba Range in Peru and the "cerrado" vegetation of central Minas Gerais makes this a very unusual case.

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1. Simpson, Donald R. 1972. New Species from South America. I. Fieldiana Botany 36 (1): 1-11.

ANNONACEAE

GUATTERIA CINNAMOMEA D. Simp. sp. nov.

Arbor ca. 40 m. alta, diametro trunci ca. 48 cm. Ramulus a pilis erectis, cinnamoneis dense lanatus. Folium longum et angustum; petiolo 3-6 mm. longo; lamina membranacea, liniari-oblanceolata, base acuta, apice acuminato, (10) 15-23 cm. longa, (2.5) 3.5-4 (4.5) cm. lata. Flores singuli vel bini in axillis foliorum; pedicelo 2-2.5 cm. longo, lanato vel sparsius pubescenti; sepalis reflexis, late lanceolatis, acuminatis, 10-12 mm. longis, 4-6 mm. latis, breviter connatis ad basim; petalis obovatis, apice late acuto, 18-25 mm. longis, eis verticilli externi 8-10 mm. latis, eis interioribus 11-15 mm. latis; connectivo antherae glabro, laevi, plano; stigmatibus minute pubescentibus. Pedicelli fructum usque 4 cm. longi; toro depresse hemisphaerico, diametro 1-3 cm.; monocarpis anguste ellipticis vel elliptico-oblongis, apice acuto et minute apiculato, 12-15 mm. longis, diametro ca. 4-6 mm.

Tree ca. 40 m. tall, trunk diameter 19 inches (ca. 48 cm.). Branchlets very densely wooly with cinnamon-colored, erect hairs, becoming glabrous on older parts below. Petiole mostly 3-6 mm. long, pilose; blade membranous, linear-oblanceolate, base acute, apex acuminate, (10) 15-23 cm. long, (2.5) 3.5-4 cm. wide, sparsely puberulous to glabrous above, sparsely villous below except pilose on the midvein, venation visible on both surfaces, 2 parallel submarginal veins on each side, the inner strongly developed, the outer less so, veins projecting about equally on both surfaces, ca. 30-40 pairs of secondary veins. Flowers borne 1 or 2 per leaf axil; pedicel ca. 2-2.5 cm. long, wooly to sparsely pubescent. Sepals lanceolate, acuminate, reflexed, 10-12 mm. long, 4-6 mm. wide at base, narrowed to the long-acuminate apex, shortly connate at base, pilose outside and inside; petals obovate, apex broadly acute, sparsely pubescent throughout except densely pilose outside toward the base, 18-25 mm. long, the outer petals 8-10 mm. wide, the inner 11-15 mm. wide; anther connective glabrous, smooth and flat; stigmas minutely pubescent. Fruiting pedicels to 4 cm. long; torus depressed hemispheric, 1-1.3 cm. diameter; monocarp stipes thin, mostly 1.5-2 cm. long; monocarps narrowly elliptic or elliptic-oblong, apex acute and minutely apiculate, 12-15 mm. long, ca. 4-6 mm. diameter.

PERU: Dept. Huánuco: Prov. Pachitea; Dist. Honoria; carretera a Tournavista, bosque seco tropical (Tosi system), alt. 220 m., (Peruvian Forest Service Dendrology Project tree no. 70-P) Eduardo Jenssen S. 133 - flowering material (holotype F; isotypes LIM, MAD, US), 10 - fruiting material (paratype F; isoparatypes LIM, MAD, US), wood samples at LIMw, MADw, USw, and others.

This seems to belong to section *Trichoclonia* R. E. Fries, and is probably closely related to *G. villosissima* St. Hil. The rather long reflexed sepals resemble those of *G. villosissima*, *G. tomentosa*, and other species of this section, but this feature is also seen in section *Brachystemon* R. E. Fries, especially in *G. selloviana*, and *G. myriocarpus*.

This new species is easily recognized by the long, narrow, linear-oblanceolate leaves and dense wooly pubescence of the branchlets. *G. cinnamomea* differs from *G. trichoclonia* and *G. tomentosa* by its membranous leaves with acutely narrowed leaf bases as contrasted with the thick, subcoriaceous leaves with rounded bases of the two latter species.

GUATTERIA SCALARINERVIA D. Simp. sp. nov.

Arbor; ramulis versus apicem adpresse sericeis. Folia mediocria; petiolis 1.5-2 cm. longis; laminis chartaceis, plerumque oblongis, rariter ellipticis, base rotundo vel late acuto et in petiolos longe decurrentibus, apice rotundo-acuto et caudato, supra glabris, subtus sparse adpresse sericeis, in superficiebus ambabus verruculoso-punctatis, 16-23 cm. (acumine 1.5-3 cm. longo incluso) longis, 4.5-8 cm. latis, costa nervisque (nervo submarginali incluso) impressis supra, subtus valde prominentibus, nervis utroque costae latere 16-20. Flores fasiculati, cauliflori vel ramiflori; pedicellis 23-30 mm. longis; sepalis ascendentibus et leviter convexis, ovatis, acutis, extus nitidis; petalis impolitis, late ellipticis, late acutis ad apicem, ubique sericeis sed extus ad basim densioribus. Fructi a pedicello 3-3.8 cm. longo fulcrati; monocarpis cylindrico-ellipsoideis, plerumque 17-19 mm. longis, diametro 7-9 mm., nitidis, glabris vel sparse sericeis; stipite monocarpi plerumque 12-15 mm. longo, longitudinaliter 4- vel 5- porcato sulcatoque, diametro ca. 2 mm.

Tree; branchlets, especially near the tips, sericeous with somewhat appressed, moderately dense, rigid, straw-colored hairs, soon glabrous, the branchlet bark reddish-brown. Petiole 1.5-2 cm. long, channelled above, sparsely pubescent with long, semi-appressed, rigid hairs; blades chartaceous, usually oblong, rarely elliptic, base rounded to broadly acute, decurrent onto the petiole, apex rounded-acute and caudate, glabrous above, sparsely appressed sericeous beneath, verruculose-punctate on both surfaces, 16-23 cm. long including the 1.5-3 cm. long caudex, 4.5-8 cm. wide, midnerve and secondaries impressed above, very prominently raised beneath, secondary nerves ca. 16-20 each side, spaced usually at least 8 mm. apart, submarginal nerve prominent, well in from margin. Flowers clustered, cauliflorous or ramiflorous; pedicels 23-30 mm. long, glabrous or with a few, scattered, appressed hairs, surface somewhat nitid. Sepals ascending and somewhat convex, ovate, apex acute, 7-10 mm. long, 6-8 mm. wide, nitid and sparsely sericeous with appressed hairs out-

side, glabrous within; petals broadly acute at apex, 14-18 mm. long, 11-14 mm. wide, inner petals differing only in being slightly shorter, very densely sericeous outside at the base becoming less densely pubescent toward the apex, less densely pubescent on the inner surface; stamens very numerous, connective expanded above the anther sacs, somewhat convex; pistils numerous. Fruiting pedicel 3-3.8 cm. long; monocarps cylindric-ellipsoidal, mostly 17-19 mm. long, 7-9 mm. in diameter, nitid, glabrous or usually sparsely sericeous; monocarp stipes mostly 12-15 mm. long 4- or 5- ridged and grooved longitudinally, ca. 2 mm. diameter.

PERU: Dept. Loreto: Prov. Maynas; Dist. Alto Nanay; "bosque humedo tropical" (Tosi system), Santa Maria de Nanay, alt. 150 m., (Peruvian Forest Service Dendrology Project tree no. 229-I) Narciso Reyna R. 40 - leaves and twigs only (holotype F; isotypes LIM, MAD, US, and others), 16 - flowers and fruits only (paratype F; isoparatypes LIM, MAD, US, etc.), wood samples at LIMw, MADw, USw, and others.

This species belongs to section *Stenocarpus* R. E. Fries. The leaf outline and venation pattern closely resemble *G. inundata* Mart. but differs from it and all other species of the section in clusters of numerous flowers borne on the stem or major branches.

The markedly verruculose-punctate leaves would in Fries' classification place this species in his section *Mecocarpus*. It is more likely that it is closely related to *G. inundata* Mart. and *G. phanerocampta* Diels, both placed by Fries in his section *Stenocarpus*, which by his definition lacks the verruculose punctae on the leaves. On examination, however, it can be seen that most specimens that he cited under the species of this section show a weakly developed verrucosity which sometimes is not easily distinguished from the punctae of section *Mecocarpus*. One recent collection (Simpson 786), unquestionably belonging to *G. phanerocampta* and from near the type locality, has leaves with the dense punctae of section *Mecocarpus*! I think it probable that section *Mecocarpus* may not be a natural assemblage, and that the presence or absence of punctae is not as meaningful in classification of *Guatteria* species as was assumed by Fries. Section *Stenocarpus* on the other hand, does appear to represent a natural assemblage of closely related species, and it is to this section that the present new species belongs.

GUATTERIA SCHUNKEVIGOI D. Simp. sp. nov.

Arbor 14-15 m. alta; diametro trunci 10 pollice. Ramuli, petioli, pagina inferna foliorum, atque pedicelli a pilis aureis dense velutini. Petioli 8-12 mm. longi, diametro ca. 5-6 mm. Lamina firme chartacea vel subcoriacea, elliptica vel oblonga vel oblongo-obovata, rotundata breviter decurrentaque ad basim, versus apicem acute angustata et apice longe acuminato, (17) 19-28 cm. (acumine 2-3 cm. longo incluso) longa, 6-9 (11) cm. lata, costa nervisque supra parum depressis, subtus valde prominentibus,

nervis in nervum undulatum submarginem terminantibus, venulis tertiariis dispositinem clathratis vel subclathratis ornatis. Flores (2) 3-5 fasciculati, ramiflori; pedicello 18-25 mm. longo, 5-8 mm. supra basim articulato; sepalis late triangularis, 6-8 mm. longis, ad basim 7-9 mm. latis, extus dense pubescentibus, intus praeter marginem pubescentem glabris; petalis obovatis, ad apicem truncatis vel retusis, dense pubescentibus sed intus ad basim glabris; petalis verticilli externi 12-16 mm. longis, 10-15 mm. latis; petalis verticilli interni 14-20 mm. longis, 10-18 mm. latis; connectivis antherarum umbonatis; stigmatibus dense adpresse sericeis. Monocarpi glabri vel sparse sericei, ellipsoidales, apiculati; stipitibus 1-1.5 mm. crassis, 15-26 mm. longis.

Tree 14-15 m. tall; trunk diameter 10 inches. Branchlets terete, densely velvety pubescent with short, erect, golden-yellow hairs. Petioles 8-12 mm. long, densely velvety pubescent, shallowly channelled above, ca. 5-6 mm. in diameter; blade firm chartaceous or subcoriaceous, elliptic or oblong or oblong-obovate, base rounded and very shortly decurrent, acutely narrowed to the long-acuminate apex, (17) 19-28 cm. long including the 2-3 cm. long acumen, 6-9 (11) cm. wide, subglabrous above except sericeous along the midvein and the secondary veins (younger leaves also sparsely sericeous between the veins with straight, scattered, appressed hairs), densely velvety pubescent beneath on the midvein and secondary veins, the surface otherwise less densely but uniformly velvety pubescent; midvein and secondary veins slightly depressed above, very prominently projecting beneath, the secondary veins joining to form an undulating submarginal vein ca. 2 mm. from the margin, tertiary veins clathrate or subclathrate. Ramiflorous, usually (2) 3-5 flowers clustered at the leafless nodes, minute flower buds in the axis of some leaves. Pedicel (= peduncle of Fries' descriptions) 18-25 mm. long, articulation 5-8 mm. above base, densely velvety pubescent. Sepals broadly triangular, 6-8 mm. long, 7-9 mm. wide at base, densely pubescent outside, pubescent near the margin within, otherwise inner surface glabrous, minutely rugose, drying black; petals obovate, apically truncate or retuse, rarely rounded, outer petals 12-16 mm. long, 10-15 mm. wide, inner petals 14-20 mm. long, 10-18 mm. wide, densely pubescent both surfaces except glabrous near the base within; anther connective umbonate; stigmas densely appressed sericeous with small, white hairs. Monocarps glabrous or with a few, scattered, appressed hairs, ellipsoidal, apiculate; stipes 1-1.5 mm. thick, 15-26 mm. long.

PERU: Dept. San Martín: Prov. Mariscal Cáceres; Dist. Campanilla; camino a las Achiras, al sudoeste del caserío de Sión, J. Schunke V. 3551 (holotype F; isotypes not yet distributed).

This is a species of section *Tylodiscus* R. E. Fries, and is probably most closely related to *G. ucayalina* Huber. It differs from *G. ucayalina* and most other species of the section in the very dense, persistent pubescence and the flowers borne in clusters at the nodes of leafless, older branchlets.

This very distinctive species is named for the collector, Mr. José Schunke Vigo. Mr. Schunke has in recent years collected principally in the accessible parts of Provincia Mariscal Cáceres, especially around Tocache, Campanilla, and Sión. There he has been able to recollect many species not encountered since Poeppig's stay at Tocache in 1829 and 1830, as also several new taxa.

TETRAMERANTHUS LAOMAE D. Simp. sp. nov.

Arbor 25 m. alta. Ramuli graciles, diametro prope apicem 3-4 mm., ad apicem per pilis stellatis dense tomentosis, mox glabris. Folia parva; petiolo gracili, ca. 12-15 mm. longo; lamina tenui, membranacea vel chartacea, 8.5-12.5 cm. longa, 3.4-5.5 cm. lata, obovata vel oblanceolata, ad apicem rotundata et acute apiculata (apiculo 2-3 mm. longo), sensim angustata basim versus et in basim decurrentem. Flores singuli in axillis foliorum; pedicellis 6-14 mm. longis, sparse stellatim tomentosis, ad basim articulatis, supra articulum bracteis carentibus, infra articulum bibracteatis; bracteis oppositis, ca. 1.5-2 mm. longis, linearibus, abaxialiter canaliculatis, a pilis stellatis alutaceis densissime pubescentibus. Flores flavi; sepalis late ellipticis vel oblongis, ad apicem late acutis vel rotundatis, ca. 2.5 mm. longis, 2 mm. latis, extus dense stellatim pubescentibus, intus glabris; petalis verticilli externi late ovato-ellipticis, ad apicem acutis, 15 mm. longis, ca. 8 mm. latis, sparse pubescentibus praeter extus ad basim dense pubescentibus et intus ad basim glabris; petalis verticilli interioris anguste ellipticis vel elliptico-oblanceolatis, 8-11 mm. longis, 3-3.5 mm. latis, pubescentia ut in verticillo altero; connectivis antherarum expansis et applantis; pistillis octo, dense pilosis; stigmatibus sessilibus, glabris. Fructus ignotus.

Tree 25 m. tall. Branchlets thin, only 3-4 mm. diameter in the leaf-bearing parts, tomentose near the tips with minute, stellate hairs, soon glabrous. Petiole thin, mostly 12-15 mm. long; blade thin, membranous or chartaceous, 8.5-12.5 cm. long, 3.4-5.5 cm. wide, obovate or oblanceolate, apex rounded and with an acute apiculus 2-3 mm. long, gradually narrowed to the decurrent base, glabrous above or sparsely stellate puberulous on the midvein proximally, sparsely stellate puberulous along the midvein below, midvein and secondary veins impressed above, projecting beneath, secondary veins obliquely arcuate, apically conjoined ca. 4 mm. from the margin. Flowers brone singly at a node, sometimes appearing to be clustered when the internodes

are much condensed at the branchlet apex; pedicels 6-14 mm. long, sparsely stellate tomentose, articulate at base, no bracts above articulation, two opposite bracts subtending the articulation, ca. 1.5-2 mm. long, linear, channelled, very desnely pubescent with yellowish-white, stellate hairs, sometimes also a smaller bract adaxially. Flowers yellow (fide collector); sepals broadly elliptic or oblong, broadly acute or rounded at the apex, ca. 2.5 mm. long, 2 mm. wide, densely stellate pubescent outside, glabrous within; petals of the two whorls unequal in size; outer petals broadly ovate-elliptic, apex acute, 15 mm. long, ca. 8 mm. wide, densely stellate pubescent outside near the base, otherwise pubescent with scattered stellate hairs throughout except near the base within where glabrous; inner petals narrowly elliptic or elliptic-oblanceolate, 8-11 mm. long, 3-3.5 mm. wide, pubescence like that of the outer petals; anther connective expanded and flat on top; carpels 8 in number, densely pilose; stigmas sessile, glabrous. Fruit unknown.

PERU: Dept. Loreto: Prov. Alto Amazonas; along the Yurimaguas to Tarapoto highway at kilometer 19 from Yurimaguas, in "bosque humedo tropical" (fide system of Tosi & Holdridge), alt. 115 m., Manuel Anibal Soria S. 64 (holotype F; isotype MOL).

This is the fourth collection known for this genus which is recognized by the 4-merous flowers; i.e. sepals 4, and petals 4 + 4. Only two other species are known, both described by Fries. They are *T. duckei*, based on a collection from Manaos, Brazil (Ducke 23919), and *T. macrocarpus* based on a collection from Vaupes Comm., Colombia (R. E. Schultes & Isidoro Cabrera 17091). A third collection from Guainia Intendencia, Colombia (R. E. Schultes, et al. 18157) was mentioned by Fries under *T. macrocarpus*, but because of the lack of flowers its assignment was uncertain.

T. laomae resembles *T. macrocarpus* in leaf outline but differs from it in texture, thickness, venation pattern, petiole diameter, etc.

The epithet of this new species honors Ing. Rafael Lao Magín, dendrologist in charge of the systematic laboratory, Faculty of Forest Sciences, National Agricultural University of Peru, at La Molina, Lima. Mr. Lao sent me this specimen together with several from his own collections, all excellent material and mostly of very rarely collected tree species.

LEGUMINOSAE

INGA TOCACHEANA D. Simp. sp. nov.
Frutex vel arbor parva, 3-8 m. alta. Folia plerumque 4-

(rarius 2- vel 5-) jugata, petiolo et rache nuda vel anguste marginata; petiolo 0.4-1.2 (3.5) cm. longo; rache 4-6 (8) cm. longa; petiolulo 1 mm. longo vel menori; folioliiis membranaceis vel chartaceis, (2) 3.5-7 (8) cm. longis, (1.5) 2.5-3 (3.7) cm. latis, ellipticis vel oblanceolatis vel obovatis, base acuta, apice caudato, acuminato, acumine 7-12 mm. longo. Inflorescentiae capitatae, ad nodos veteriorum, plerumque aphyllorum ramulorum singulatim portatae; pedunculo (6) 10-15 cm. longo, folia aequantes vel excedentes; pedicellis 1-2 mm. longis; bracteis 0.6-2.5 mm. longis, oblanceolata vel spathulatis, apicibus plerumque trilobatis, lobis acuminatis. Calyx ad anthesem 1.5-2 mm. longus, lobis non altis, ciliatus; corolla anguste infundibuliformis, ca. 8-11 mm. longa, glabra; stamina ca. 2 cm. longa, tubo filamentorum corallam non excedentem. Fructus complanatus, margine elevato, rectaus vel parum arcuatus, usque ad 3 cm. latus et 29 cm. longus.

Shrub or tree 3-8 m. tall. Branchlets longitudinally striate, terete to slightly angled in cross-section, lenticillate. Leaves mostly 4- (rarely 2- or 5-) jugate, (8) 10-14 cm. long, petiole and rachis nude or narrowly margined; stipule 3-4.5 mm. long, linear or acicular; petiole usually short 0.4-1.2 (rarely to 3.5) cm. long, channelled above, glabrous; rachis 4-6 (8) cm. long, glabrous above; glands sesssile at each node of the rachis, cupulate, ca. 0.8 mm. diameter by 0.5 mm. high; leaflets subsessile, the petiolule not exceeding 1 mm., membranous to chartaceous, elliptic or oblanceolate to obovate, mostly (2) 3.5-7 (8) cm. long by (1.5) 2.5-3 (3.7) cm. wide, caudate, acuminate, acumen 7-12 mm. long, base acute. Inflorescences capitate, borne singly in leaf axils of older twigs or at the nodes of older, leafless branches; peduncle glabrous or sparsely puberulent near base and apex, (6) 10-15 cm. long and usually equalling or exceeding the leaves; bracts subtending the pedicels 0.6-2.5 mm. long, oblanceolate to spatulate, apex often trilobed, the lobes acuminate, inner surface glabrous, outer surface hispid in the apical one-third. Flowers subsessile, the pedicels 1-2 mm. long, glabrous; calyx campanulate, 1.5-2 mm. long, glabrous or with a few scattered hairs, the lobes shallow, ciliate margined; corolla narrowly funnelform, mostly 8-11 mm. long, glabrous; stamen tube not exceeding the corolla; stamens mostly about 2 cm. long. Fruit flattened, margins elevated, straight or somewhat curved, the largest pod available is 3 cm. wide and ca. 29 cm. long.

Type: José Schunke V. 3789, from Tocache, Peru.

PERU: Dept. San Martín: Prov. Mariscal Cáceres; Dist. Tocache Nuevo; along the road to the old town of Tocache, alt. ca. 500 m., J. Schunke V. 3789 flowers and fruit (holotype F); Quebrada de Huasca Yacu (near New Tocache), alt. ca. 500 m., J. Schunke V. 4800. Prov. San Martín; near Tocache, Spruce 4565 (dupl. at F, also photo of dupl. at B, negative no. 1079).

This species obviously belongs in Bentham's section *Diadema*, and is probably related to *I. nutans* (Vell.) Mart. and *I. diadema* (Vell.) Mart. The latter two species are both endemic to coastal Brazil in the area around Rio de Janeiro and differ also from *I. tocacheana* in several morphological features. Most obvious are the thin, membranous leaflets with caudate apex of the latter species which contrasts with the more rigid, apically acute leaflets of the former two species.

The Spruce collection was tentatively placed by Bentham (1874) with *I. diadema* but with the comment that "... they are in fruit only, and cannot not be safely determined". Macbride (1943) placed this Spruce collection in *I. tarapotensis* Benth., but it is certainly not that species. *I. tocacheana* differs from *I. tarapotensis* in that the former has membranous leaves, leaflets mostly 4 pairs and apically caudate, much longer peduncle, and stamen tube included, contrasted with subcoriaceous leaves, leaflets 2-3 pairs and apically acute, the peduncle short, and the stamen tube usually exserted ca. 4-5 mm. in the latter species.

The Schunke collections perfectly match the Spruce specimen and there is no doubt that they are conspecific, I expect that future collections of this species will show it to be an endemic of the Middle Valley of the Huallaga River.

MACROLOBIUM TAYLORI D. Simp. sp. nov.

Arbor ca. 5 m. alta. Folia paripinnata, foliola bijugata; petiolis 10-15 mm. longis; rachibus 24-35 mm. longis; foliolis firme chartaceis, ellipticis vel elliptico-oblongis, acutis ad basim, apice obtusi-apiculato, glabris vel costa supra sparse puberulo; foliolis paris inferioris plerumque 4.5-7.5 cm. longis, 2.2-3.5 cm. latis; foliolis paris apicalis (7.5) 8.5-10.5 (12?) cm. longis, (2.6) 3.5-5 cm. latis. Inflorescentia axillaris, racemosa, 3-7 cm. longa, epedunculata; pedicellis 2-3.5 mm. longis, bractea caduca praecici (a me non visa); bracteolis ca. 5-6 mm. longis, glabris, obovatis, per mediam longitudinem abaxialiter connatis, ad apicem rotundatis vel late acutis. Flores parvi; hypathio cylindrico vel anguste campanulato, 2-2.5 mm. longo, extus glabro, ad faucem piloso; sepalis ellipticis vel oblongis, 4.5-5 mm. longis, 2-3 mm. latis; petalis obovatis vel obovato-ellipticis, ca. 8 mm. longis, 3-4 mm. latis; filamentis ca. 11 mm. longis; stipite ovarii hypanthium a 2-2.5 mm. excedenti; ovario ca. 2 mm. longo, glabro praeter secus suturam piloso; stylo ca. 10 mm. longo, glabro, stigmate terminali, capitato, parum obliquo. Fructus ignotus.

Tree 15 ft. (ca. 5 m.) tall. Branchlets glabrous, terete or slightly angled in the ultimate internodes. Leaves abruptly pinnate, leaflets 2 pairs; petioles 10-15 mm. long, canaliculate above; rachis 24-35 mm. long, canaliculate above; leaflets firm-chartaceous, elliptic or elliptic-oblong, base acute, apex

bluntly apiculate, glabrous except puberulous along the midvein above, midvein slightly raised above, prominent beneath, tertiary veins indistinct above, faintly visible beneath, the lower pair of leaflets mostly 4.5-7.5 cm. long and 2.2-3.5 cm. wide, the apical pair larger, mostly (7.5) 8.5-10.5 (12?) cm. long by (2.6) 3.5-5 cm. wide, glabrous throughout or sparsely puberulous on the midvein above. Inflorescence axillary, racemose, 3-7 cm. long, epedunculate, the rachis and pedicels glabrous or sparsely puberulous; pedicels 2-3.5 mm. long, subtending bract early deciduous (not seen by me); bracteoles mostly 5-6 mm. long, glabrous, obovate, abaxially fused for half their length, rounded or broadly acute. Flower with a cylindric or narrowly campanulate hypanthium 2-2.5 mm. long, glabrous outside, pilose at the throat; sepals elliptic or oblong, 4-5.5 mm. long, by 2-3 mm. wide, glabrous; petals obovate or elliptic-obovate, ca. 8 mm. long by 3-4 mm. wide, glabrous except on the lower 1/4 of the abaxial surface where sparsely pilose; filaments ca. 11 mm. long, sparsely long pilose in the lower 1/3 to 1/2; ovary stipe exceeding the hypanthium by 2-2.5 mm., ovary ca. 2 mm. long, glabrous on the sides, pilose along the line of suture, style ca. 10 mm. long, glabrous, stigma terminal, capitate, slightly oblique.

PERU: Dept. Huánuco: Prov. Leoncio Prado; woods west of Santa Theophila above junction of Río Huallaga and Río Cuchara [between Tingo Maria and Aucayacu] Mildred E. Mathias & Dermot Taylor 5000 (holotype F; isotypes UCLA and other herbaria).

This species belongs to section *Stenosolen* Harms, and seems to be most closely related to *M. stenocladium* Harms from which it differs in the leaves having two pairs of leaflets, petioles 10-15 mm. long, inflorescence 3-7 cm. long, hypanthium 2-2.5 mm. long, sepals 4-5.5 mm. long, petals 11 mm. long, ovary glabrous except along the suture where pilose. By contrast, *M. stenocladium* has leaves unijugate, petioles 2.5-5 mm. long, inflorescence to 3 cm. long, hypanthium 6.5 mm. long, sepals 11-12.5 mm. long, petals ca. 20 mm. long, and ovary densely puberulous throughout.

The specific epithet honors one of the collectors, Dr. Dermot Taylor, former Chairman of the Department of Pharmacology, University of California at Los Angeles.

SWARTZIA HUALLAGAE D. Simp. sp. nov.

Arbor 9-16 m. alta, ubique glabra. Folia alterna, imparipinnata; stipulis minutis, caducis; foliolis 4- (raro 3-) jugatis, firme membranaceis, supra nitidis, reti venularum in superficiebus ambabus prominenti, foliolo terminali plerumque obovato. Inflorescentiae singulae (raro binae) ad nodos aphyllos ramulorum vetiorum; alabastris globosis vel ellipsoidalis, diametro ca. 7-10 mm., 10-15 mm. longis, verruculosis, glabris. Flores grandes; calycibus irregulariter findentibus, intus glabris; petala una, alba, glabra, reniformi vel subcircularis, emarginata, basaliter unguiculata, 3-4 cm. lata, ca. 3 cm. longa, unque

4 mm. longo; staminibus glabris; pistillo glabro, stipite 8-10 mm. longo, ovario anguste oblongo, arcuato, ca. 15 mm. longo, stylo 6-15 mm. longo, stigmate punctiformi. Fructus late cylindricus, (10) 15-30 cm. longus, diametro 4.5-6.5 cm.; valvis coriaceis.

Tree 9-16 m. tall, glabrous throughout. Branchlets 3- to 5-angled, often longitudinally striate between the angle-ridges. Leaves alternate, odd-pinnate; stipules minute, early deciduous, stipule scar 1.5 mm. long; petiole 4-8 cm. long, rachis (10) 14-19 cm. long, terete; leaflets 4-jugate (rarely 3-jugate), petiolules (2) 4-10 mm. long, blades firm membranous, shiny above, venation prominent on both surfaces (at least in dried material), terminal leaflet and subterminal pair usually obovate, base broadly acute, apex caudate-acuminate, (10) 12-18 cm. long including the 1.5-2 cm. long caudex, mostly 4.5-7.5 cm. wide, leaflets of the lower pairs oblong or elliptic to usually ovate in the basal pair, mostly 7-12 cm. long and 3.5-6 cm. wide. Inflorescences borne singly (rarely 2) at the nodes on older, leafless branches or rarely in the axil of persistent leaves on older branchlets, (4) 7-17 cm. long racemes; bracts ca. 1.5 mm. long and 1 mm. wide; pedicels 10-18 mm. long, bibracteolate at or above midlength, bracteoles 0.5-1.0 mm. long, inconspicuous. Flower buds globose to ellipsoidal, ca. 7-10 mm. diameter at maturity and 10-15 mm. long, verruculose, glabrous; calyx splitting irregualrly, glabrous within; petal 1, white, glabrous, reniform or subcircular, emarginate, ca. 3 cm. long by 3-4 cm. broad, claw 4 mm. long; stamens glabrous, longer filaments ca. 3 cm. long, shorter filaments 1.7 cm. long, the anthers 5 mm. and 2.5 mm. respectively; pistil glabrous, stipe 8-10 mm. long, ovary narrowly oblong, arcuate, ca. 15 mm. long, style variable, 6-15 mm. long, stigma punctiform. Fruit broadly cylindrical, (10) 15-30 cm. long and 4.5-6.5 cm. diameter, slightly constricted between the seeds, valves coriaceous. According to Mr. Schunke's field notes the fruit is bright green, and the seeds very light green ("verde blancuzco") with a vivid yellow aril.

Type: José Schunke V. 4490 (holotype F, isotypes to be distributed to USM, US, G, etc.).

PERU: Dept. San Martín: Prov. Mariscal Cáceres; Dist. Tocache Nuevo; caserío de Cedro, margen derecha del Río Huallaga, J. Schunke V. 4490 (flowers); Balsa Probana, margen derecha del Río Huallaga, J. Schunke V. 4442 (fruits); Dist. Campanilla; camino a Las Achiras, al sudoeste del caserío de Sión, J. Schunke V. 3550 (fruit & flowers). ——— Dept. Loreto: Prov. Maynas; Dist. Alto Nanay; trocha a Pisco, a 4 km. de Santa Maria de Nanay, alt. 130 m., J. Schunke V. 2509 (flowers); Prov. Alto Amazonas; Yurimaguas, Ll. Williams 4003 (flowers). Vernacular names *paujil ruro* (Schunke 3550, 4442, 4490), *afasiremocaspi blanco* (Schunke 2509).

Two of these collections, Schunke 2509 and 3550, were distributed as *Swartzia* cf. *polyphylla* A. DC., det. D. Simpson 1970. The other two Schunke collections have not yet been distributed, and the Llewellyn Williams collection was probably distributed many years ago as general inserendae, at least it was so filed in the herbarium at Field Museum until recently.

This species is very closely related to *S. reticulata* Ducke, but differs from it in having much larger flowers, more and smaller leaflets, and the apical leaflets are usually obovate.

STYRACACEAE

PAMPHILIA VILCABAMBAE D. Simp. sp. nov.

Frutex vel arbor parva, 2-7 m. alta (specimen typi ex arbore ca. 2.5 m. alta, diametro 5-10 cm.); ramulis, petiolis, rache inflorescentiae, pedicellis, calicibusque dense ferrugineis-lepidotis in statu sicco, in statu vivo "nitidis et rufo-cupreis" (fide collectoris). Folia parva; petiolo tenui, 5-7 mm. longo; lamina coriacea vel subcoriacea, leviter bullata, plerumque elliptica vel elliptico-lanceolata, raro oblonga, ad basim acuta, apice acuminato, 5-7.5 cm. longa, plerumque 1.5-2.8 (3.2) cm. lata, supra glabra vel dispersione squamarum praesertim secus nervos, subtus densius lepidota, margine glandulifero et interdum revoluto, glandulis ad intervallis 1.5-4 mm. dispositis, costa nervisque subtus prominentissimis, supra parum impressis. Racemi in axillis foliorum singuli, plerumque 2-5 cm. (1-2.5 cm. pedunculo incluso) longi; pedicellis vulgo 2-3 mm. longis; alabastris ca. 6-8 mm. longis, diametro ca. 3 mm. Flores parvi; calyce cupulato, truncato et minute 5-dentato, plerumque 2 mm. longo; corolla in alabastro quinquangulari, ad maturitatem 6-7 mm. longa, lobis lineari-oblongis, intus a pilis simplicibus, adpressisque sparse tomentosa, extus a pilis stellato-lepidotis, flavis vel aureis dense vestita; tubo filamentorum 2.5-3 mm. longo, lobis ca. 2.7-3 mm. longis; antheris 5, linearis, ad paginam interiorem loborum tubi filamenti dorsifixis; stylo ca. 3 mm. longo, prope apicem glabro, versus basim densissime pubescenti; ovario densissime pubescenti. Fructus ignotus.

Small tree or shrub, 2-7 m. tall (type tree ca. 2.5 m. tall and d.b.h. 5-10 cm.). Branchlets longitudinally angled and grooved toward the apex; branchlets, petioles, inflorescence rachis, pedicels, and calices densely rusty-brown lepisote in dried condition, "lustrous and rufous-copper colored" in natural condition (fide collector). Petioles thin, 5-7 mm. long; leaf blades coriaceous or subcoriaceous, slightly bullate, usually elliptic or elliptic-lanceolate, rarley oblong, base acute, apex acuminate, 5-7.5 cm. long, mostly 1.5-2.8 (3.2) cm. wide, margin sometimes revolute, usually glandular, glands spaced 1.5-4 mm. apart, midvein and secondary veins very prominent beneath, somewhat impressed above, glabrous or with scattered lepidote scales especi-

ally along the veins above, only slightly more lepidote pubescent beneath. Racemes one per leaf axil, mostly 2-5 cm. long of which ca. 1/2 is peduncle and 1/2 is rachis; pedicels mostly 2-3 mm. long. Flower buds mostly 6-8 mm. long, ca. 3 mm. diameter; calyx cupulate, truncate and minutely 5-toothed, mostly 2 mm. long; corolla 5-angled in bud, 6-7 mm. long at maturity, the lobes linear oblong, sparsely tomentose with appressed, simple hairs within, densely covered outside with light yellow to yellow-gold, lepidote-stellate hairs; filament tube 2.5-3 mm. long, lobes ca. 2.7-3 mm. long, anthers linear, dorsally adnate to the inner surface of the lobes of the filament tube; style ca. 3 mm. long, glabrous near the top, very densely white pubescent toward the base as also the ovary. Fruit unknown.

PERU: Dept. Cuzco: Prov. La Convención; (73°34'W, 12°38'S) in more or less open and exposed, depauperate cloud forest becoming elfin forest (monte chico), on ridges and rounded "cumbres", and on steep slopes at ca. 2400-2655 m. alt., between Camps 3 and 4 (of the National Geographic Society Expedition to the Cordillera Vilcabamba, 1968), T. R. Dudley 10808 (holotype F; isotypes NA, USM); in very dense, dark, high cloud forest about halfway between Camp 4 and 5 at ca. 2600-2750 m. alt., T. R. Dudley 10802 (F, NA, USM).

Of the many interesting plants collected by Dr. Dudley and his associates in the Vilcabamba Range, this is one of the most unexpected. The genus *Pamphilia* differs from *Styrax* principally in having 5 stamens as opposed to 10 in the latter genus. Until now only three species of *Pamphilia* have been known, all limited to eastern Brazil, mainly Minas Gerais State. This fourth species closely resembles the Brazilian species in most significant features including the short racemes, and small, coriaceous leaves.

Although the International Code of Botanical Nomenclature recommends that specific epithets derived from geographical names be treated as adjectives, the alternative treatment as a substantive in the genetive case gives a shorter and more easily pronounced epithet. The name Vilcabamba is of Quechua origin and translates thus: *vilca* sacred, *bamba* valley.

Another collection, Dudley 11299, from this same mountain range is a *Styrax* and appears to be an undescribed species. Unfortunately the material is too badly fragmented to serve as the basis for proposing a new species. It serves to illustrate the need for more botanical collecting in that region.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LVI

Harold N. Moldenke

PAEPALANTHUS POLYTRICHOIDES Kunth

Additional bibliography: Moldenke, Phytologia 30: 279--280. 1975.

It is perhaps worth noting here that Ruhland (1903) cites this species to page "507" of Kunth's work (1841) and to page "499" in Huber's work (1898), but as far as I can determine it is not mentioned on either of those pages.

Recent collectors describe P. polytrichoides as an herb, 20 cm. tall, with the general aspect of a Polytrichum, the flowering heads white. They have found it growing on savannas and campos, wet or slightly moist sand savannas, in white sand, on varzea land, and on quartzite-based savannas, at altitudes of 315--1270 meters, flowering from December to October, fruiting in May, August, and December. Silva reports it as very frequent on wet campos in Minas Gerais, Brazil. My wife and I found it extremely abundant on the blazing-hot Zanderry Savanna in Surinam. Vernacular names for it in that country are "waroekoemakoebia diamaroe" and "woka".

Macbride (1936) cites Henschel s.n. from Peru and gives the overall distribution of the species as only "Amazonian Brazil" and Peru; actually it occurs also in Colombia, Venezuela, and Surinam. Ruhland (1903) cites the same Henschel collection from Peru and, from Brazil, the following: Guedes 598, Huber 1616, and Poeppig 2983 from Pará and Spruce 1503 from Amazônas. The Guedes 598 collection is the type collection of P. maracanus Huber which Huber says (1898) is related to P. supinus Körn. and P. obtusifolius (Steud.) Körn. and of which he notes "Esta elegante especie é bem caracterisada pelos caracteres realçadas na descripção acima pela impressão." Kunth says that P. polytrichoides is related to what we now know as P. lamarckii Kunth and P. fasciculatus (Rottb.) Kunth. The Spruce 1503, cited by Ruhland and by Körnicke, is regarded by me as representing P. subtilis instead. Silveira (1928) cites a Collector undesignated 439 from Maracá Island, Pará, Brazil. Uittien & Heyn (1938) cite Boldingh 3843, B. W. 520 & 1094, Essed s.n., Kuyper 85a, Lanjouw 141 & 332, Pfeiffer s.n., Pulle 46, and Splitgerber 1128 from Surinam. They note that Boldingh 3843 has its "peduncles sometimes nearly glabrous", as opposed to the rest of the cited specimens which presumably agree with the description given by them of the species as having "peduncles nearly always densely clothed with long, soft, spreading hairs, which are easily destroyed by fire".

Huinink (1966) asserts that P. polytrichoides is a member of the Hyrido-Paspaletum and Van Donselaar (1965) of the Syngonantho-

Xyridion ecologic association.

Körnicke (1863) differentiates his two unnamed varieties as follows:

var. α - "pedunculo pilis arrecto-patentibus vel patentissimis densis persistentibus ornato", citing Poeppig 2983 from Pará and from Colares.

var. β - "pedunculo pilis longissimis irregulariter patentissimis sparsioribus ornato vel glabro", citing Spruce 1503 from Barra along the Amazon of Brazil and Henschel s.n. from Peru. As noted above, I regard the Spruce collection as P. subtilis Miq.

Material of P. polytrichoides has been misidentified and distributed in various herbaria as P. polytrichoides f. villosus Moldenke, P. subtilis Miq., and P. subtilis var. hirsuta Ruhl. On the other hand, the Holt & Blake 463 & 575 and Killip & Smith 30160 & 30162, distributed as P. polytrichoides, are actually P. fasciculatus (Rottb.) Kunth, while G. Gardner 1169, Leprieur 49, and Pickel 2774 are P. lamarckii Kunth, Cowan 39283 and Maguire, Wurdack, & Bunting 36741 are P. polytrichoides var. glaber Moldenke, and Archer 8441, Black 860, Spruce 1503, and G. H. H. Tate 1310 are P. subtilis Miq. The Prance, Pennington, & Murça Pires 1283 & 1284 are intricate mixtures with Syngonanthus bellus Moldenke and S. gracilis var. hirtellus (Steud.) Ruhl.

Additional citations: COLOMBIA: Vaupés: Schultes & Cabrera 19129 (Ss), 19185 (Ss). SURINAM: Boldingh 3843 (Ut--10650), 3889 (Ut--10604); Dirven LP.278 (Ut--309388); Donselaar & Donselaar 407 (Ut--936098); Essed s.n. [Aug. 1914] (Ut--44064A); Florschütz & Florschütz 629 (Ut--80224B); Gonggrijp & Stahel 520b (Ut--44060A); Kuyper 85a (Ut--44059A); Lanjouw 141 (Ut--44063A), 332 [photo no. 53] (Ut--44061A); Lanjouw & Lindeman 120 (Ut--17883B), 231 (N, Ut--17875B), 336 (Ut--17880B), 629 (N), 1793 (N, Ut--17879B), 1856 (N, Ut--17889B), 3251 (Ut--17877B); Lindeman 6535 (W--2559781); Moldenke & Moldenke 19581 (B, Bs, Fy, Hk, Hw, Le, Im, Ok, Rs, Sm, Ss, Ss, Z); Pulle 46 (N, Ut--44065A). PERU: Department undetermined: Henschel s.n. [Peruvia] (Mu). BRAZIL: Amapá: W. A. Egler 1431 [Herb. Mus. Goeldi 24587] (Mi), 47239 (N); Frões 26749 (N, N); Maguire, Murça Pires, & Maguire 47131 (N). Amazônas: Murça Pires 330 (Be--28285); Spruce s.n. [prope Barra, Prov. Rio Negro, Dec.--Mart. 1850] (S, S). Maranhão: Frões 34574 (Bm). Mato Grosso: J. G. Kuhlmann 1636 (Ja--47664, N). Minas Gerais: J. B. Silva 557 [Herb. Set. Lag. 694] (Ba). Pará: G. A. Black 873 (Be--29366), 50-8813 (N), 54-16153 (Ca--59926, Hk); Ducke 8010 (Bs), 10500 (Bs), 11679 (Ac), 12034 (Bs), s.n. [Herb. Mus. Goeldi 16259] (Bs); Egler & Raimundo s.n. [Egler 1255; Herb. Mus. Goeldi 24302] (Bm); Frões 29358a (Be--78896); Kissenberth 3564 (Sm); Murça Pires 4089 (N, Z); Murça Pires & Silva 4716

(N, W--2252822); E. Pereira 5007 (Bd--12470); Poeppig 2983 [Macbride photos 10637] (B--type, N--photo of type, N--photo of type, W--photo of type), s.n. [Rio Pará] (B); Prance, Pennington, & Murça Pires 1282 (N, S), 1283, in part (N), 1284, in part (N); M. Silva 701 [Herb. Brad. 48083] (Ac); Suck s.n. [Herb. Brad. 4620] (Bd). State undetermined: Burchell 1418 (T), 9254 (T); Herb. Bernhardi s.n. (E). MOUNTED ILLUSTRATIONS: notes & drawings by Körnicke (B).

PAEPALANTHUS POLYTRICHOIDES var. DENSUS Moldenke, Phytologia 8: 392--393. 1962.

Bibliography: Moldenke, Phytologia 8: 392--393. 1962; Moldenke, Résumé Suppl. 5: 5. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 956. 1971.

This variety differs from the typical form of the species in having its leaves extremely dense, very closely appressed, and tightly overlapping during anthesis.

Citations: COLOMBIA: Cundinamarca: Cuatrecasas & Jaramillo 25737 (Z--type).

PAEPALANTHUS POLYTRICHOIDES var. GLABER Moldenke in R. E. Schult., Bot. Mus. Leafl. Harvard Univ. 17: 66. 1955.

Bibliography: Moldenke in R. E. Schult., Bot. Mus. Leafl. Harvard Univ. 17: 66. 1955; Moldenke, Résumé 68, 72, 75, 101, & 489. 1959; Moldenke, Résumé Suppl. 12: 3. 1965; Moldenke, Fifth Summ. 1: 118, 125, 130, & 166 (1971) and 2: 956. 1971.

Recent collectors describe this plant as an herb, 7 cm. tall, the leaves gray-green, and the flowering heads white or cream-color. They have found it growing on white sand of campinas and disturbed caatinga, damp sandy soil of road margins, sandy river beaches, rock outcrops, and forming small tussocks on wet sand, at altitudes of 100--130 meters, flowering from January to March and June to September, fruiting in March and July. Maguire and his associates refer to it as "locally occasional on savannas in Amazonas", Venezuela, while Cowan found it to be "frequent on moist open savannas, white sand" in Guyana. Material has been distributed in many herbaria as typical P. polytrichoides Kunth.

Citations: COLOMBIA: Vaupés: Schultes & Cabrera 19180 (Oa--isotype, Oa--isotype, Oa--isotype, Ss--isotype, Z--type). VENEZUELA: Amazonas: Maguire, Wurdack, & Bunting 36741 (N). Bolívar: Maguire, Steyermark, & Maguire 53599 (N). GUYANA: Cowan 39283 (N); Whitton 214 (K). BRAZIL: Amazônas: Prance, Coêlho, Maas, & Pinheiro 11662 (Ac, N), 11667 (Ld, Mu, Mu, N, S); Prance, Philcox, Rodrigues, Ramos, & Farias 5145 (Ld, N, S); Prance, Ramos, Farias, Elias de Paulo, & Albuquerque 10420 (Ld, N, S); Prance, Ramos, Farias, & Philcox 4833 (Ac, N, S), 4836 (Ac, N, S). Pará: Ducke 8466 (Bs); Egler & Raimundo s.n. [Egler 1272; Herb. Mus. Goeldi 24319] (Bm). Rondônia: Prance, Forero, Wrigley, Ramos, & Farias

6017 (Ac, N, S).

PAEPALANTHUS POLYTRICHOIDES f. VILLOSUS Moldenke, Phytologia 3: 62. 1949.

Bibliography: Moldenke, Phytologia 3: 62 & 80. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 67 & 211. 1949; Moldenke, Alph. List Cit. 3: 744. 1949; Moldenke, Phytologia 4: 202. 1953; Moldenke, Résumé 77 & 489. 1959; Moldenke, Résumé Suppl. 3: 12 & 13. 1962; Lindeman & Görts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 333. 1968; Teunissen & Wildschut, Verh. Konink. Nederl. Akad. Wet. Natuurk. 59 (2): 23. 1970; Moldenke, Fifth Summ. 1: 132 & 166 (1971) and 2: 956. 1971; Teunissen & Wildschut, Meded. Bot. Mus. Utr. 341: 23. 1971.

This form differs from the typical form of the species in having its leaves, sheaths, and peduncles very densely villous with long, white, spreading hairs, which, however, wear off in age. It grows in the same soil and exposure to the sun as the typical form.

Lindeman & Görts-van Rijn (1968) cite Lindeman 6556 from Surinam in addition to the type collection. Material has been misidentifed and distributed in some herbaria as P. supinus Körn. On the other hand, the J. G. Kuhlmann 1636, distributed (and cited by me in 1953) as this form, is actually typical P. polytrichoides Kunth.

Additional citations: BRAZIL: Amapá: G. A. Black 49-8245 (N); W. A. Egler 1414 [Herb. Mus. Goeldi 24570] (Z).

PAEPALANTHUS PRAEDENSATUS Alv. Silv., Fl. Mont. 1: 120—121, pl. 75 II. 1928.

Synonymy: Paepalanthus praedensatus Alv. Silv., Fl. Mont. 1: 411, sphalm. 1928. Paepalanibus praedensatus Alv. Silv., Fl. Mont. 1: pl. 75 II, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 120—121 & 411, pl. 75 II. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 956. 1971; Moldenke, Phytologia 28: 460. 1974.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 75 II. 1928.

The type of this species is A. Silveira 509 from "In campis, sub rupibus et locis umbrosis arenosisque, prope Contagem, in Serra do Riacho do Vento, inter Diamantina et Curvello", Minas Gerais, Brazil, collected in April, 1908, and deposited in the Silveira herbarium. Silveira (1928) says of the plant "A speciebus affinibus praecipue differt vaginis transverse truncatis".

PAEPALANTHUS PRAEMORSUS Ruhl. in Engl., Pflanzenreich 13 (4-30):

172. 1903.

Synonymy: Paepalanthus paraemorsus Ruhl., in herb.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 168, 172, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 15, 52, & 54. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 328, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 591 & 956. 1971.

This species is based on Glaziou 19960 from "Tombador, bei Diamantina" and Glaziou 19966 from "Serra dos Cristaes, bei Diamantina", Minas Gerais, Brazil, flowering in April, and deposited in the herbarium of the Botanisches Museum in Berlin where the former was photographed by Macbride as his type photograph number 10638.

Ruhland (1903) notes that the "Species cum P. succiso Koern., a me non viso, valde affinis esse videtur. Sed huic speciei pedunculi tricostati et bracteae involucrantes apiculatae ab autore attribuuntur." The P. succisus Körn., reduced by me in my 1971 work to the synonymy of P. praemorsus, obviously actually belongs, rather, in the synonymy of P. succisus Mart.

Citations: BRAZIL: Minas Gerais: Glaziou 19960 [Macbride photos 10638] (B--cotype, N--photo of cotype, N--photo of cotype, W--photo of cotype), 19966 (B--cotype, Z--cotype).

PAEPALANTHUS PRUINOSUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 210. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 210, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 15 & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 956. 1971.

The type of this species was collected by Ernst Heinrich Georg Ule (no. 580) "in Torfsümpfen der Boa Vista, Serra do Mar", Minas Gerais, Brazil, at an altitude of 950 meters, flowering in December, and deposited in the herbarium of the Botanisches Museum in Berlin where it was photographed by Macbride as his type photograph number 10639. Ruhland (1903) says of it "Species foliis et pedunculis insignis. Excellit praetersea bracteis involucrantibus latis, vaginis ore persistenter ciliolatis". It is known thus far only from the original collection.

Citations: BRAZIL: Minas Gerais: Ule 580 [Macbride photos 10639] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS PSEUDOELONGATUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 141. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 126, 141, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101

& 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 956. 1971.

The type of this species was collected by Auguste François Marie Glaziou (no. 19961) on the campos at Tombador near Diamantina, Minas Gerais, Brazil, flowering in April, and is deposited in the herbarium of the Botanisches Museum in Berlin where it was photographed by Macbride as his type photograph number 10640. It was originally misidentified and distributed as P. elongatus (Bong.) Körn. In fact, Ruhland (1903) comments that the "Species a P. elongati Koern. speciminibus validioribus primo intuitu vix distinguenda, sed folia multo latiore quam in P. elongato sunt. Analysi florum trimerorum species plane diversa et inter Variabiles Ruhl. collocanda, inter quos valde insignis, cognoscitur." It is known thus far only from the original collection.

Citations: BRAZIL: Minas Gerais: Glaziou 19961 [Macbride photos 10640] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS PSEUDOTORTILIS Ruhl. in Engl., Pflanzenreich 13 (4-30): 155. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 155, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 411. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 956. 1971.

This species is based on Ule 3508, collected in the Serra do Itatiaia, Minas Gerais, Brazil, in February, 1894, and deposited in the herbarium of the Botanisches Museum in Berlin. The species has also been collected in anthesis in January and Silveira (1928) cites a Collector undesignated 511 collected in "Itatiaia" in 1903. Ruhland (1903) comments that the "Species P. tortili Mart. habitu simillima et affinis, sed capitulis globosis vel fere semiglobosis (nec sylindraceo-ovatis) et praesertim bracteis involucrantibus semper manifestis, earumque forma longe differt".

The F. C. Hoehne 32, distributed as P. pseudotortilis, is actually Syngonanthus caulescens (Poir.) Ruhl.

Citations: BRAZIL: Minas Gerais: Dusén 254 (B, N--photo, S, Z--photo); Strang 369 [Herb. Cent. Pesq. Florest. 1308] (Z); Ule 3508 (B--type, Z--isotype). Rio de Janeiro: Glaziou 5453 (N, S), 6746 (B).

PAEPALANTHUS PUBESCENS Körn. in Mart., Fl. Bras. 3 (1): 384. 1863.

Synonymy: Dupatya pubescens (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya pubescens Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 384, 386, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-

30): 126, 142—143, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 34, 79, & 411. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 101, 281, & 489. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Phytologia 20: 306. 1970; Moldenke, Fifth Summ. 1: 166 & 484 (1971) and 2: 956. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1160 & Ind. 21. 1972; Moldenke, Phytologia 29: 209 & 288. 1974.

The type of this species was collected by Carl Friedrich Philipp von Martius (no. 896) on campos in Minas Gerais, Brazil, and is deposited in the herbarium of the Botanisches Museum in Berlin. The Martius 893 photographed by Macbride in the Munich herbarium apparently is not the type collection. Ruhland (1903) cites, all from Minas Gerais, Glaziou 15528 & 19970, Magalhães Gomes 756, Martius 893 & 896, Schwacke 9224 & 9283, and Sena s.n. [Herb. Schwacke 14476 & 14545].

The species has been found growing in sandy soil and on campos at 1500 meters altitude, flowering from February to April and in June. Silveira (1928) cites A. Silveira 704 from Diamantina, Minas Gerais, collected in 1918. Ruhland (1903) comments that the "Bracteis involucrantibus pallidis etc. statim dignoscitur. Ceterum satis variabilis, praesertim indumento foliorum."

The Martius 893, cited below, is a mixture with Leiothrix curvifolia (Bong.) Ruhl.; in fact, the original determination of the Munich herbarium specimen of this number was "Eriocaulon calocephalon Bong.", but to this Körnicke has appended a note as follows: "No. 893 est Trichocephalus curvifolius Mart. qui non est."

The Angely (1972) reference in the bibliography above is dated "1970" on its title-page, but was not actually issued until 1972.

Material of P. pubescens has been misidentified and distributed in some herbaria as Eriocaulon calocephalon Bong., E. macrocephalum Bong., and E. modestum Kunth.

Citations: BRAZIL: Minas Gerais: Glaziou 22309 (Br, N); Martius 893, in part [Macbride photos 18719] (Mu, N—photo, W—photo), 896 (B—type, Mu—isotype); Mello Barreto 9177 [Herb. Jard. Bot. Belo Horiz. 26594] (N). São Paulo: Eiten & Eiten 5106 (W—2426085); Hemmendorff 25 (S). MOUNTED ILLUSTRATIONS: notes & drawings by Körnicke (B).

PAEPALANTHUS PUBESCENS var. CHAPADENSIS Ruhl. in Engl., Pflanzenreich 13 (4-30): 143. 1903.

Synonymy: Paepalanthus pubescens var. chapadensis Alv. Silv. ex Moldenke, Résumé 327, in syn. 1959. Paepalanthus chapadensis

Ruhl. ex Moldenke, Fifth Summ. 2: 579, in syn. 1971 [not P. chapadensis Alv. Silv., 1928].

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 143 & 291. 1903; Alv. Silv., Fl. Mont. 1: 411. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Résumé Suppl. 1: 120. 1959; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 579, 589, & 956. 1971.

This variety is based on Magalhães Gomes 2724 from near Chapada in the Serra da Itatiaia, Minas Gerais, Brazil, flowering in May, and deposited in the herbarium of the Botanisches Museum in Berlin. Silveira (1928) cites A. Silveira 243 from "Itatiaia", collected in 1913.

Citations: BRAZIL: Minas Gerais: Magalhães Gomes 2724 (B--type); Magalhães Gomes & Schwacke 2724 [Herb. Jard. Bot. Rio Jan. 26615] (N--isotype).

PAEPALANTHUS PUBESCENS var. LONGEPILOSUS Alv. Silv., Fl. Mont. 1: 79 [as "longepilosa"]. 1928.

Synonymy: Paepalanthus pubescens var. longepilosa Alv. Silv., Fl. Mont. 1: 79. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 79 & 411. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589. 1971.

This variety differs from the typical form of the species in its leaves being glabrous and its peduncles sparsely long-pilose.

It is based on A. Silveira 498 from "In campis prope Pouso Alto, (Diamantina)", Minas Gerais, Brazil, collected in April, 1908, and deposited in the Silveira herbarium. On page 411 of his work, Silveira (1928) writes the name of the type locality as "Pouso Alto (Serro)". The taxon is known thus far only from the original collection. Obviously much more intensive collecting should be done in the Diamantina region, as well as in the Serra do Cipó and the other mountain chains of Minas Gerais.

PAEPALANTHUS PULCHELLUS Herzog in Fedde, Repert. Spec. Nov. 20: 85--86. 1924.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 20: 85--86. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 174. 1929; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 61 [43]. 1932; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 956. 1971.

The cotypes of this species were collected by Freiherr Philipp von Lützelburg (no. 15507) at the summit of the Serra das Almas, altitude 1800 meters, and in dry places on the campos, Rio de Contas, altitude 800 meters, Casa de Pedra (no. 11b) and Serra

Sincora (no. 11a), in Bahia, Brazil, and are deposited in the Botanische Staatssammlung herbarium in Munich, where Macbride photographed Lützelburg 11a as his type photograph number 18720. Herzog (1924) cites "no. 11" in his original description of the species, but the letters "a" and "b" have often been added to the Munich specimens of Lützelburg's numbers, as they have been here, when these numbers were represented in Munich by more than a single sheet.

Herzog (1924) comments that "Nach Köpfchen- und Blutenbau wie durch manche andere Charaktere, z. B. die pappusähnliche Behhaarung der Scheidenmündung dem P. hispidissimus n. sp. mihi nahe verwandt, aber schon durch die Blattform und dem Wuchs deutlich verschieden". The species has been collected in flower and fruit in July.

Citations: BRAZIL: Bahia: Belém 1686 (N, Z); Lützelburg 11a [Macbride photos 18720] (Mu--cotype, N-- photo of cotype, W--photo of cotype), 11b (Mu--cotype, Z--cotype), 15507 (Mu--cotype).

PAEPALANTHUS PULLUS Körn. in Mart., Fl. Bras. 3 (1): 366--367. 1863.

Synonymy: Dupatya pulla (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya pulla Kuntze apud Durand & Jacks., Ind. Kew., Suppl. 1, imp. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 366--367 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 124, 132, 137, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 56 & 412. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 101, 281, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 3: 14. 1962; Moldenke, Fifth Summ. 1: 166 & 484 (1971) and 2: 956. 1971; Moldenke, Phytologia 26: 191 (1973), 29: 489 (1974), and 30: 84. 1975.

The type of this species was collected by Georg Heinrich von Langsdorff somewhere in Minas Gerais, Brazil, and is probably deposited in the Botanische Staatssammlung herbarium in Munich. The Paris specimen of Gaudichaud s.n. photographed by the United States National Museum staff photographer is not a type.

Ruhland (1903) comments that the "Species ad antecedentem [P. silveirae Ruhl.] et P. capillarem Koern. proxime accedit."

Citations: BRAZIL: Minas Gerais: Langsdorff s.n. (B--isotype, Ut--375--isotype, Z--isotype). Rio de Janeiro: Gaudichaud s.n. [Rio Janeiro; U. S. Nat. Herb. photo 5887] (N--photo, P).

PAEPALANTHUS PULLUS var. FLAVIDUS Alv. Silv., Fl. Mont. 1: 56 [as "flavida"]. 1928.

Synonymy: Paepalanthus pullus var. flavida Alv. Silv., Fl. Mont. 1: 56. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 56 & 412. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 956. 1971.

This variety is based on a J. Michaeli collection from "In campis in Serra do Cipó", Minas Gerais, Brazil, collected in August, 1921, and deposited as no. 722 in the Silveira herbarium. It is described by Silveira (1928) as "Folia ut in varietate precedente [var. longepilosus]. Pedunculi pilis longis sparsisque cum brevibus intermixtis pilosi. Bracteae involucrantes flavidae." Thus far the taxon is known only from the original collection.

PAEPALANTHUS PULLUS var. LATIFOLIUS Alv. Silv., Fl. Mont. 1: 56 [as "latifolia"]. 1928.

Synonymy: Paepalanthus pullus var. latifolia Alv. Silv., Fl. Mont. 1: 56. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 56 & 412. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 956. 1971.

This variety is based on A. Silveira 771 from "In campis, sub rupibus, inter Serro et Diamantina", Minas Gerais, Brazil, collected in June, 1925, and deposited in the Silveira herbarium. On page 412 of his work (1928) Silveira cites the type locality and date as "Serra Geral 1926" — it is not evident whether this is intended as an emendation of the information given in the original discussion on page 56 or refers to another collection under the same herbarium number. He describes the variety as "Caulis ramosus, ramis elongatis usque 10 cm. longis, 1/2 mm. diametro crassis, sparse foliosis. Folia in apice caulis et ramorum densiora, indumento ut in varietatibus precedentibus [vars. longepilosus & flavidus] praedita, 3 mm. diametro in parte latiore. Pedunculi ut in varietatibus precedentibus." The taxon is known thus far only from the original collection.

PAEPALANTHUS PULLUS var. LONGEPILOSUS Alv. Silv., Fl. Mont. 1: 56 [as "longe pilosa"]. 1928.

Synonymy: Paepalanthus pullus var. longe pilosa Alv. Silv., Fl. Mont. 1: 56. 1928. Paepalanthus pullus var. longepilosa Alv. Silv., Fl. Mont. 1: 412. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 56 & 412. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 956. 1971.

This variety is based on A. Silveira 770 from "In campis areno-

sis, sub rupibus, inter Serro et Diamantina, in Serra Geral", Minas Gerais, Brazil, collected in 1925, and deposited in the Silveira herbarium. On page 412 of his work (1928) Silveira gives the date of collection as "1926" — whether this refers to another later collection under the same number or is intended as a correction of the date given in the original discussion is not evident. He describes the plant as "Folia et pedunculi longis sparsisque cum brevibus ac patentibus intermixtis pubescentes. Capitula sordide fusca." The variety is known thus far only from the original collection.

PAEPALANTHUS PULLUS var. RAMOSUS Alv. Silv., Fl. Mont. 1: 56 [as "ramosa"]. 1928.

Synonymy: Paepalanthus pullus var. ramosa Alv. Silv., Fl. Mont. 1: 56. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 56 & 412. 1928; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 956. 1971.

This variety is based on A. Silveira 772 from "Sub rupibus, in campis arenosis inter Serro et Diamantina", Minas Gerais, Brazil, collected in June, 1925, and deposited in the Silveira herbarium. On page 412 of his work (1928) Silveira cites the type locality and date as "Serra Geral 1926", but it is not evident if he intends this as an emendation of the information given by him on page 56 of the same work or if he is actually referring to a later collection filed in his herbarium under the same number. He describes the variety as "Caulis valde ramosus, usque 10 cm. et ultra longus, ramis sparse foliosis, 1/2 mm. diametro crassis. Folia 2 mm. diametro lata in latiore parte, indumento ut in varietatibus precedentibus [vars. longepilosus, flavidus, & latifolius] instructa. Pedunculi ut in varietatibus precedentibus." The taxon is known thus far only from the original collection.

PAEPALANTHUS PULVINATUS N. E. Br. in Thiselt.-Dyer, Fl. Trop, Afr. 8: 262--264. 1902.

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 262-264. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 221—222 & 291. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 595. 1908; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 21 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111 & 211. 1949; Roberty, Pet. Fl. Ouest-Afric. 366. 1954; Moldenke, Résumé 137 & 489. 1959; Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Moldenke, Fifth Summ. 1: 218 (1971) and 2: 956. 1971.

Brown (1902) says of this plant: "This plant is very distinct from all other African species of this Order. The sepals in the flowers of both sexes often appear to be entirely without cilia, but I am unable to determine whether the cilia have fallen away or whether only some of the flowers have ciliate sepals".

The species is based on Borkstadt s.n. from Sierra Leone. Roberty (1954) says of it "Signalé du Sierra-Leone, plante 'en coussinêt', de montagne, certainement très rare".

PAEPALANTHUS PUNGENS Griseb., Cat. Pl. Cub. 224. 1866.

Bibliography: Griseb., Cat. Pl. Cub. 224. 1866; Sauv., Fl. Cub. 164. 1871; Sauv., Anal. Acad. Sci. Habana 8: 49. 1871; Gomez de la Maza, Not. Bot. Sist. 49 & 110. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 166—167 & 291. 1903; Britton, Bull. Torrey Bot. Club 44: 33. 1917; A. W. Hill, Ind. Kew. Suppl. 6: 72. 1926; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930; Moldenke, N. Am. Fl. 19: 38 & 42. 1937; Moldenke, Phytologia 1: 334 & 354. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; León, Fl. Cuba 1: 283. 1946; Moldenke, Alph. List Cit. 1: 92 & 185. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44 & 211. 1949; Moldenke, Résumé 52 & 489. 1949; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 18: 9. 1969; Moldenke, Fifth Summ. 1: 97, 484, & 485 (1971) and 2: 956. 1971; Moldenke, Phytologia 25: 156. 1973.

The Ekman 2341 collection, cited below, is a mixture with P. brittoni Moldenke and P. pungens var. brevifolius Moldenke.

Additional citations: CUBA: Oriente: Ekman 2187 (S), 2341, in part (N, S), 5709 (Er, S), 9121 (S); La Guardia s.n. [López Figueiras 1992] (Ha).

PAEPALANTHUS PUNGENS var. BREVIFOLIUS Moldenke, Phytologia 4: 56. 1952.

Bibliography: Moldenke, Phytologia 4: 56. 1952; Moldenke, Fifth Summ. 1: 97 (1971) and 2: 956. 1971; Moldenke, Phytologia 25: 156. 1973.

Citations: CUBA: Oriente: Ekman 2341, in part (N--photo of type, S--type, Z--photo of type).

PAEPALANTHUS RAMOSISSIMUS Alv. Silv., Fl. Mont. 1: 209—210, pl. 138. 1928.

Synonymy: Paepalanthus ramisissimos Alv. Silv., Fl. Mont. 1: pl. 138. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 209—210 & 412, pl. 138. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 956. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 138. 1928.

This species is based on A. Silveira 776 from "In campis secus margines capoeiras, inter Serro et Datas, Serra Geral", Minas Ger-

ais, Brazil, and is deposited in the Silveira herbarium. On page 412 of his work (1928) Silveira cites the place of collection of the type as "prope Serrinha 1926". He comments that the "Species a P. Diffuso Alv. Silv. pedunculis brevioribus et erecto denseque pubescentibus praecipue differt". Thus far it is known only from the original collection.

PAEPALANTHUS RAMOSUS (Wikstr.) Kunth, Enum. Pl. 3: 514. 1841.

Synonymy: Eriocaulon ramosum Wikstr., K. Svensk. Vet. Akad. Handl. Stockh., ser. 2, 1: 76, pl. 3. 1820. Eriocaulon maximiliani Schrad. ex Roem. & Schult., Mant. 2: 470. 1824 [not E. maximiliani Bong., 1831, nor Kunth, 1841, nor Mart., 1863]. Paepalanthus maximiliani Kunth, Enum. Pl. 3: 515. 1841. Eriocaulon maximiliani (Schrad.?) Bong. ex Kunth, Enum. Pl. 3: 572, in syn. 1841. Eriocaulon ramosum Bong. ex D. Dietr., Syn. Pl. 5: 261. 1852. Paepalanthus ramosus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 330. 1863. Paepalanthus ramosus var. α Körn. in Mart., Fl. Bras. 3 (1): 330—331. 1863. Paepalanthus ramosus var. γ Körn. in Mart., Fl. Bras. 3 (1): 331. 1863. Paepalanthus ramosus var. δ Körn. in Mart., Fl. Bras. 3 (1): 331. 1863. Paepalanthus ramosus var. ε Körn. in Mart., Fl. Bras. 3 (1): 331. 1863. Paepalanthus ramosus var. ϑ Körn. in Mart., Fl. Bras. 3 (1): 331. 1863. Paepalanthus hilairei var. β Körn. in Mart., Fl. Bras. 3 (1): 332. 1863. Dupatya ramosa (Wikstr.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya ramosa Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902. Eriocaulon maximilianii Schrad. ex Stapf, Ind. Lond. 3: 91. 1930. Actinocephalus ramosus Lutz ex Moldenke, Résumé Suppl. 12: 9, in syn. 1965.

Bibliography: Wikstr., K. Vet. Acad. Handl. Stockh., ser. 2, 1: 76—78, pl. 3. 1820; Wikstr., Trenne Nya Art. Örtsl. Erioc. (repr.) 9—11 & [15], pl. 3. 1821; Roem. & Schult., Mant. 2: 469—470. 1824; Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 621, pl. 1. 1831; Bong., Ess. Monog. Erioc. 5, [20]—22, & 37—39, pl. 1. 1831; A. St.-Hil., Voy. Distr. Diam. 2: 443—444. 1833; Steud., Nom. Bot., ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 512—515, 572, 613, 614, & 625. 1841; Mart., Flora 24, Beibl. 2: 35. 1841; Schnitzlein, Iconogr. 1: pl. 46, fig. 4. 1845; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273, 274, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 330—332, 394, & 507. 1863; Körn. in Warm., Vidensk. Meddel. Naturh. Foren. Kjöbenh. 23: 310. 1871; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 878 (1893) and imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 190, 195, 286, 287, & 291. 1903; Beauverd, Bull. Herb. Boiss., ser. 2, 8: 293—294. 1908; Alv. Silv., Fl. Mont. 1: 200 & 412. 1928; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in

Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 878 (1946) and imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 32, 36, 39, 44, & 53. 1946; Moldenke, Alph. List Cit. 4: 1203 & 1204. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Phytologia 4: 202. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 101, 290, 291, 327, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 878 (1960) and imp. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Résumé Suppl. 6: 21 & 22 (1963) and 12: 4 & 0. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 159, 161, 174, & 187--190. 1969; Moldenke, Fifth Summ. 1: 166 & 377 (1971) and 2: 505, 510, 584, 589, & 956. 1971; Moldenke, Phytologia 25: 239 (1973), 26: 229 (1972), 28: 456, 460, & 461 (1974), 29: 308, 314, 493, 495, 497, & 499 (1974), and 30: 35, 275, & 278. 1975.

Illustrations: Wikstr., K. Vet. Akad. Handl. Stockh., ser. 2, 1: pl. 3. 1820; Wikstr., Tremne Nye Art. Örtsl. Erioc. (repr.) pl. 3. 1821; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 1. 1830; Bong., Ess. Monog. Erioc. pl. 1. 1831; Schnitzlein, Iconogr. 1: pl. 46, fig. 4. 1845.

The binomial of Johann Emanuel Wikstrom was definitely published in his paper entitled "Trenna nya arter af Örtslagtet Eriocaulon, pp. 9—11, in 1820 [not in "1826" as is sometimes stated], the date confirmed in the "Master Book List" for Bibliografia Huntiana 2: 1971 (1972). A reprint of the paper, apparently published in 1821 (according to the printed date on the back page), but without the illustrations, is preserved in the New York Botanical Garden library.

Paepalanthus ramosus is apparently based on Freyreiss 3 in the Stockholm herbarium. Paepalanthus hilairei var. β is described by Körnicke as "apice caulis sterili brevi; foliis caulinis supra glabris, subtus pilis brevibus patentissimis hirto-pubescentibus; foliis ramorum illis similibus vel subtus glabris".

Kunth (1841) comments that this species is "Proxime affinis P. congesto Humb. et Bonpl., sed differt charactere dato". The Humboldt and Bonplant species to which he refers here is now called P. fasciculatus (Rottb.) Körn. and bears no close relationship whatever nor apparent similarity whatever to P. ramosus! He also notes that it is "Praecedenti [P. maximiliani] similis. Specimina nostra, a Sellowio inter Rio Janeiro et Campos lecta, a Wikstroemianis haud differre videntur". In his discussion of the latter species he notes that it "Differt a planta Schraderiana statura altiore, pedunculis longioribus, squamis (bracteis involucrantibus) capitulo multo brevioribus.....Specimina a Sellowio in Serra da Piedade lecta a Bongardianis differunt pedunculis glabris (potius ob pilos delapsos glabratis?)."

It should be noted that the Eriocaulon maximiliani Bong., referred to in the synonymy above, is a synonym of P. hilairei Körn., while P. maximiliani Mart. is in part P. hilairei and in part Syngonanthus nitens var. filiformis (Bong.) Ruhl.

Körnicke (1863) divides P. ramosus into six varieties, which, however, he does not name and which seem hardly worth nomenclatural recognition. He describes them as follows: "var. α foliis pilis brevissimis, longo hinc inde intermixto, ciliolatis, ceterum glabris; var. β foliis pilis brevibus patentissimis albis dense ciliatis, ceterum glabris; var. γ foliis pilis longis strictis demum perturbatis praesertim versus basin dense ciliatis, ceterum glabris; var. δ foliis pilis brevibus patentissimis ciliatis, subtus puberulis vel dense pubescentibus [with P. maximiliani Kunth as synonym]; var. ε foliis pilis longis demum perturbatis ciliatis, inferioribus subtus pubescentibus, superioribus subtus arachnoideo-pilosulis; var. ζ foliis pilis longis patentissimis demum perturbatis dense ciliatis, subtus puberulis v. pubescentibus [the typical form]."

For his var. α he cites "in prov. Minarum: Pohl; in Serro Frio: Mart."; for var. β he cites "Mart. Hb. Fl. Bras. n. 482. pro parte; in prov. Bahiensi"; for var. γ he cites "Merckel; in prov. Minarum: Langsdorff; in Serra da Piedade: Sellow n. 1300"; for var. δ he cites "in arenosis; prope Rio de Janeiro: Gomez; Restinga de Taipu: Weddell n. 568; in turfoso-arenosis ad Campos, Cabo Frio: Pohl; in arenosis prope Belmonte: Princ. Neovid."; for var. ε he cites only "Sellow"; and for var. ζ he cites "Freyreiss, Horn, Merckel; inter Macahé et Campos, Junio: Riedel n. 562.; ad Cabo Frio: idem." His variety β is now placed in the synonymy of P. ramosus var. affinis (Bong.) Ruhl.; the others seem to represent only transitory stages or phases of P. ramosus, but not sufficient material is yet available for certain disposition.

In his 1871 work Körnicke cites Warming s.n. from "In Serra da Piedade, Jan., Febr., Majo lect" and describes it as a "Planta 1—3 pedalis; pedunculi 1 1/2 — 3 pollicares".

Recent collectors have encountered P. ramosus in sandy soil on "sandig-moorigen Campos", in "inner restingas", and on campos with Vellozia and "piassava", at 1570 meters altitude, flowering in February, March, June, August, September, and November, and fruiting in February.

Peter Clausen's surname is often spelled "Claussen" on labels in some herbaria and by numerous authors. The label of Glaziou 15516 is inscribed "Rio de Janeiro", but it appears rather certain that the collection was made in Minas Gerais. Silveira (1928) cites A. Silveira 270 from Minas Gerais.

Ruhland (1903) cites from Bahia, Brazil, Wied-Neuwied s.n., and from Minas Gerais P. Clausen s.n., Freyreiss s.n., Gomez s.n., Herb. Reichenbach f. 151820, Horn s.n., Langsdorff s.n., Martius 482 (in part), Merkel s.n., L. Riedel 562, J. E. Pohl s.n., Schwacke 9754, Sellow 1300, and Weddell 568. He comments that "Cl. Koernicke seriem hanc polymorpham praesertim secundum indumenta dividenti assentiri non possum, quamquam specimina singula (cfr. Claussenianа in Serra da Piedade collecta) foliis longissime et dense ciliatis, ceterum glabris valde insignia videntur".

Material of P. ramosus has been misidentified and distributed in some herbaria under the designations Eriocaulon affine Bong., E. affine Mart., E. divaricatum Bong., E. maximiliani Bong., E. maximiliani Mart., E. polyanthum Bong., Paepalanthus affinis Kunth, P. falcifolius Körn., P. hilairei Körn., P. hilairei var. maximiliani Ruhl., P. polyanthus (Bong.) Kunth, and P. ramosus var. affinis (Bong.) Ruhl.

On the other hand, some of the Ackerman s.n. [1832], distributed as P. ramosus, actually is P. claussenianus Körn.

Additional citations: BRAZIL: Bahia: Belém 1693 (Ac, N), 1840 (Ac); Lützelburg 27a (Mu), 27b (Mu). Guanabara: B. Lutz 601 (Ja--24575); Palacios, Balegno, & Cuezzo 4114 (Ja--53979); Rose & Lutz 27 (Ja--52478); Strang 1006 [Castellanos 26308; Herb. Brad. 45560] (Mu). Minas Gerais: P. Clausen 3 (Br, Br, Ml, Mu, N, Qu), 4 (B), 109 (Br, Br), 158 (B), 232 (Mi), 267 (N), 319 (N, Ug), s. n. [Aug.--April 1840] (Br, Br), s.n. [1840] (S), s.n. [Carassa] (Br); Freyreiss 3 (F--photo of type, N--photo of type, S--type, Z--photo of type); Glaziou 15516 (B); Martius s.n. [Serro Frio] (B, Br, Mu); Pereira 2693 [Pabst 3529; Herb. Brad. 3844] (Bd); J. E. Pohl s.n. [in Brasilia] (Mu, Mu, Mu); Pohl & Schott s.n. [Cabo Frio] (Br); Sellow 1300 (B, Br), s.n. (B); Weddell 568 [44] (Br). Rio de Janeiro: Alston & Lutz 34 (Ja--113696); Lucae s.n. [Tijuca] (B); B. Lutz 601 (W--1593788); Martius 482, in part (Br, Br, M, Mu, Mu, N, Z); Mello Mattos s.n. [Herb. Mus. Nac. Rio Jan. 29463] (S), s.n. [Agosto de 1897] (Ja--29463); Segadas-Vianna 4225 (Sm), 4282 (Sm); Segadas-Vianna, Dau, Ormond, Machline, & Lorêdo 153 (Sm), 447 (Sm), 871 (Sm), 946 (Z); Ule 8199 [Herb. Mus. Nac. Rio Jan. 29462] (S), s.n. [8/99] (Ja--29462). State undetermined: Ackerman s.n. [1832] (B); Guillemin 223 (N). MOUNTED ILLUSTRATIONS: Wikstr., K. Vet. Acad. Handl. Stockh., ser. 2, 1: pl. 3. 1821 (N, Z, Z); drawings by Körnicke (B, B).

PAEPALANTHUS RAMOSUS var. AFFINIS (Bong.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 195. 1903.

Synonymy: Eriocaulon affine Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 621. 1831. Eriocaulon (Paepalanthus) affine Bong. ex Mart., Flora 24, Beibl. 2: 35. 1841. Paepalanthus affinis Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 330. 1863. Paepalanthus affinis var. α Körn. in Mart., Fl. Bras. 3 (1): 330. 1863. Paepalanthus affinis var. β Körn. in Mart., Fl. Bras. 3 (1): 330. 1863. Paepalanthus affinis var. γ Körn. in Mart., Fl. Bras. 3 (1): 330. 1863. Paepalanthus ramosus var. β Körn. in Mart., Fl. Bras. 3 (1): 330 & 331. 1863. Dupatya affinis (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya affinis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902. Actinocephalus affinis (Bong.) Kunth, in herb. Eriocaulon

affine Mart., in herb.

Bibliography: Bong., Ess. Monog. Erioc. 21. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 621 (1831) and 5: pl. 32. 1839; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 514, 515, 572, & 612. 1841; Mart., Flora 24, Beih. 2: 35. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 274 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 330--332 & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 877 (1893) and imp. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 195, 284, 289, & 291. 1903; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 877 (1946) and imp. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 32, 44, & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 101, 285, 323, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 877 (1960) and imp. 3, 2: 401. 1960; Moldenke, Résumé Suppl. 6: 22. 1963; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 492, 577, 589, & 957. 1971; Moldenke, Phytologia 25: 239 (1973), 28: 456 (1974), and 30: 35 & 278. 1975.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 5: pl. 32. 1839.

This variety is apparently based on an L. Riedel collection from Bahia, Brazil, deposited in the Leningrad herbarium, probably one of the two cited by Ruhland (1903) as "auf Wiesen am Meere zwischen Marahu und Rio das Contas (Riedel); bei Ilheos (Derselbe -- blühend im Februar)". Bongard (1831) notes that it "Differt ab E. ramoso, ad quod proxime accedit: statura humiliore; caulibus caespitosis; pedunculis subpubescentibus (nec pilosis); vaginis glabris. Radix fasciculata insignis."

Ruhland (1903) that it "Differt a forma typica caule jam basi et tota longitudine ramoso; ramis elongatis, gracilibus, remote foliosis, 8--10 cm longis, circiter 1,5 mm crassis; foliis longiuscule ciliatis, demum glabris, junioribus subtus pubescentibus, illis ramorum similibus, brevioribus, vix puberulis, 1,5--3 cm longis, medio 2,5 mm latis." In addition to the Riedel collections referred to above, he cites from Espiritu Santo Riedel s.n. [auf Campos bei S. José] and from "Südöstliches Brasilien" Sellow s.n.

Körnicke (1863) describes his three unnamed varieties of P. affinis as follows: "var. α foliis (junioribus) utrinque pubescentibus [this is the typical form]; var. β foliis supra glabris, subtus pubescentibus; var. γ foliis utrinque glabris", but Ruhland does not seem to regard them as worthy of nomenclatural recognition. More material is needed before a definite decision should be made as to their validity. For var. α he cites "P. affinis Kth. En. III.514. E. affine.....in Brasiliae orientalis arenosis"; for var. β he cites "Majo: Sellow; prope Ilheos et Rio dos Contas, Februario: Riedel"; and for var. γ he cites "Eriocau-

lon (Paepalanthus) affine Mart.....Mart. Hb. Fl. Bras. n. 482. pro parte; in prov. Espiritu Santo campis prope S. José; in pratis maritimis inter Marahu et Rio dos Contas: Riedel". His P. ramosus var. β is described as having the "foliis pilis brevibus patentissimis albis dense siliatis, ceterum glabris" and he cites for it "Mart. Hb. Fl. Bras. n. 482. pro parte; in prov. Bahiensi".

Körnicke's P. hilairei var. β is described by him as "apice caulis sterili brevi; foliis caulinis supra glabris, subtus pilis brevibus patentissimis hirto-pubescentibus; foliis ramorum illis similibus vel subtus glabris" and he bases it on P. Clausen 4 and J. E. Pohl 2033 & 3634 from Minas Gerais, Brazil.

Kunth (1841) notes relative to this taxon "Differt a praecedente [P. ramosus], ad quem proxime accedit: statura humiliore, caulibus caespitosis, pedunculis subpubescentibus (nec pilosis), vaginis glabris. Radix fasciculata insignis." This is a verbatim repetition of Bongard's original description (see above).

My wife and I encountered this plant in considerable abundance, about 3 feet tall, in a sandy restinga in Guanabara, Brazil. It has been collected in anthesis in February, June, September, and October. Material has been misidentified and distributed in some herbaria as P. polyanthus var. villosus Beuaverd.

On the other hand, the Martius 482 (in part), Strang 1006, Castellanos 26308, and Herb. Brad. 45560, distributed as var. affinis, seem, rather, to represent typical P. ramosus (Wikstr.) Kunth. The Blanchet 5 collection, cited below, is a mixture with P. lamarckii Kunth.

Citations: BRAZIL: Bahia: Glocker s.n. [1842] (N—photo, S, Z—photo). Distrito Federal: Segadas-Vianna 3557 (Ja), 3558 (Z), 3559 (Ja). Guanabara: Moldenke & Moldenke 19600 (B, Fy, N, Rs, Ss); Pabst 7350 [Herb. Brad. 25323] (Lw). Minas Gerais: A. Lutz 1520 (Ja); Martius 482, in part (B). Rio de Janeiro: Duarte & Pereira s.n. [A. P. Duarte 6201] (Bd—15381); Luschnath s.n. [Campo inter San José et Macahé, July 1833] (Br); Strang 190 [Herb. Cent. Pesq. Florest. 474] (Ac). State undetermined: Blanchet 5, in part (S); Sellow s.n. (B, B); Ule s.n. [Herb. Mus. Nac. Rio Jan. 29464] (S). MOUNTED ILLUSTRATIONS: drawings by Körnicke (B).

PAEPALANTHUS REFLEXUS Alv. Silv., Fl. Mont. 1: 157—158, pl. 99. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 157—158, pl. 99. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 957. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 99. 1928.

This species is based on A. Silveira 586 from "In campis prope Lagoão, in serra do Cabral", Minas Gerais, Brazil, collected in

May, 1910, and deposited in the Silveira herbarium. Thus far it is known only from the original collection.

PAEPALANTHUS REFRACTIFOLIUS Alv. Silv., Fl. Mont. 1: 171—172, pl. 110. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 170--172 & 412, pl. 110. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 957. 1971; Moldenke, Phytologia 30: 56. 1975.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 110. 1928.

This species is based on A. Silveira 814 from "Inter saxa quartzitosa, secus viam ex Itacambira et Juramento", Minas Gerais, Brazil, collected in July, 1926, and deposited in the Silveira herbarium. On page 412 of his work (1928) Silveira cites only Itacambira as the type locality. Thus far the species is known only from the original collection. Silveira comments that the "Species in subsectione Polyactide Ruhl., bene distincta ob folia veteriora refracta" and, under his discussion of P. macrocaulon Alv. Silv., notes that this "Species a P. refractifolio Alv. Silv. statura, pili acuti et aliis characteribus differt".

PAEPALANTHUS REGALIS Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 393. 1863.

Synonymy: Dupatya regalis (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya regalis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 393 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 128, 149--150, 284, & 291. 1903; Lützelburg, Estud. Bot. Nordest. 3: 148 & 150. 1923; Alv. Silv., Fl. Mont. 1: 55 & 412. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Phytologia 4: 202. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 101, 281, 282, & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 166 & 485 (1971) and 2: 957. 1971; Moldenke, Phytologia 28: 461. 1974.

Cotypes of this species were collected by Carl Friedrich Philipp von Martius "in stratis saxis Itacolumy prope Tejuco [Diamantina] et in serra de S. Antonio", Minas Gerais, Brazil, in May, 1818, and are deposited in the herbarium of the Botanische Staatssammlung in Munich, where a sheet of a single specimen but with both localities given on the label was photographed by Macbride

as his type photograph number 18721.

Ruhland (1903) cites only the original collections and comments that "Ex cl. Koernicke capitula inter omnes generis Paepalanthi (sens. ampl.) maxima; habitu P. (Platycaulo) monticolae Mart. similis. Ego quidem specimen integrum non vidi." It also resembles P. dupatya in habit.

Recent collectors have found the plant growing on sandstone, at 1200 meters altitude, flowering in May.

Citations: BRAZIL: Bahia: Lützelburg 311 (Mu, Z). Minas Gerais: Maguire, Mendes Magalhães, & Maguire 49265 (N, Z); Martius s. n. [prope Tejuco, Mai 1818] (B--cotype, Mu--cotype), s.n. [prope Tejuco et in serra de S. Antonio; Macbride photos 18721] (My--cotype, N--photo of cotype, W--photo of cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS REGALIS var. RECURVUS Alv. Silv., Fl. Mont. 1: 55 [as "recurva"], pl. 31 & 32. 1928.

Synonymy: Paepalanthus regalis var. recurva Alv. Silv., Fl. Mont. 1: 55, pl. 31 & 32. 1928. Paepalanthus regalis recurvus Alv. Silv. apud Worsdell, Ind. Lond. Suppl. 2: 184. 1941.

Bibliography: Alv. Silv., Fl. Mont. 1: 55 & 412, pl. 31 & 32. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 327, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 957. 1971; Moldenke, Phytologia 28: 461. 1974.

This variety is based on two collections by Álvaro Adolpho da Silveira (no. 578) collected "In campis argillosis prope Grão Mogol et in Chapadão inter Itacambira et Juramento", Minas Gerais, Brazil, in July, 1926, and deposited in the Silveira herbarium. On page 412 of his work (1928) Silveira cites Grão Mogol as the type locality, but it still seems that technically the variety was actually based on two collections from different localities but given the same collection number by Silveira. He describes it as having the "Capitulis usque 2,5 cm. latis bilateraliter recurvatis discum verticalem imitantibus a forma typica differt."

PAEPALANTHUS REGELIANUS Körn. in Mart., Fl. Bras. 3 (1): 386--387, pl. 49. 1863.

Synonymy: Dupatya regeliana (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya regeliana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 386--387, 499, & 507, pl. 49. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 128, 148, 284, & 291. 1903; Alv. Silv., Fl. Mont. 1: 65. 1928; Stapf, Ind. Lond. 4: 519. 1930; Durand & Jacks., Ind.

Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 101 & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 166 & 485 (1971) and 2: 957. 1971; Moldenke, Phytologia 26: 238. 1973.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 49. 1863.

The type of this species was collected by Georg Heinrich von Langsdorff somewhere in Minas Gerais, Brazil, and is probably deposited in the Munich herbarium. The species is thus far known only from the original collection.

Citations: MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 49. 1863 (N, Z).

PAEPALANTHUS REPENS (Lam.) Körn. in Mart., Fl. Bras. 3 (1): 371. 1863.

Synonymy: Eriocaulon repens Lam., Encycl. Méth. Bot. 1: 213, pl. 50, fig. 2. 1791 [not E. repens Bong., 1831]. Eriocavlon repens Lam. apud Willd. in L., Sp. Pl., ed. 4, 1: 486. 1797. Paepalanthus repens Körn. in Mart., Fl. Bras. 3 (1): 371. 1863. Paepalanthus domingensis Ruhl. in Urb., Symb. Ant. 1: 485. 1900. Dupatya repens Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 177, in syn. 1903. Paepalanthus tuerckheimii Ruhl. in Urb., Symb. Ant. 7: 173. 1912. Paepalanthus dominguensis Ruhl. ex Alv. Silv., Fl. Mont. 1: 405. 1928. Dupatya repens (Lam.) Kuntze ex Moldenke, Fifth Summ. 2: 485, in syn. 1971. Paepalanthus tuerckheimii Urb. ex Moldenke, Fifth Summ. 2: 592, in syn. 1971.

Bibliography: Lam., Encycl. Méth. Bot. 1: 213. 1791; Lam., Tabl. Encycl. Méth. [Illustr. Gen.] 1: pl. 50, fig. 2. 1791; Henckel, Nom. Bot. 68. 1797; Willd. in L., Sp. Pl., ed. 4, 1: 486. 1797; Pers., Syn. Pl. 1: 111. 1805; J. E. Sm. in Rees, Cycl. 13: Eriocaulon. 1809; Pers., Sp. Pl. 1: 284. 1817; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 866. 1817; Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Poir. in Cuvier, Dict. Sci. Nat. 24: 240. 1822; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 7. 1831; Steud., Nom. Bot., ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 569, 572, & 614. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 371—373, 504, & 508. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 879 (1893) and imp. 1, 2: 402. 1894; Durand & Schinz, Consp. Fl. Afr. 5: 504. 1894; Ruhl. in Urb., Symb. Ant. 1: 485. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 22, 125, 137—138, 173, 174, 176—177, 284, 287, 289, & 291. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 131. 1904; Ruhl. in Urb., Symb. Ant. 7: 173. 1912; Prain, Ind. Kew. Suppl. 5, imp. 1, 183. 1921; Alv. Silv., Fl. Mont. 1: 405. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Stapf, Ind. Lond. 3: 91. 1930; Moldenke, N.

Am. Fl. 19: 41--42. 1937; Moldenke, Phytologia 1: 332--335, 351, 353, 354, 356, 362, & 363. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 879 (1946) and imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5, 22, 31, 39, 47, 53, & 55. 1946; Moldenke, Alph. List Cit. 1: 99 & 216 (1946) and 4: 996 & 1012. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 48, 124, 209, 211, & 212. 1949; Moldenke, Phytologia 4: 140--141 (1952) and 4: 207. 1953; Moldenke, Résumé 57, 158, 282, 291, 324, 486, 489, & 490. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 879 (1960) and imp. 3, 2: 402. 1960; Prain, Ind. Kew. Suppl. 5, imp. 1, 183. 1960; Straka, Erdkunde 14: 90. 1960; Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 170 & 171, fig. 29 & 30. 1964; Moldenke, Résumé Suppl. 12: 11 (1965) and 18: 12. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148, 152, 153, 159--162, 164-169, 184, 187, & 191, fig. 31 L & M & 34 D. 1969; Moldenke, Phytologia 18: 247 (1969) and 20: 422 & 423. 1970; Moldenke, Fifth Summ. 1: 103, 265, & 485 (1971) and 2: 510, 517, 581, 589, 591, 592, 950, & 957. 1971; Moldenke, Phytologia 26: 260--262 (1973) and 30: 20 & 83. 1975.

Illustrations: Lam., Tabl. Encycl. Méth [Illustr. Gen.] 1: pl. 50, fig. 2. 1791; Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 171, fig. 29 & 30. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 152 & 164, fig. 31 L & M & 34 D. 1969.

According to Lamarck (1791) and Kunth (1841) the original description of this species is "Surculis foliosis, repentibus; scapis nudis; foliis confertis, ensiformibus, recurvis.....Insula Borboniae. -- Caules dense foliosi, parum decumbentes, repentes, 3--5-pollicares. Folia ensiformia, brevia, striata, patenti-recurva. Pedunculi terminales et laterales, solitarii, graciles, angulato-striati, 5--6-pollicares, basi vagina arcta pollicaria cincti. Capitula globosa, villosa, aldiba, magnitudine pisi minoris. Bracteae involucrantes ovales, nitentes, imbricatae."

Körnicke (1863) also says "crescit in insula Borbonia: Commerson", noting that it is similar in appearance to P. intermedia Körn. and P. bongardi Kunth. Ruhland (1903) cites it from "Réunion (Insel): ohne nähere Angaben (Commerson)" and cites no other collections. He comments that "Valde doleo quod specimen hujus speciei non vidi. Nisi schedulae commutatae sunt, magnopere mirandum est, quod species, cui proxime affines in America meridionali distributae sunt, in insula Réunion nec in tota interjacente Africa omnino nullam speciem hujus generis meo strictiore sensu quidem possidente inveniatur; Bentham et Hooker (Gen. plant. 1. c. 1022) dubitant, quin ad Paepalanthum species pertineat et ad Eriocaulonem eam disponendam censent. Sed si analysis originaria auctore cl. Koernicke herbarii Berolinensis recta est, sine ulla dubitantione Paepalanthus verus est." Smith (1809), however, tells us that "The repens of Lamarck was gathered by Thierry de Menonville in Hispaniola not by Commerson in the isle of Bourbon". Durand & Schinz (1894) still list it as a Réunion plant, while Jackson (1894) cites it to "Ind. occ." Macbride photographed what purports to be an isotype from the Lamarck her-

barium at Copenhagen as his type photograph number 22293. Lamarck calls the species "joncinelle rampante". The illustration in Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: pl. 7, cited by Stapf (1930), actually depicts P. bongardi Kunth and not P. repens.

In view of all these facts, it seems apparent that what has up to now been known as P. domingensis Ruhl. and/or P. tuerckheimii Ruhl. must now be regarded as conspecific with P. repens and take on the latter name. All the information, therefore, given by myself in my 1973 publication under P. domingensis must now be shifted to P. repens.

The H. H. Johnston s.n. [28th September 1888], distributed in some herbaria as P. repens, is actually the type collection of Eriocaulon johnstonii Ruhl.

Paepalanthus repens has been collected in flower in June and in fruit in May and June. Liogier found it growing at 2600 meters altitude, describes it as "Herbácea acaule, creciendo en grupos, flores blancas", and refers to it as common "En pinar, en ladera".

Additional citations: HISPANIOLA: Dominican Republic: Eggers 2216 (Mu); A. H. Liogier 21742 (N, N); Türckheim 3327 (Mu), 3422 (Mu). Haiti: Menonville s.n. [Macbride photos 22293] (N--photo of isotype, W--photo of isotype). MOUNTED ILLUSTRATIONS & CLIPPINGS: Lam., Tabl. Encycl. Méth. 1: pl. 50, fig. 2. 1791 (N, Z); drawings by Körnicke & Ruhland's description (K).

PAEPALANTHUS RESTINGENSIS Moldenke, Phytologia 17: 435--436. 1968.

Bibliography: Moldenke, Phytologia 17: 435 & 436, pl. 1. 1968; Moldenke, Résumé Suppl. 17: 3. 1968; Anon., Biol. Abstr. 50 (8): B.A.S.I.C. S.141. 1969; Moldenke, Biol. Abstr. 50: 4449. 1969; Rogerson, Rickett, & Becker, Bull. Torrey Bot. Club 96: 387. 1969; Hocking, Excerpt. Bot. A.16: 39. 1970; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 957. 1971; Heslop-Harrison, Ind. Kew. Suppl. 15: 99. 1974.

Illustrations: Phytologia 17: 436, pl. 1. 1968.

Citations: BRAZIL: Bahia: Belém & Pinheiro 3181 (N--photo of type, N--drawings of type, Z--type).

PAEPALANTHUS RETUSUS C. Wright ex Sauv., Anal. Acad. Ci. Habana 8: 50. 1871.

Synonymy: Paepalanthus retusus Sauvalle ex Gomez de la Maza, Not. Bot. Sist. 49. 1893.

Bibliography: Sauv., Anal. Acad. Ci. Habana 8: 50. 1871; Sauv., Fl. Cub. 164--165. 1871; Gomez de la Maza, Not. Bot. Sist. 49 & 110. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 126, 140—141, & 291. 1903; Prain, Ind. Kew. Suppl. 4, imp. 1, 170. 1913; Moldenke, N. Am. Fl. 19: 38 & 39. 1937; Moldenke, Phytologia 1: 334, 351, 355, & 363. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; León, Fl. Cub. 1: 283. 1946; Moldenke, Known Geogr.

Distrib. Erioc. 5 & 53. 1946; Moldenke, Alph. List Cit. 1: 186 (1946) and 4: 1144. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44 & 211. 1949; Moldenke, Phytologia 4: 203. 1953; Prain, Ind. Kew. Suppl. 4, imp. 2, 170. 1958; Moldenke, Résumé 52 & 489. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 97 (1971) and 2: 957. 1971.

Ruhland (1900, 1903) cites only the type collection of this species, C. Wright 3744. He comments (1900) that "Praecedenti [P. seslerioides] speciei valde affinis, foliis subpersistenter villosis et pedunculis brevissimis, 3-costatis ad illa satis differre videtur. Tamen comparatione quam numerosissimorum specimium probandum est, utrum re vera species distincte an modo illius varietas sit" and (1903) "Speciei praecedenti proxima quamquam habitu alieno".

The León & Victorin 18852, distributed as P. retusus, is actually P. alsinoides var. minimus Jennings.

Additional citations: CUBA: Pinar del Río: Ekman 11064 (S), 12806 (S). Province undetermined: C. Wright 3744 (S—isotype).

PAEPALANTHUS RHIZOCEPHALUS Alv. Silv., Fl. Mont. 1: 126—127, pl. 78. 1928.

Synonymy: Paepalanthus rhyzocephalus Alv. Silv., Fl. Mont. 1: pl. 78. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 126—127, pl. 78. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Phytologia 2: 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 328, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 589 & 957. 1971; Moldenke, Phytologia 23: 418 (1972) and 28: 439. 1974.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 78. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 832) "Sub rupibus inter Itacambira et Juramento", Minas Gerais, Brazil, in July, 1926, and is deposited in the Silveira herbarium. He says of it (1928) "Species a P. viridulo Ruhl. pedunculis capillaceis et bracteis involucrantibus obtusis praecipue differt; a P. filoso Ruhl. pedunculis capillaceis haud striatis neque applanatis, pilis supremi bractearum acutis et vaginis altioribus differt."

Hunt calls it a "small white-flowered herb" and found it growing on boulders at the foot of a sheet-conglomeritic sandstone cliff, at 600—1000 meters altitude, flowering in June.

Citations: BRAZIL: Goiás: W. R. Anderson 8188 (Z). Mato Grosso: D. R. Hunt 6002 [Hunt & Ramos 6002] (N).

PAEPALANTHUS RHIZOMATOSUS Alv. Silv., Fl. Mont. 1: 148—149, pl. 92. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 148—149 & 412, pl. 92. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W.

Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101 & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 957. 1971; Moldenke, Phytologia 30: 93. 1975.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 92. 1928.

This species is based on A. Silveira 761 from "In campis prope Baraunas, in Serra Geral", Minas Gerais, Brazil, collected in June, 1925, and deposited in the Silveira herbarium. Silveira (1928) says that this "Species a P. Macrocephalo (Bong.) Koern. caule ramoso, foliis glabris et capitulis majoribus praecipue differt". The illustration is cited as "Tabula XCIII" in the text, but as "Tabula XCII" under the figure. Plate XCII in the text is said to represent P. myriophyllus Alv. Silv., but the illustration of P. myriophyllus is labeled as plate "XCIIL", doubtless a typographic error for "XCIII". Thus it appears that the two plates (or the two descriptions) have merely had the plate numbers reversed.

Thus far this species is known only from the original collection.

PAEPALANTHUS RIEDELIANUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 383. 1863.

Synonymy: Eriocaulon riedelianum Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831. Eriocaulon vauthierianum Guill. in Deless., Icon. Select. 3: 57—58 & 67, pl 95. 1837. Paepalanthus vauthierianus Kunth, Enum. Pl. 3: 500—501. 1841. Eriocaulon vauthurianum Guill. ex D. Dietr., Syn. Pl. 5: 259, sphalm. 1852. Paepalanthus riedelianus Körn. in Mart., Fl. Bras. 3 (1): 383. 1863. Dupatya riedeliana (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon vautherianus Guill. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 879. in syn. 1893. Dupatya riedeliana Kuntze apud Durand. & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902. Paepalanthus riedelianus var. macrocephala Alv. Silv., Fl. Mont. 1: 412. 1928. Eriocaulon vautherianum Guill. ex Moldenke, Known Geogr. Distrib. Erioc. 41, in syn. 1946.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 630. 1831; Bong., Ess. Monog. Erioc. 30. 1831; Guill. in Deless., Icon. Select. 3: 57—58 & 67, pl. 85. 1837; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 5: pl. 34. 1839; Steud., Nom. Bot., ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 500, 575, 576, 614, & 625. 1841; D. Dietr., Syn. Pl. 5: 259 & 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 278, 279, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 383—384 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 879 (1893) and imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 126, 143, 284, 287, 288, 291, & 292. 1903; Alv. Silv., Fl. Mont. 1: 412. 1928; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind.

Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 879 (1946) and imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, 39, 41, 53, & 55. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 101, 282, 291, 293, 328, 329, & 489. 1959; Moldenke, Résumé Suppl. 1: 22. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 879 (1960) and imp. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 166 & 485 (1971) and 2: 510, 516, 589, 592, & 957. 1971; Moldenke, Phytologia 30: 83. 1975.

Illustrations: Guill. in Deless., Icon. Select. 3: pl. 95. 1837; Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 5: pl. 34. 1839.

Bongard's original (1831) description of this species is "acaule; pilosum; foliis caespitosis pedunculos subaequantibus erectis lineari-lanceolatis acuminatis canescentibus ciliatis; pedunculis caespitosis incanis.....Habitat in arenosis humidis prope Marahu provinciae Bahiae, ubi legit et benevole mecum communicavit D. Riedel....Flor....¼." This description is repeated virtually verbatim by Kunth (1841). For P. vautherianus Kunth says "Valde affinis Eriocaulo Riedeliano Bong., differre videtur praecipue foliis obsolete acutis (nec acuminatis) pedunculisque vix pilosis (nec incanis).....Praecedenti [P. blepharophorus (Bong.) Kunth] proximus, nisi ejus forma?; an stigmata vere indivisa?"

Ruhland (1903) cites the type collection from Bahia and also L. Riedel s.n. [Serro Frio] and Schwacke 13433 from Minas Gerais. He comments that the "Species habitu P. eriophaeo Ruhl. simillima, pedunculis brevibus foliorumque indumento ab affinibus longe distincta. Bracteae involucrantes specimimum a cl. Schwacke collectorum dense ciliatae, sed dorso fere glabriusculae sunt."

It should be noted that Eriocaulon vauthieri Ruhl. is a synonym of E. koernickei Britten.

Citations: BRAZIL: Minas Gerais: P. Clausen s.n. [Aug.—April 1840] (Br, N, N—photo, Z—photo); Schwacke 13433 (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS RIGIDIFOLIUS Alv. Silv., Fl. Mont. 1: 66—67, pl. 38 [as "viridifolius"]. 1928.

Synonymy: Paepalanthus viridifolius Alv. Silv., Fl. Mont. 1: pl. 38. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 66—67 & 412, pl. 38. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 477. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 15 & 53. 1946; Moldenke, Phytologia 2: 381. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Moldenke, Résumé 101, 329, & 489. 1959; Moldenke, Fifth Summ. 1: 166 (1971) and 2: 592 & 957. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 38 [as "viridifolius"]. 1928.

This species is based on A. Silveira 701 from "In campis in Chapada do Coupe", Minas Gerais, Brazil, collected in April, 1918, and deposited in the Silveira herbarium. So far it is known only from the original collection.

PAEPALANTHUS RIGIDULUS Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 15 & 42, pl. 2, fig. 1--7. 1835.

Synonymy: Papulanthus rigidulus Mart. ex Steud., Nom. Bot., ed. 2, 1: 586, in syn. 1840. Eriocaulon rigidulum Mart. ex D. Dietr., Syn. Pl. 5: 260. 1852. Paepalanthus rigidulus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 396. 1863. Dupatya rigidula (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon rigidulum Steud. ex Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 879, in syn. 1893. Dupatya rigidula Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902.

Bibliography: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 15 & 42, pl. 2, fig. 1--7. 1835; Steud., Nom. Bot., ed. 2, 1: 586 (1840) and ed. 2, 2: 247. 1841; Kunth, Enum. Pl. 3: 510 & 625. 1841; Schnitzl., Iconogr. 1: pl. 46. 1845; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 296, 396, 397, & 507. 1863; Kuntze, rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 879 (1893) and imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 284, 287, & 291. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 483. 1906; Alv. Silv., Fl. Mont. 1: 236 & 412. 1928; Stapf, Ind. Lond. 4: 519. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145 & 483. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 879 (1946) and imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 15, 31, 39, & 53. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 87 & 211. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145 & 483. 1959; Moldenke, Résumé 101, 282, 291, & 489. 1959; Moldenke, Résumé Suppl. 1: 18. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 879 (1960) and imp. 3, 2: 402. 1960; Moldenke, Fifth Summ. 1: 166 & 485 (1971) and 2: 510, 589, 593, & 957. 1971; Moldenke, Phytologia 30: 40, 78, & 111. 1975.

Illustrations: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): pl. 2, fig. 1--7. 1835; Schnitzl., Iconogr. 1: pl. 46 (in color). 1845.

This species is apparently based on an unnumbered Martius collection from "in subalpinis" at Villa do Rio de Contas, Bahia, Brazil, deposited in the herbarium of the Botanisches Staatssammlung in Munich where it was photographed by Macbride as his type photograph number 18722. The original description is "Caule perbrevi, simplici, lanuginoso; foliis caespitosis, erectis, linearilanceolatis, acuminatis, nervosis, glabriusculis, vaginas truncatas, integras subquadruplo superantibus, subaequantibus scapos compresso-planos lineares 8--20-fidos; capitulis subglobosis;"

[to be continued]

NOTEWORTHY GRASSES FROM MEXICO III[1]

Alan A. Beetle, Range Management Section, University of Wyoming, University Station, P. O. Box 3354, Laramie, Wyoming 82071.

For previous papers see Phytologia 27(6):441-444, Jan., 1974: Phytologia 28(4):313-318, Aug., 1974.

Bothriochloa saccharoides (Sw.) Rydb. var. laguroides (DC) comb. nov. Based on Andropogon laguroides DC. Cat. Hort. Monsp. 78. 1813. Andropogon saccharoides var. laguroides (DC) Hack. in Mart. Fl. Bras. 2(3):293. 1883.

Although Andropogon laguroides DC. (Mexican sourgrass) was described from Mexico it has only been treated with consistency as a species in South America.

This grass was first included in the Argentine flora by Hackel in Flora Brasiliensis (1883) as follows: "Habitat in Brasilia australi (Sello) - in Mexico (Schiede), prope Montevideo (Gaudichaud), in Argentine (ex Grisebach)" and was accepted by Stuckert, 1904, in "Gramineas Argentinas" as Andropogon saccharoides var. laguroides (DC) Hack.

South American treatments of this grass as a species include:

1939. Parodi, L.R. Gramineas Bonarienses, third edition.
1943. Parodi, L.R. Veg. del Dept. de San Martin. Darwiniana 6:127-178.
1946. Parodi, L.R. Gramineas Bonarienses, fourth edition.
1948. Roseveare, G.M. The grasslands of Latin America. Imperial Bureau Bul. 36.
1948. DeAraujo, A.A. O Graminado disclimax. Rio Grande do Sul, Brazil.
1949. Cabrera, A.L. Las communidades vegetales de los alrededores de la Plata. Lilloa 20:269-276.
1950. Crovello, R. Martinez & B.G. Piccinini. La vegetacion de la Republica Argentina Rev. Inves. Agric. 4(2):188.
1952. Clos, E.C. Catalogo general 1951 de la Division de exploraciones e introduccion de plantas. Rep. Arg. Inst. Fito. publ. tec. 68.

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[1] Published with approval of the director, Wyoming Agricultural Experiment Station as Journal Article No. 706.

1957. Burkart, A. La vegetacion del Delta del Rio Parana. Darwiniana 11:457-460.
1958. Parodi, L.R. Gramineas Bonarienses, fifth edition.
1962. Hawkins, H.S. and C.M. Donald. Pasture development in the beef cattle regions of Argentina. Jour. Brit. Grassland Soc. 17:245-259.
1962. Diaz, H.B. Jornados forrajeras del noroeste Argentian. Est. Exp. Agric. de Tucuman Publ. Misc. 12.
1969. Burkart, A. Flora Illustrado de Entre Rios (Argentina) Parte II. Gramineas. Buenos Aires.
1972. Rosengurtt, B. et al. El caracter lipido del endosperma central en especies de Gramineas. Bol. Univ. de La Republica Urguay 124.

Any treatment of Andropogon laguroides DC. depends first on an understanding of Andropogon saccharoides Sw. (1788) described from Jamaica and the earliest available specific epithet in the complex. In relation to typical A. saccharoides its variations have been treated as varieties (Grisebach, 1879; Hackel, 1883, 1889 and 1894; Vasey, 1894 and 1896; Eckman, 1912; Krause, 1914; Standley, 1931; Gould, 1955, 1957, and 1967) and varieties have the longest and most frequent treatment. The two previous transfers attached to Bothriochloa saccharoides have both been varieties.

However, (1) subspecies have been used (Hackel, 1889; Hitchcock, 1927) and
(2) subvarieties have been used (Hackel, 1883, 1889 and 1911; and Roberty, 1960). Hackel used subvar. in 1883 as subdivisions of varieties. Hackel used subvar. in 1889 as subdivisions of subspecies. Roberty used subvar. in 1960 as subdivisions of species.

Taxonomy in its purest sense reflects the evolutionary pattern. Taxonomy in its most practical sense reflects the status quo, that is, the present day field situation. Apparently in Andropogon it has been found difficult to do both within the same taxonomic framework.

Not all the difficulty has been concentrated at the specific and subspecific level. Andropogon has been used to include such oft-times recognized genera as Schizachyrium, Bothriochloa, Dichanthium and even the more traditional Sorghum and Sorghastrum.

Bothriochloa has usually been treated to include both Old World and New World species but Roberty suggests that its use (as Section Amphilophis under Dichanthium) be confined to one species (B. saccharoides) which is essentially New World but has two "sub-varieties" in Australia. One of these is the grass in question treated as Dichanthium saccharoides subvar. laguroides (DC) Roberty, distributed from Oklahoma to Uruguay.

Since the plants associated with A. saccharoides, e.g. saccharoides, laguroides, longipaniculatus, and torreyanus, have all been, at times, recognized as distributed from s.w. United States to Uruguay, the question of separation of the types "torreyanus" and "laguroides" seems to be the key to a taxonomic treatment. Andropogon laguroides DC., after careful review of herbarium material and published reports, is here considered to be synonymous with Andropogon torreyanus Steud., and best treated, as has most consistently been done in the past, as a variety of A. saccharoides.

Since Bothriochloa has been accepted internationally this name should be transferred to that genus.

Bothriochloa saccharoides (Sw.) Rydb. var. laguroides (DC) comb nov.

Andropogon laguroides DC. Cat. Hort. Monsp. 78. 1813.
Andropogon laguroides Lagasca, Gen. et Spec. nov. 3. 1816.
Andropogon glaucum Torr. Ann. Lyc. N.Y. L:153. 1824; not Retz., 1789; not Muhl., 1817.
Trachypogon laguroides Nees, Agrost. Bras. 349. 1829.
Andropogon jamesii Torr. in Marcy, Expl. Red. River 302. 1853.
Andropogon torreyanus Steud., Nome Bot. ed. 2. 1:93. 1840 nomen; Steud. Syn. Pl. Glum. 1:392. 1854.
Andropogon saccharoides var. laguroides (DC) Hack. in Mart. Fl. Bras. 2(3):293. 1883.
Andropogon laguriformis Griseb. Symbol. Flor. Arg. 309. 1879.
Andropogon saccharoides Sw. subsp. laguroides (DC) Hackel, in DC. Monograph. Phanerog. 6:495. 1889.
Andropogon saccharoides subsp. genuinus var. torreyanus (Steud.) Hack. in DC. Monogr. Phan. 6:495. 1889.

Andropogon saccharoides var. glaucus (Torr.) Scribn. Mem. Torrey Bot. Club 5:28. 1894.
Amphilophis torreyanus (Steud.) Nash in Britton, Man. 71. 1901.
Holcus saccharoides (Sw.) Kuntze var. laguroides (DC) Hack. ex Stuck. Anal. Mus. Nac. Buenos Aires 11:48. 1904.
Bothriochloa laguroides (DC) Herter, Rev. Sudam. Bot. 6:135 (Junio) 1940; (DC) Pilger in Engler et al., Die Naturl. Pflanzenfam., ed. 2, 14e:160, fines de 1940.
Bothriochloa saccharoides var. torreyana (Steud.) Gould, Southw. Nat. 3:212. 1959.
Dichanthium saccharoides (Sw.) Roberty subvar. laguroides (DC) Roberty, Boissiera 9:168. 1960.
Dichanthium saccharoides (SW) Roberty subvar. torreyanum (Steud.) Roberty, Boissiera 9:168. 1960.

KEY

Culms 60 to 150 cm. tall, leafy, simple; nodes always white hispid; blades 2-8 mm. wide; panicle 5-15 cm. long: spikelets 3.2-5 mm. long; awn 15 to 20 mm. long.

Bothriochloa saccharoides var. saccharoides

Culms 30 to 100 cm. tall, in dense clumps, the leaves tending to be basal; nodes short bearded or often glabrous; blades 2-6 mm. wide; panicle 4-10 cm. long, spikelets 2.8-3.5 mm. long; awn 10-16 mm. long.

Bothriochloa saccharoides var. laguroides

Both Bothriochloa saccharoides var. saccharoides and Bothriochloa saccharoides var. laguroides are widespread in Mexico but var. laguroides is more common.

MUHLENBERGIA SINUOSA Swallen, which was described in 1947 from New Mexico and reported then from Arizona, is a common annual in both southern Sonora and northern Chihuahua. Collections include Chihuahua: at Ranch Teseachic, collected by Ganboa Gonzalez y Lopez; Sonora: between El Coyote and Bavispe, juniper/oak savanna, Beetle M - 2045.

AGROSTIS BOREALIS Hartm. has been reported from Mexico on the basis of Liebman collections which had no exact locality. A. borealis has been collected in Puebla: east of Esperanza, Beetle M - 3012, in an area that Liebman might easily have visited.

BROMUS DIANDRUS Roth (B. rigidus Roth) which previously has been reported introduced in Baja California Norte has now been collected in Puebla: east of Esperanza, Dec., 1973, Beetle M - 3008.

ARISTIDA PENINSULARIS Hitchc. is endemic to the Sonoran desert area of Baja California and the adjacent mainland. Its nearest relative appears to be an undescribed species from Peru.

ARISTIDA PERUVIANA sp. nov.

Gramen annuum; culmi dense fasciculati; ligula ad seriem pilorum reducta; foliorum laminae planae demum convolutae, glaberrimae, 1 - 2 mm. latae; gluma inferior 5 - 6 mm. l., superior 10 mm. long., lemma ca. 9 mm. l., callus barbatus; aristae 15 ad 30 mm. l., seta mediana usque ad 27 mm. l., laterales parum breviores.

Type: Peru, Dept. Arequipa, Prov. Islay, south of Mollendo, sand dunes near ocean, Nov. 17, 1935. Collected by Ynes Mexia 4172 in Herb. Univ. of California (Berkley). Other collections include Weberbauer 6867, Arequipa (cited by McBribe, 1936, Field Museum of Natural History 13:183, under Aristida adscensionis L.); Hutchinson 502, Moquequa; and E. Anderson 733, Dept. Piura, 10 kil. e. of Piura.

First glume 10 mm. long, second glume 20 mm. long, awns 4 to 5 cm. long. A. peninsularis Hitchc.

First glume 5-6 mm. long, second glume 10 mm. long, awns 1.5 to 3 cm. long. A. peruviana Beetle

ARISTIDA PERUVIANA

Annual, bush; sheaths glabrous; ligule a conspicuous row of hairs; blades flat or somewhat involute; panicles numerous; glumes unequal, 1-nerved, the first 4 mm. long, the second 10 mm. long; lemma about 9 mm. long, glabrous below, minutely scaberulous toward the summit; callus well developed, densely pubescent; awns about equal, 1.5 to 3 cm. long, a central awn sometimes 2 mm. longer than the laterals, awns flexuous and divergent and twisting at maturity.

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NOTES ON NEW AND NOTEWORTHY PLANTS. LXXVI

Harold N. Moldenke

LIPPIA HOEHNEI var. GOYAZENSIS Moldenke, var. nov.

Haec varietas a forma typica speciei recedit foliis ovato-ellipticis usque ad 4.5 cm. longis 3 cm. latis ad apicem argute acutis vel breviter subacuminatis.

This variety differs from the typical form of the species in its smaller and rather narrowly ovate-elliptic leaves which are only to 4.5 cm. long and 3 cm. wide, sharply acute or shortly subacuminate at the apex, with the margins finely serrulate.

The type of the variety was collected by Gert Hatschbach (no. 34642) in "campo cerrado" at Rod. Br. 060, in the municipality of Mineiros, Goiás, Brazil, on July 20, 1974, and is deposited in the H. N. Moldenke herbarium at Plainfield, New Jersey.

The collector describes the plant as erect, 1 meter tall, the flowers rose-colored.

FUNGI AND DISEASES OF ERYTHROXYLUM

BY

P. L. Lentz, B. R. Lipscomb, and D. F. Farr

Mycology Laboratory, Plant Protection Institute
Agricultural Research Service, U.S. Department of Agriculture
Beltsville, Maryland 20705

This is a report on the occurrence and pathogenicity of 54 fungi and a witches'-broom on Erythroxylum. Records for preparation of the report were assembled by the staff of the Mycology Laboratory. Detailed supporting data have been assimilated and condensed for preparation of this report.

The genus Erythroxylum includes perhaps 200 species situated principally in Central and South America and the West Indies, and also in Africa, Madagascar, Southern Asia and the Southern Pacific area (Schulz, 1907; Willis, 1966). Most familiar is E. coca Lam., a native South American plant from which cocaine is extracted (Rogers, 1963). Although E. coca is thus economically significant, little is known about its diseases or those of other species in the genus. The literature of phytopathology includes few references specifically to pathogens of Erythroxylum, and no comprehensive account. This void is filled by the following report based on information obtained from abstract-journals; mycological and phytopathological books and journals; data files of the Plant Pathogens Index in the National Fungus Collections (BPI); and herbarium collections, also in BPI. Abstract-journals that were consulted include Abstracts of Mycology, Bibliography of Agriculture, Biological Abstracts, Horticultural Abstracts, Review of Applied Mycology, and Review of Plant Pathology. Also, P. A. Saccardo's Sylloge Fungorum (1882-1931) and the Phytopathology Index of the National Agricultural Library were surveyed. Distribution and other records not accompanied by literature citations were derived from data available in the Plant Pathogens Index or herbarium. The following discussion is presented in six sections based primarily on characteristics of disease production.

SECTION I: WITCHES'-BROOM

1. ESTALLA (WITCHES'-BROOM)

Occurrence: E. coca - Bolivia.

Witches'-broom of coca is discussed in papers by Cardenas. Originally (1944), he suggested that the disease resulted from physiological disturbances, perhaps involving a virus. Later (1948), Cardenas seemed convinced that a virus was responsible, with a small, black aphid as the vector. The disease transforms leaves into reduced, scaly structures compactly grouped as a witches'-broom. Further information is needed before the importance of this disease can be determined.

SECTION II: THREAD-BLIGHT AND CORTICIOID PATHOGENS

2. CORTICIUM INVISUM Petch, Roy. Bot. Gard. Peradeniya Ann. 9: 316. 1925.

Occurrence: E. coca - Ceylon.
Camellia sinensis (L.) Ktze. - Ceylon.
Oxyanthus tubiflorus DC. - Ceylon

Petch (1921, 1922) originally referred this fungus to C. theae Bernard, which may belong in the genus Thanatephorus (with Rhizoctonia hyphal stages). Later (1923, 1924), he decided that the Ceylon fungus was not C. theae and he finally (1925) named it as C. invisum. According to Donk (1958), C. invisum seems much like Koleroga noxia Donk (Pellicularia koleroga Cke.), a pathogenic thread-blight fungus on many hosts in the Tropics. At present, C. invisum must be regarded as possibly synonymous with K. noxia. In Ceylon, it causes a black rot of coca and tea plants.

3. CORTICIUM PERVAGUM Petch, Roy. Bot. Gard. Peradeniya Ann. 9: 316. 1925.

Occurrence: E. coca - Ceylon.

According to Talbot (1965), the original description of C. pervagum can be interpreted as characterizing a species of Ceratobasidium. Petch (1925) described the fungus as parasitic, with hyphae overrunning and killing leaves and twigs.

Donk (1958) wrote that it may be close to Koleroga noxia, which causes thread-blights of tropical plants. Regardless of its precise identity, C. pervagum apparently is a thread-blight fungus. Although harmful to crop production, thread-blight can be controlled by copper sprays (Theis et al., 1959).

4. CORTICIUM SALMONICOLOR Berk. & Br., Linn. Soc. Bot. J. 14: 71. 1875.

Synonymy: Botryobasidium salmonicolor (Berk. & Br.) Venkatarayan, Indian Phytopath. 3: 82. 1950.
Pellicularia salmonicolor (Berk. & Br.) Dastur, Current Sci. 15: 193. 1946.
Corticium zimmermanii Sacc. & Syd., in Sacc., Syll. Fungorum 16: 1117. 1902.
Corticium javanicum Zimmerm., Centralbl. Bakt. 7: 103. 1901; non C. javanicum (P. Henn.) Sacc. & Syd., in Sacc., Syll. Fungorum 16: 189. 1902.

Occurrence: E. coca - South America; Ceylon, Java.
Many hosts - Ubiquitous in tropical areas.

This fungus causes "pink disease" on branches, twigs, and leaves of many tropical plants. According to Fröhlich and Rodewald (1963), who wrote about pink disease of rubber trees, control can be accomplished with copper sprays, or the affected parts of plants may be removed.

5. HYPOCHNUS ERYTHROXYLI Sawada, Natl. Taiwan Univ. Col. Agr. Spec. Publ. 8. p. 100-101. 1959.

Occurrence: E. coca - Taiwan.

This fungus is known only from Sawada's description (1959). Probably it is a species of Thanatephorus, thus close to T. cucumeris (Frank) Donk (Rhizoctonia solani Kühn) and Pellicularia sasakii (Shirai) S. Ito. According to Sawada, it attacks the basal parts of young coca seedlings. Sclerotia develop on the lesions and fruiting areas appear farther above soil level.

6. PELLICULARIA SASAKII (Shirai) S. Ito, Mycol. Fl. Japan 2(4): 107. 1955.

Synonymy: Pellicularia filamentosa (Pat.) Rogers f. sp. sasakii (Shirai) Exner, Mycologia 45: 717. 1953.
Corticium sasakii (Shirai) Matsumoto, Sapporo Nat. Hist. Soc. Trans. 13: 119. 1934.
Hypochnus sasakii Shirai, Bot. Mag. Tokyo 20: 319. 1906.

Occurrence: E. coca - India, Japan, Java, Philippines, Taiwan.
Many hosts - Louisiana; India, Japan.

This is a thread-blight type of fungus that causes a so-called "banded sclerotial disease" of leaves. Donk (1958) placed it in the genus Thanatephorus together with T. cucumeris, the basidial stage of Rhizoctonia solani. R. solani is a well-known pathogen which is particularly troublesome because of its ability to form sclerotia that persist in the soil as infective agents. Sawada (1959) said that P. sasakii does not produce sclerotia, but Butler (1918), Matsumoto (1934) and Exner (1953) all mentioned sclerotial formation by fungi identified as P. sasakii.

SECTION III: RUST FUNGI

7. BUBAKIA ERYTHROXYLONIS Cumm., Mycologia 48: 601. 1956.

Synonymy: Bubakia erythroxylonis (Graz.) Cumm., Torrey Bot. Club Bull. 67: 69. 1940, nom. nud.
Uredo erythroxylonis Graz., Soc. Mycol. France Bull. 7: 152. 1891; as U. erythroxyli Graz., in Sacc., Syll. Fungorum 11: 224. 1895.

Occurrence: E. coca - Argentina, Bolivia, Colombia, Costa Rica, Ecuador, Panama, Peru; possibly Brazil, Cuba Puerto Rico, Venezuela.
E. spp. - Bolivia, Brazil, Cuba, Dominican Republic, New Guinea, Puerto Rico, Venezuela, Virgin Islands.

Cummins (1939) reported Bubakia sp. on Erythroxylum from Central and South America and New Guinea. Apparently this is the same fungus that he later (1940) recognized as B. erythroxylonis. Arthur (1918) said that the uredial stage is common wherever coca is cultivated. According to Bues (1914), the disease develops slowly and results in yellowing of leaves and premature defoliation. Spegazzini (1920) found the rust

on 1-2 percent of leaves that he examined. Although the fungus is well established throughout much of the area in which Erythroxylum grows, apparently it does not represent a serious threat to host plants in South America.

8. CRONARTIUM GILGIANUM P. Henn., Engler's Bot. Jahrb. 22: 83. 1895.

Synonymy: Cronartium bresadoleanum P. Henn., in Engler, Die Pflanzenwelt Ostafrikas und der Nachbargebiete, Teil C, p. 51. 1895.

Occurrence: E. sp. - Tropical Africa.
Euclea sp. - Tropical Africa.
Royena sp. - Tropical Africa.

This rust is capable of causing moderately severe spotting of leaves, with abundant production of teliosori. Apparently it occurs on several hosts in Africa, but information about its importance is lacking.

9. PUCCINIA ERYTHROXYLI Viegas, Bragantia 3: 53-54. 1943.

Synonymy: Chaconia erythroxyli (Viegas) Viegas, Indice Fungos America do Sul p. 405. 1963, without reference to original publication.

Occurrence: E. suberosum St. Hil. - Brazil.

Figure 6 of Viegas (1943) shows that the teliospores of this rust are 2-celled, as in Puccinia. According to Mains (1938), teliospores of Chaconia are 1-celled. Thus the rust that Viegas described should be retained in Puccinia. P. erythroxyli is quite unlike Bubakia erythroxylonis, the common rust of Erythroxylum. Only the teliospore stage is known and further studies are required for determination of pathogenesis.

SECTION IV: OTHER SIGNIFICANT PATHOGENS

Deuteromycetes (Nos. 10-15)
Ascomycetes (Nos. 16-21)
Basidiomycetes (Nos. 22-24)

10. CERCOSPORA ERYTHROXYLONIS Gov. & Thirum., Sydowia 9: 221. 1955.

Occurrence: E. monogynum Roxb. - India.

Leaf spots develop mostly on the lower surface. Govindu and Thirumalachar (1955) found no record of any other Cercospora on Erythroxylaceae. Although Cercospora is an asexual stage of Mycosphaerella, no relationship has been found between C. erythroxylonis and M. erythroxyli (Speg.) Morelet, which occurs on E. coca in South America. Until shown otherwise, every Cercospora must be regarded as a potentially significant pathogen. Various species cause diseases of economically important plants, including Sigatoka of bananas, yellow spot of sugarcane, and frog-eye leaf spot of soybean.

11. CERCOSPORELLA COCAE Speg., Soc. Cient. Argentina An. 90: 31. 1920.

Occurrence: E. coca - Argentina.

Spegazzini (1920) considered C. cocae as an asexual stage of Sphaerella erythroxyli Speg. See additional discussion under Mycosphaerella erythroxyli (No. 16).

12. COLLETOTRICHUM COCAE Speg., Soc. Cient. Argentina An. 90: 31. 1920.

Occurrence: E. coca - Argentina.

According to Spegazzini (1920), C. cocae is an asexual stage of Sphaerella erythroxyli, but Arx (1957) reported that it is synonymous with C. gloeosporioides Penz., a well-known and ubiquitous plant pathogen. See additional discussion under Mycosphaerella erythroxyli (No. 16).

13. GLOEOSPORIUM sp.

Occurrence: E. coca - South America; Java.

The South American record is by Viegas (1961), and it consists only of the host listing. The report from Java (Hall, 1925) is more significant, for it refers to a loss of up to 50 percent of seedlings. Since Hall also mentioned "Gloeosporium?"

and "Gloeosporium-type" infection, the identity of the fungus is uncertain. "Gloeosporium" could be a form of Colletotrichum gloeosporioides, but this cannot be determined on the basis of literature records.

14. PHYLLOSTICTA ERYTHROXYLONIS Graz., Soc. Mycol. France Bull. 7: 154. 1891.

Occurrence: E. coca - Bolivia, Colombia, Peru.

At the time that he described Mycosphaerella erythroxyli (as Sphaerella), Spegazzini (1920) cited P. erythroxylonis as an asexual stage. Various species of Phyllosticta are leaf-spot pathogens, and some are asexual stages of Mycosphaerella. See additional discussion under Mycosphaerella erythroxyli (No. 16).

15. PHYLLOSTICTA? LEPTOSPERMA Speg., Mus. La Plata Rev. 15: 33. 1908.

Occurrence: E. suberosum - Brazil.

The significance of this fungus as a pathogen is unknown. Before any assessment can be made, P. leptosperma must be studied taxonomically.

16. MYCOSPHAERELLA ERYTHROXYLI (Speg.) Morelet, Soc. Sci. Nat. Archeol. Toulon Var Ann. 20: 105. 1968.

Synonymy: Sphaerella erythroxyli Speg., Soc. Cient. Argentina An. 90: 27. 1920.

Occurrence: E. coca - Argentina.

According to Spegazzini (1920), M. erythroxyli is the ascigerous stage of Phyllosticta erythroxylonis (as P. erythroxyli), Cercosporella cocae, and Colletotrichum cocae. Arx (1957) cited Colletotrichum cocae as a synonym of C. gloeosporioides, which is an asexual stage of the ascigerous fungus Glomerella cingulata (Stonem.) Spauld. & Schrenk. However, ascospores of Glomerella are 1-celled; those of Mycosphaerella are 2-celled, as noted by Spegazzini for M. erythroxyli. Either Spegazzini was mistaken in relating Colletotrichum cocae to M. erythroxyli or Arx was misinformed when he referred C. cocae to C. gloeosporioides.

17. NECTRIA ERYTHROXYLIFOLIAE Viegas, Bragantia 3: 52. 1943.

Occurrence: E. campestre St. Hil. - Brazil.
E. suberosum - Brazil.

Relatively few species of Nectria are serious plant pathogens, usually as a cause of stem cankers. According to Viegas (1943), N. erythroxylifoliae causes grayish-red spots on the upper surface of the coca leaves. Parasitism was described as weak and perhaps secondary.

18. PHYLLACHORA ERYTHROXYLINA Petrak, in Sydow and Petrak, Ann. Mycol. 27: 32. 1929.

Occurrence: E. lucidum H.B.K. - Costa Rica.

This fungus is an ascomycete of the order Sphaeriales. It forms black fruiting bodies on the host leaves. Damage is limited essentially to leaf areas on which the ascocarps develop.

19. PHYLLACHORA USTERIANA Speg., Mus. La Plata Rev. 15: 25. 1908.

Synonymy: Phyllachora erythroxyli Viegas, Soc. Brasil. Agronom. Bol. 7(2): 61-62. 1944.

Occurrence: E. suberosum - Brazil.

The pathogenic attributes of this fungus are similar to those of P. erythroxylina.

20. PROTOMYCES? COCAE Speg., Soc. Cient. Argentina An. 90: 29-30. 1920.

Occurrence: E. coca - Argentina.

By use of a question mark, Spegazzini (1920) indicated that he was uncertain about a genus name for this fungus. Protomyces is not well understood. According to Ainsworth (1971), it belongs in the hemiascomycetous order Protomycetales, together with Taphridium and Protomycopsis. Heim (1967) reported that it is allied with the Chytridiales. The position of the genus was discussed also by Gjaerum (1964). The original description of P. cocae suggests that its pathological effects are similar to those of P. macrosporus Unger, a species

that parasitizes Aegopodium podograria L. According to Butler and Jones (1949), P. macrosporus causes "a simple stem gall... where there is a hyperplasy of the outer cortical cells, restricted to those in the neighbourhood of the intercellular hyphae."

21. XYLARIA APICULATA Cke., Grevillea 8: 66. 1879.

Synonymy: Xylaria cookei Lloyd, Mycol. Notes 5, Large Pyrenomycetes p. 25. 1919.
Xylaria venosula Speg., Acad. Nac. Cienc. Cordoba Bol. 11: 133. 1889.

Occurrence: E. coca - Brazil, Dominican Republic, Puerto Rico, Trinidad; also Ceylon, China, Java, Rhodesia.
Hevea brasiliensis (Willd ex A. Juss.) Muell.-Arg. - Ceylon.
Solanum tuberosum L. - Florida.
Other hosts - Brazil, Dominican Republic, Trinidad; also New Zealand.

Steinmann (1928) reported that X. apiculata was associated with dying coca plants in central Java, and that it seemed responsible for their deaths. A black hyphal mass covered roots and stem bases, and ascocarps of the Xylaria developed on stem bases near soil level. A few other pathogenic kinds of Xylaria are known, including X. mali Fromme on apple and X. thwaitesii Berk. & Cke. on coffee and rubber. Dissemination of X. apiculata apparently is by means of hyphal strands that grow through the soil and enter host roots.

22. ARMILLARIELLA MELLEA (Vahl ex Fr.) Karst., Flor. Faun. Fenn. Acta 2(1): 4. 1881.

Synonymy: Armillaria putrida Murr., N. Am. Fl. 10: 39. 1914.
Armillaria mellea (Vahl ex Fr.) Quél., Champ. Jura Vosges p. 75. 1872.
Agaricus melleus Fr., Syst. Mycol. 1: 30. 1821.

Occurrence: E. coca - South America.
Many hosts - Ubiquitous in tropical areas.

According to Smith (1949), A. mellea may be either saprobic or parasitic. Singer (1962) reported that A. mellea and the closely related A. tabescens (Scop. ex Fr.) Sing. are important pathogens of trees, and that they also damage crops such as

peanuts and sweet potatoes. A. mellea produces extensive black rhizomorphs, which facilitate dissemination within local areas. Rhizomorphs also develop in culture (Snider, 1959), and presumably they could serve as a convenient form of mass inoculum for infection experiments.

23. MYCENA CITRICOLOR (Berk. & Curt.) Sacc., Syll. Fungorum 5: 263. 1887.

Synonymy: Mycena flavida (Maubl. & Rangel) Sing., Lilloa 22: 357. 1951.
Omphalia flavida Maubl. & Rangel, Soc. Mycol. France Bull. 30: 46. 1914.
Stilbum flavidum Cke., Grevillea 9: 11. 1880.
Agaricus (Mycena) citricolor Berk. & Curt., Linn. Soc. Bot. J. 10: 285. 1869.

Occurrence: E. coca - Peru; Soviet Union.
Coffea - Brazil, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guiana, Jamaica, Mexico, Puerto Rico, Trinidad, Venezuela; West Africa.
Many hosts - Brazil, Colombia, Costa Rica, Peru, Venezuela.

This fungus causes a relatively well-known disease of coffee bushes in South America. The Stilbum stage appears on leaves in the form of detachable "gemmae" (Butler and Jones, 1949) that serve as the primary method of dissemination. Severe infection causes shedding of leaves and berries. The perfect stage is a small mushroom that develops in culture but not on the host (Brooks, 1953). Buller (1934) wrote a detailed description of this fungus and called it an extreme example of a nonspecialized parasite.

24. FOMES NOXIUS Corner, Straits Settlements Gard. Bull. 5: 342. 1932.

Synonymy: Phellinus lamaensis (Murr.) Heim, in Pascalet, Ann. Crypt. Exot. 7: 21. 1934, sensu auctt., non typis.
Fomes lamaensis (Murr.) Sacc. & Trott., in Sacc., Syll. Fungorum 21: 287. 1912, sensu auctt., non typis.
Pyropolyporus lamaensis Murr., Torrey Bot. Club Bull. 34: 479. 1907, sensu auctt., non typis.

Hymenochaete noxia Berk., in Cke., Grevillea 8: 149. 1880.

Occurrence: E. coca - Ceylon, Java, Taiwan.
Many hosts - Ubiquitous in tropical areas of Africa, Asia, western and southwestern Pacific Islands; occasionally found in South America.

Brown root rot of many economically important tropical woody plants is caused by F. noxius. According to Corner (1932), the identity of this fungus is thoroughly confused with that of the saprobic F. lamaensis. Corner referred all pathogenic collections to F. noxius. A discussion of F. noxius by Fröhlich and Rodewald (1963) includes the comment that this fungus can kill young plants within a few months.

SECTION V: FLY-SPECK AND SOOTY-MOULD FUNGI

This section includes 24 species of leaf-inhabiting fungi that cause very little damage to their hosts. They belong in various ascomycete orders, including Meliolales, Microthyriales, Asterinales, and Pseudosphaeriales.

25. AMAZONIA ERYTHROXYLI Hansford, Sydowia 11: 46. 1957.

Occurrence: E. sp. - Jamaica.

26. ASTERINA SP.

Occurrence: E. lucidum - South America (Viegas, 1961).

27. BRENESIELLA ERYTHROXYLI Syd., in Sydow and Petrak, Ann. Mycol. 27: 16. 1929.

Occurrence: E. lucidum - Costa Rica.

28. DIMERIELLA SP.

Occurrence: E. sp. - Brazil (Viegas 3693 in BPI).

29. HYMENIOPELTIS ERYTHROXYLI Batista & Vital, in Batista, Soc. Biol. Pernambuco An. 16(1): 147. 1959.

Occurrence: E. sp. - Brazil.

This is a conidial leaf-inhabiting fungus in the family Leptostromataceae of the order Sphaeropsidales. Its fruiting body resembles those of the ascomycete order Microthyriales. It is essentially harmless.

30. MELIOLA ERYTHROXYFOLIAE Batista & Vital, IV Congr. Nac. Soc. Bot. Brasil An. p. 105. 1953.

Occurrence: E. sp. - Brazil.

31. MELIOLA ERYTHROXYLONIS Ciferri, Mycopath. Mycol. Appl. 7: 127. 1954.

Occurrence: E. urbanii O. E. Schulz - Dominican Republic.

32. MICROPELTIS ERYTHROXYLINA Batista & Lima, in Batista, Monogr. Fung. Micropelt. p. 89-91. 1959.

Occurrence: E. sp. - Brazil.

33. MICROPELTIS GRAVATAENSIS Batista & Vital, in Batista, Monogr. Fung. Micropelt. p. 99-102. 1959.

Occurrence: E. sp. - Brazil.

34. MICROPELTIS PSEUDO-OSTIOLATA Batista, Monogr. Fung. Micropelt. p. 134-135. 1959.

Occurrence: E. sp. - Brazil.

35. MICROPELTIS SELECTA Batista & Lima, in Batista, Monogr. Fung. Micropelt. p. 141. 1959.

Occurrence: E. sp. - Brazil.

36. MICROTHYRIELLA ERYTHROXYLI (Batista & Vital) Batista, Monogr. Fung. Micropelt. p. 360. 1959.

Synonymy: Dictyopeltis erythroxyli Batista & Vital, IV Congr. Nac. Soc. Bot. Brasil An. p. 117. 1953.

Occurrence: E. pelleterianum St. Hil. - Brazil.

37. MICROTHYRIELLA ERYTHROXYLIANA Batista & Lima, in Batista, Monogr. Fung. Micropelt. p. 359-360. 1959.

Occurrence: E. sp. - Brazil.

38. MICROTHYRIELLA SCUTELLIFORME (Rehm) Theissen, Broteria, Bot. Ser., 12: 96. 1914.

Synonymy: Clypeolum scutelliforme Rehm, Hedwigia 37: 322. 1898.

Occurrence: E. pelleterianum - South America.

39. PARAPELTELLA ERYTHROXYLI Batista, Monogr. Fung. Micropelt. p. 286-287. 1959.

Occurrence: E. sp. - Brazil.

40. PARASTERINA BATISTAE Maia & Arx, in herb.

Occurrence: E. pelleterianum - Brazil (Maia 20102 in BPI).

41. PARODIELLA MELIOLOIDES (Berk. & Curt.) Cke. Grevillea 13: 106. 1885.

Synonymy: Nectria megalospora Sacc. & Berl., Rev. Mycol. 7: 157. 1885.
Rosellinia melioloides (Berk. & Curt.) Sacc., Syll. Fungorum 2: 276. 1883.
Sphaeria melioloides Berk. & Curt., Linn. Soc. Bot. J. 10: 387. 1869.

Occurrence: E. pulchrum St. Hil. - South America.

42. PARODIELLA PARAGUAYENSIS Speg., Soc. Cien. Argentina An. 18: 285. 1884.

Occurrence: E. ovalifolium Peyritsch - Brazil.
Evolvulus sp. - Paraguay.

Sydow and Petrak (1931) reported the occurrence of this fungus in the Philippines, and several varieties have also been described. The relationships of these with Spegazzini's fungus are uncertain.

43. SCOLECOPELTIDIUM ERYTHROXYLI Batista & Lima, in Batista, Monogr. Fung. Micropelt. p. 195-196. 1959.

Occurrence: E. sp. - Brazil.

44. SEYNESIA PIRAGUENSIS Speg., Soc. Cien. Argentina An. 19: 256. 1885.

Occurrence: E. pulchrum - South America (Viegas, 1961).
Lauraceae - Brazil.

45. SPEGAZZINIELLA ERYTHROXYLIANA Batista, Monogr. Fung. Micropelt. p. 343. 1959.

Occurrence: E. sp. - Brazil.

46. SPEGAZZINIELLA ERYTHROXYLICOLA Batista & Lima, in Batista, Monogr. Fung. Micropelt. p. 344. 1959.

Occurrence: E. sp. - Brazil.

47. SPEGAZZINIELLA FIMBRIATA Batista, Mongr. Fung. Micropelt. p. 345. 1959.

Occurrence: E. sp. - Brazil.

48. STOMIOPELTIS SUTTONIAE (Mendoza) Luttrell, Mycologia 38: 587. 1946.

Synonymy: Stomiopeltella suttoniae Mendoza, Bot. Gaz. 79: 292. 1925.

Occurrence: E. sp. - Brazil (Batista, 1959).

49. THYROSOMA PULCHELLUM Syd., Ann. Mycol. 19: 307. 1921

Occurrence: E. ecarinatum Burck - Indonesia.

SECTION VI: SAPROBIC AND ENTOMOGENOUS FUNGI

50. ASCHERSONIA TURBINATA Berk., Nat. Hist. Ann., Ser. 2, 9: 192. 1852.

Occurrence: E. coca - Bolivia.
Insects - South America and West Indies; Florida.

This is an entomogenous fungus. The ascomycete stage of this conidial form is Hypocrella turbinata Petch.

51. ASPERGILLUS CINEREUS Speg., Soc. Cient. Argentina An. 10: 162. 1880.

Occurrence: E. coca - Argentina.

Spegazzini (1920) reported that this fungus grows on poorly dried leaves of coca. According to Raper and Fennell (1965), it is a conidial fungus, but not identifiable.

52. CLAVULINA LEVEILLEI (Sacc.) Overeem, Jard. Bot. Buitenzorg Bull., Ser. 3, 5: 260. 1923.

Synonymy: Clavulina fusco-lilacina (Berk.) Overeem, sensu Overeem, non typis, Jard. Bot. Buitenzorg Bull., Ser. 3, 5: 262. 1923.
Clavaria fusco-lilacina Berk., sensu Overeem, non typis, Jard. Bot. Buitenzorg Bull., Ser. 3, 5: 262. 1923.
Clavaria leveillei Sacc., Syll. Fungorum 6: 709. 1888.

Occurrence: E. coca - Java.

This fungus probably is not a pathogen. According to Corner (1950), it grows on the ground in the forests of Java and Malaya. Steinmann (1928) reported its occurrence as a saprobe on diseased roots of coca in central Java. It belongs in the basidiomycete order Polyporales.

53. HYPOCHNUS RUBROCINCTUS Ehrenb., Nees's Horae Physic. Berolinensis p. 84. 1820.

Occurrence: E. coca - Venezuela.

This fungus was reported on coca by Bues (1914). No other such report exists, and this species is now considered as a lichen.

54. HYPOCRELLA PALMAE (Berk. & Curt.) Sacc., Syll. Fungorum 2: 580. 1883.

Synonymy: Hypocrea palmae Berk. & Curt., Acad. Nat. Sci. Philadelphia J., Ser. 2, 2: 285. 1851.

Occurrence: E. coca - Peru.
Insects - South America and West Indies.

This is an entomogenous fungus. It is not harmful to plants.

55. RAVENELULA BOLIVIENSIS Speg., Soc. Cient. Argentina An. 90: 28-29. 1920.

Occurrence: E. coca - Bolivia.

Spegazzini's (1920) description indicates that this fungus develops from dead wood of the coca plant. It is a discomycete of the order Helotiales. It should not be confused with Ravenelia, which is a rust genus.

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DIATOMS AS WATER QUALITY INDICATORS: PART I

Donald J. Schmidt
Biology Department
Fitchburg State College
Fitchburg, Mass. 01420

C.L. Christensen
Biology Department
Iowa Central College
Webster City, Iowa 50595

Abstract: A seven year study involving diatom collections and chemical analyses was conducted on the Nashua River, Fitchburg, Massachusetts. A comparison was made between three clean feeder streams and the highly polluted river, above and below the city of Fitchburg. Five diatom species were collected in the highly polluted area and are considered to be useful as water quality indicators for this specific water system.

Introduction:

Algae species have been widely used as indicators of water quality. One must approach the use of algae species as water quality indicators with some caution since the physical and chemical parameters of various aquatic systems are key factors in determining which species are present and pollution indicators in one environment may not serve for all situations. In his report of 165 studies, Palmer [1] listed the 80 most pollution-tolerant species of algae. Included in this list were 21 species of diatoms that could be considered water quality indicators. In this paper which is a summary of a seven year study (1967-1974) of the highly polluted Nashua River, an attempt is made to identify pollution tolerant species of diatoms and to examine their value as water quality indicators.

The Study Area:

The Nashua River is a tributary of the Merrimack River located in New England. The Nashua River drains an area of 450 square miles in the north Worcester County area of central Massachusetts and 88 square miles in the south central section of New Hampshire. The overall gradient of the river is shallow, dropping 527 feet over its 51 mile length. The bedrock of the area is composed of granite (and related igneous rocks) and metamorphic rocks such as shist and gneiss. The surface geology is a complex of weathered bedrock and glacial deposits including sand and gravel deposits in the form of outwash and drumlins. More than 75% of the basin is covered with second-growth mixed coniferous-hardwood forest. The above factors contribute to an overall acidic nature of the water in this region. The specific study area was the north branch of the Nashua River which has five small feeder streams that arise in the foothills of the 2000 foot Wachusett Range. These streams are rather clean and are not considered polluted and provide good trout fishing waters. As the feeder streams combine to

form the Nashua River at Fitchburg, Massachusetts the water is utilized by a large number and wide variety of industries including paper mills, plastic and metal finishing factories. These industries along with and out-of-date sewage disposal facility for the city of Fitchburg, (pop. 40,000) impose a heavy load of pollutants and drastically change the character of the river. For the purpose of this study, three of the rather clean feeder streams were selected for collection sites and one collecting station was established on the Nashua River below the city of Fitchburg. This design was to facilitate the comparison study of diatoms in clean and polluted water. Collection sites were located on Phillips Brook, Old Mill Brook, and the Whittman River above the city of Fitchburg and at the point where the Nashua River crosses Massachusetts Route #2 below the city of Fitchburg.

Methods:

Routine chemical and physical examination of the water has been made over a period of seven years. A Hach Engineers Portable Water Testing Laboratory (Model Dr-El) was used. The Millipore filter coliform technique was used for bacteria study. The five day, 20°C B.O.D. technique was used for Biological Oxygen Demand data. The chemical and physical parameters vary greatly with the season, water level and most of all the day to day activity of the various industries. In table 1, these data are presented.

Table 1 - Physical and Chemical Data

	Nashua	Old Mill	Whittman	Phillips
Dissolved Oxygen	0-12 ppm avg. 7	6-14 ppm avg. 9	6-14 ppm avg. 10	8-14 ppm avg. 10
Water Temperature	3-25 C avg. 20	0-20 C avg. 15	0-21 C avg. 14	0-20 C avg. 13
pH	5.5 - 7	6 - 7	6 - 6.5	6 - 7
CO_2	5 ppm	5 ppm	5 ppm	5 ppm
Total Hardness	30 ppm	50 ppm	50 ppm	45 ppm
Ca Hardness	26 ppm	33 ppm	37 ppm	40 ppm
Chloride	avg. 75	avg. 73	avg. 33	avg. 47
H_2S	trace	trace	trace	trace
Silica	2 ppm	0.2 ppm	0.1 ppm	0.1 ppm
Copper	.5 ppm	0.5 ppm	0.4 ppm	0.1 ppm
Iron	1.5 ppm	0.1 ppm	0.1 ppm	0.1 ppm
Turbidity (JTU)	105	5	10	0
Ortho-Phosphate	4.8 ppm	1.3 ppm	trace	trace
Nitrate	5-9 ppm	trace	trace	trace
B.O.D.	6-8 ppm	6 ppm	4 ppm	2 ppm
Coliform/50 ml	500+	230	56	18

Diatoms collections were made at the three feeder stream sites and at the Nashua River site. Rock and plant scrapings were made at each site along with diatometer samples, taken by placing the microscope slides in the diatometer for a period of seven days. The diatoms were "cleaned" by using the hydrogen peroxide-potassium dichromate method. The cleaned material was placed on #1 cover slips and mounted in Hyrax on microscope slides and studied under oil immersion. The species list, Table 2, is based upon 500 to 800 diatom counts per slide, thus they are expected to represent at least 80% of the taxa present.

Table 2: Nashua River Diatoms

Key: 1 = Nashua R. 2 = Old Mill 3 = Whittman 4 = Phillips

Achnanthes affinis (1,2,3,4)
Achnanthes diflexa (2,4)
Achnanthes exigna constricta (4)
Achnanthes hungarica (1)
Achnanthes lanceolata (2)
Achnanthes lanceolata lanceolatoid (3,4)
Achnanthes linearis pusilla (4)
Achnanthes marginulata (4)
Amphora ornata (2)
Amphora ovalis affinis (2)
Anomeoneis serions brachysira (3)
Asterionella formosa (1,2,3,4)
Cocconeis placentula (2)
Cocconeis placentula lineata (4)
Cocconeis placentula euglypta (2,3,4)
Cyclotella glomerata (2)
Cyclotella meneghiniana (1,2,4)
Cyclotella stelligira (2,3,4)
Cymbella amphicephala (3)
Cymbella aspera (2,3,4)
Cymbella turgida (2)
Cymbella ventricosa (1,2,4)
Diatoma anceps (4)
Eunota arcus (1,2)
Eunota curvata (1,2,3,4)
Eunota curvata capitata (3)
Eunota didon (4)
Eunota fallax (3,4)
Eunota hexaglyphis (3)
Eunota monodon (2,3,4)
Eunota pectinalis (2)
Eunota pectinalis monor(1,2,3,4)
Eunota perminuta (4)
Eunota serra (3)
Eunota tridentula perminuta (2)
Fragilaria construens (2,4)
Fragilaria crotonensis(134)
Fragilaria pinnata (3,4)
Fragilaria construens venter (3)
Fragilaria vaucheriae(1,2,4)
Fragilaria virescens (2,3,4)
Frustulia rhomboides capitata (2,3,4)
Frustulia rhomboides saxonica (2,3,4)
Frustulia rhomboides (4)
Frustulia rhomboides viridula (1,2)
Gomphonema angustatum major (2,3)
Gomphonema angustatum sarcophagus (2)
Gomphonema constrictum capitata (4)
Gomphonema parvulum (1,2,34)
Melosira granulata (1,2,3,4)
Melosira varians (4)
Meridion circulare (1,2,3,4)
Navicula cocconeiformis (4)
Navicula cuspidata (1,2)
Navicula lacustris (3,4)
Navicula lanceolata (1234)
Navicula minima (1,2,3,4)
Navicula placenta (2)
Navicula pupula elliptica (3)

Table 2 (continued)

Navicula pupula rectangularis (2)
Navicula scutiformis (3)
Navicula rhynchocephala(1,2,3,4)
Nedium affine (4)
Nedium bisulcatum balcalense (3,4)
Nitzschia amphibia (1)
Nitzschia dissipata (1,2,4)
Nitzschia filiformis (1,2,3,4)
Nitzschia palea (1,2,3,4)
Nitzschia recta (2)
Nitzschia romona (4)
Nitzschia thermalis (2)
Pinularia biceps petersinii (1,2,3,4)
Pinnularia microstauron (1,2)
Pinnularia brebissonii (3,4)
Pinnularia obscura (3,4)
Pinnularia subcapitata (3)
Pinnularia viridis (2,3)
Stauroneis anceps (4)
Stauroneis anceps gracilis (3,4)
Stauroneis phoenicenteron (134)
Stephanodiscus hantzschia(2,4)
Surirella angustata (1,2)
Surirella birostrata (3,4)
Surirella delicatissima (2,4)
Surirella linearis (4)
Surirella moelleriana (4)
Surirella ovalis (1)
Surirella ovata pinnata (1)
Surirella tenera (2,3,4)
Synedra parasitica (2)
Synedra rumpens (1,2,3)
Synedra rumpens fragilorioides (2,4)
Synedra rumpens meneghiniana (2,4)
Synedra rumpens var. (1)
Synedra ulna (2,4)
Synedra ulna subaequalis (1,2)
Tabellaria fenestrata (3,4)
Tabellaria flocculosa (1,2,4)

Results:

99 diatom species were identified from the collections made at the four sites and are listed in Table 2. As expected, some of the species found in the feeder streams were also collected in the Nashua River, indicating that some of the diatoms are constantly being washed down stream. Five diatom species were identified only from the Nashua River collections and are thus assumed to be the best water quality indicators for this specific water system. They are, Achnanthes hungarica, Nitzschia amphibia, Surirella ovalis, Surirella ovata pinnata, and Synedra rumpens. The most striking feature of the physical and chemical data is the fact that the water is always pH 7.0 or lower, total hardness is low and biological oxygen demand in the Nashua River borders on the value of the dissolved oxygen available.

Table 3 shows a comparison of diatoms that were indicated on Palmers [1] list of most pollution-tolerant species and those found in the Nashua River only, the feeder streams of the Nashua and from two diatom collection locations in Iowa (from Christensen and [2] Gudmundson [3]). It should be noted that the two streams studied in Iowa showed many of the pollution-tolerant species reported by Palmer. The Iowa streams were alkaline and exhibited much higher hardness readings than the

New England waters. Seven of the species reported by Palmer as pollution-tolerant species were collected in the clean feeder streams of the Nashua River system and only one, Surirella ovata, was found to be located in the highly polluted Nashua River.

Table 3: Comparison of Pollution-Tolerant Diatom Species

Diatoms from the 80 most pollution-tolerant species reported in 165 studies. C.M. Palmer-1969	pollution tolerant species in Nashua River	Nashua feeder streams	Iowa Stream Christ-ensen	Iowa Stream Gudmund-son
Nitzschia palea		x	x	x
Synedra ulna		x	x	x
Melosira varians			x	
Cyclotella meneghiniana		x	x	x
Nitzschia acicularis			x	x
Navicula cryptocephala				x
Gomphonema parvulum		x	x	x
Hantzschia amphioxys				x
Stephanodiscus hantzschi				x
Surirella ovata	x	x	x	x
Melosira granulata		x		x
Diatoma vulgare			x	x
Navicula viridula			x	x
Synedra acus				x
Cocconeis placentula			x	
Nitzschia sigmoidea			x	x
Achnanthes minutissima				
Cymatopleura solea			x	x
Fragilaria crotonensis		x		x
Navicula cuspidata		x	x	x
Fragilaria capucina				x

Conclusion:

Apparently diatoms can be utilized as water quality indicators, however the special physical and chemical characteristics of any given water system will dictate what species are valuable as indicators. One should not depend upon universal lists of water quality indicator organisms, specific lists should be developed for the systems under study. This Nashua River study site will continue to be an important area due to the fact that 17 million dollars is being expended by local, state and federal agencies to construct two large sewage and waste water treatment plants for the Fitchburg area. Upon completion of these facilities and the expected dramatic change in the water quality of this system, a true test of the here-in mentioned diatom species as water quality indicators will be possible.

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1. Palmer, C.M. A Composite Rating of Algae Tolerating Organic Pollution. Journal of Psychology 5, (78-82) 1969.

2. Christensen, C.L. & Edwards, M., Notes on Autumn Collections of Diatoms from Brewer's Creek, Hamilton County, Iowa. Proc. Iowa Acad. Sci. 79, 1972-73.

3. Gudmundson, B.R., Plankton Algae of the Upper Des Moines River, Iowa. Proc. Iowa Acad. Sci. 79, 1972-73.

BOOK REVIEWS

Alma L. Moldenke

"WATER POLICIES FOR THE FUTURE: Final Report to the President and to the Congress of the United States by the National Water Commission, Charles F. Luce, Chairman", xxviii & 579 pp., illus., Water Information Center, Inc., Port Washington, N. Y. 11050. 1973. $17.50.

This "is a photographic reproduction of the text of the paperback edition issued by the United States Government Printing Office undertaken to make this significant report available in an enduring casebound format for general and reference use." We all will be a lot safer in the future if it is used broadly and wisely. So many ecologically needed corrective measures get no or only limited activation because of political conniving as distinct from political leadership, pennywise and pound-foolish financing, personal profit grabbing often accompanied by expressed interest in the "greater good", often abysmal ignorances of assorted kinds and scopes on the part of well-intentioned "ecophiles", etc.

This book analyzes carefully and fairly the following subjects: forecasting water requirements quantitatively and qualitatively, the role of water in the natural environment and in the economy, pollution control, improving water-related programs with sensible procedures for resolving differences over environmental and developmental values, improving use of existing supplies, logical means of increasing water supply, analysis and recommendations re Federal-State jurisdiction in the law of waters, who shall pay for what, and basic data and research for future progress. Each chapter is provided with valuable statistical tables and recommended conclusions. The professional staff was broad in scope with consultants and hard workers from the legal, engineering fields and from environmental, social and behavioral sciences.

"THE AGRICULTURAL SYSTEMS OF THE WORLD: An Evolutional Approach" by D. B. Grigg, ix & 358 pp., illus., Cambridge University Press, London NW1 2DB & New York, N. Y. 10022. 1974. $19.50 clothbound, $7.95 paperbound. This is No. 5 in the Cambridge Geographical Studies.

With an emphasis upon the historical geography of the major farming systems, some of which can be traced back at least 10,000 years, the following are analyzed: shifting agriculture, Asian wet rice culture, pastoral nomadism, Mediterranean, Western European and North American mixed farming, dairying, plantation system, ranching, and large-scale grain production. Even though most of the major crop plants and livestock were domesticated by the second millenium B.C., as well as simple farm tools, following cattle and

legume manuring and irrigation, radical changes in agricultural technology only date from 1850 along with such concomitants as urban industrialization, rapid and distance transportation of produce, increased land values that made fallowing impractical, population increase, etc. The Afro-Asian and Latin American agriculturalists have not been exposed to all these changes as have those of North America and Western Europe. Might the "green" revolution help them or will it only cause a continuation of the breeding of human mouths too fast?

The vetch genus Astragalus is misspelled. There are excellent charts, index and bibliography enriching this excellent typology of world agriculture.

"HUMAN POISONING FROM NATIVE AND CULTIVATED PLANTS", Second Edition, by James W. Hardin & Jay M. Arena, M.D., xii & 194 pp., illus., Duke University Press, Durham, North Carolina 27708. 1974. $6.75.

This is a valuable book fortunately selling at a very reasonable price so that it should be readily available for educating a broad spectrum of the public and for ready reference in emergencies. The first edition was basically well received. This new edition follows the same basic format, has a few details more carefully honed, adds improved illustrations including 15 color photographic prints (but more of the black/white ones are superior) and still maintains its clarity of language and easy accessibility to contained information.

To the large and vulnerable group of "touching and tasting" youngsters must now be added those chronologically adult "babes in the woods" from urban or unseeing suburban backgrounds who, in sampling "nature's larder", organic gardening, simple living, etc., may run into serious allergy, dermatitis, assorted internal poisoning, etc. without such information as is included here. Such general parlance as "this plant is poisonous" without specifying what parts and what growth stages are involved and in what ways can well be counteracted by the careful perusal of this precise, helpful book.

"PHARMACOGNOSY TITLES: Cumulative Genus Index", Vol. VII, 1972, edited by Norman R. Farnsworth et al., ca. 200 pp. unnumbered, Pharmacognosy, University of Illinois, Chicago, Ill. 60680. 1975. Paperbound.

This computer print-out is really far too valuable for the vast amount of biodynamic material to which it directs such easy access to appear without stated author(s) and/or editor(s) and address of same. Perhaps they appear on a separate title page not included in our copy, leaving the printed cover to serve that purpose.

Organisms are coded within major taxonomic groups, then listed alphabetically by genera within these groups, followed by species and family names and the numbers for the pertinent literature reference(s) abstracted during that year.

"PLANT VIRUSES", Fifth Edition, by Kenneth M. Smith, ix & 211 pp., illus., Chapman & Hall, Ltd., London EC4P 4EE & Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10016. 1974. £3.30 in U.K. only, $10.00 clothbound & $5.95 paperbound elsewhere.

This new edition continues the same concise and clearly presented survey of this field to which the author has been a foremost contributor for over four decades. New information, interpretations and bibliography have been added throughout. A new chapter has been added on viruses affecting fungi and algae. Material on the commonly known aster yellows has been omitted since the condition is now known to be due to mycoplasma, not virus.

The eighteen E-M plates include some fine new substitutions.

For these "bits of infectious heredity in search of a chromosome" nomenclatural systems grow and speciate in almost direct proportion to new research and researchers on the 300 recognized phytoviruses and their assorted strains. As in other fields of prevention, treatment and control, more, stronger and longer applications of toxic substances are being superceded by careful life history studies of vectors and plants to discover points of greater vulnerability, separation, resistant strains, meristem-tip culture of uninfected strains from infected plants (if the tip grows faster than the invading virus), cure by heat, etc.

"DRUGS AND FOODS FROM LITTLE-KNOWN PLANTS: Notes in Harvard University Herbaria", by Siri von Reis Altschul, xii & 366 pp., Harvard University Press, Cambridge, Mass. 02139. 1973. $10.00.

Excluding the better known uses of the better known plants already covered in Uphof's "Dictionary of Economic Plants" (1959), the author cites information for 5,178 species arranged by families and culled from the 2,500,000 sheets in the combined Gray and Arnold Arboretum herbaria at Harvard. A typical entry number reads: 3659 Premna taitensis var. rimatarensis Fiji Is. / Degener & Ordonez 13793 / 1940/ Used to dye hair black / "Rauvula" and hundreds of other entries indicate a broader scope to the text than is implied in the title of the work.

Edible species for other animals as well as man tally to 1255, aromatics to 992, medicinal but not literally drug-limited to 407, poisonous to 284, analgesic-propertied to 190, beverage-producers to 112, etc. The plant families most commonly involved, in descending order, are: Compositae, Euphorbiaceae, Leguminosae, Labiatae.

An index to families, an index to genera and a medical index referring to diseases, therapeutic properties and related topics all make material in this book readily available.

There is an important foreword by Richard Evans Schultes, a world-renowned leader in fields of economic, ethnic and systematic botany, emphasizing the value to general knowledge, cultural anthropology, and the pharmaceutical and medical efforts at health improvement of such a documented study as this one.

"THE SHIKIMATE PATHWAY" by Edwin Haslam, vi & 316 pp., illus., Butterworth & Co. Publishers, Ltd., London WC2B 6AB & Halsted Press of John Wiley & Sons, Inc., Toronto & New York, N. Y. 10016. 1974. $29.00.

This book is one in the Biosynthesis of Natural Products Series. Its intrinsic value is considerable since it offers much scientific information that should be of help to many biochemists, pharmaceutical workers, microbiologists, organic chemistry teachers, students and technicians; its extrinsic value hardly matches the super-inflated price.

This Shikimate pathway is utilized by many bacteria, fungi and higher plants for the production of the three aromatic amino acids that animals cannot synthesize de novo — L-phenylalanine, L-tyrosine and L-tryptophan.

Shikimic acid, one of the stepping stones on this pathway, is so-called after the Japanese common name shikimi-no-ki for Illicium religiosum Sieb. in which it was first identified by Eykmann in 1885. It can be phosphorylated in the presence of ATP.

The book describes the formation, enzyme accompaniment and further conversion of the metabolites formed en route, such as the plant phenols. Each chapter is provided with its own bibliography.

The species name in Amorpha fruticosa and the genus name Wakemania are misspelled.

"STRATEGIES OF BIOCHEMICAL ADAPTATION" by Peter W. Hochachka & George N. Somero, v & 357 pp., illus., W. B. Saunders Co., London WC1A 1DG, Toronto 18, & Philadelphia, Pa. 19105. 1973. £ 3.20 U.K., $7.75 Canada & $7.50 U.S.A. paperbound.

The authors direct their efforts "to the ecologist, the evolutionary biologist, and the population biologist, as well as to our primary audience, the comparative biochemist/physiologist" and related students.

"The biochemical changes which we describe are, for the most part, adaptive at the level of basic metabolic function, and therefore are not apparent macroscopically....[and] are expressions of genotypic diversity existing among various organisms....

As we gain the ability better to understand the types of molecular changes which allow organisms to survive in and exploit their environments, we are further charting the course of evolution at its most fundamental level."

The only reservation that I harbor for this clearly written book is that the uninformed would never know from the text which of these biochemical mechanisms also apply to the plant world. In fact, "green plants" are mentioned just once and there unavoidably in reference to photosynthesis!

"THE ILLUSTRATED WALDEN" by Henry D. Thoreau, xxxv & 352 pp. & 66 plates. Princeton University Press, Princeton, New Jersey 08540. 1973. $15.00 slipcase covered.

This is a beautifully prepared edition. The "Walden" text is reproduced by photo-offset from the 1971 Princeton edition which was awarded "an approved text" rating by the Center for Editions of American Authors of the Modern Language Association of America.

There is a nicely detailed topical index that can lead directly to so many details of description or ideas so well expressed by this unique naturalist-author whose fame is once again on the increase.

"The sulphur-like pollen of the pitch-pine soon covered the pond and the stones and rotten wood along the shore....the 'sulphur showers' one hears of.....Thus was my first year's life in the woods completed; and the second year was similar to it. I finally left Walden September 6th, 1847". What a legacy readers have or can acquire from these recorded experiences!

This edition is enriched by 66 fullpage plates of the beautiful photographs taken by Herbert Wendell Gleason, a former Congregational minister, who took on a new life of arduous dedication to photography, lecturing, writing and studying nature and the wilderness. Commissioned by Houghton Mifflin Co. to illustrate an edition of Thoreau's writings, he followed Thoreau's paths through Massachusetts and Maine well equipped with skill, camera and appreciation near the beginning of this century. Roland Wells Robbins selected these from his huge collection of Gleason's large glass negatives as is related in an introductory comment.

The scholar, J. Lyndon Shanley, provides an excellent historical introduction about the several manuscript preparations, printings, reception, distribution and translations and is responsible for the editing on this truly beautiful book.

"OLD-TIME HERBS FOR NORTHERN GARDENS" by Minnie Watson Kamm, xi & 256 pp. & 32 plates, illus. Facsimile Edition of Dover Publications Inc., New York, N. Y. 10014. 1971. $2.75 paperbound.

This is an unabridged replication of the original 1938 publication whose introductory remarks "Growing of herbs finds increasing

and widespread favor" indicates the cyclic nature of "interests" and is appropriate again for the 1970s.

The concise introduction delimits terms, surveys the history of herb usage and whets the appetite for the plant descriptions, uses and lore which follow. The plants are arranged by families and indicated in the Table of Contents. They are also indexed by common names, scientific names and on a usage chart. The material is fascinatingly presented and well illustrated with 78 line drawings and 44 halftones.

"GARDENING WITH HERBS FOR FLAVOR AND FRAGRANCE" by Helen Morgenthau Fox, xv & 334 pp., illus., Facsimile Edition of Dover Publications Inc., New York, N. Y. 10014. 1970. $2.50 paperbound.

This unabridged republication of the charming 1933 original should be much appreciated by the increasing number of herb aficionados and by any others interested in specific plants treated, in the history treated, in the preparation of herbs and in cooking with herbs.

The topically arranged bibliography is well prepared.

The illustrations reproduced very well, showing much greater realism and detail in leaf structure than in the inflorescences and their individual flowers.

"PLANT CARBOHYDRATE BIOCHEMISTRY" edited by J. B. Pridham, xiii & 269 pp., illus., Academic Press, New York, N. Y. 10003 & London NW1 7DX. 1974. $18.50 & £ 7.20.

These sixteen important papers, each documented with bibliographic references, were presented at the Phytochemical Society Symposium in the Heriot-Watt University in Edinburgh in April 1973. They were authored by twenty-two recognized biochemists mainly from the British Isles, but also from the continent, the U.S.A. and Israel.

There is an author index and also a subject index, but unlike many other fine publications from Academic Press, there is no organism index which would give quick access to the specific algae, fungi and higher plants involved in all this research.

This book which reports valuable biochemical information could have been made even more valuable by consistently listing both the full scientific and well as the common name of the organisms mentioned.

The main topics covered are: carboxylating mechanisms capable of autocatalysis and of growth, gluconeogenesis, sucrose metabolism, α-galactosidases, enzyme degredation of starch as in cereal germination, polyols, as alditols, glycolipids with their maintenance of the thylakoid membrane structure in chloroplasts and possible energy storage, starch metabolism, the primary cell wall

with even a hypothetical mechanism for cell elongation, cell wall polysaccharide synthesis sites, biosyntheses of glucose, cellulose, pectin, hemicelluloses, algal polysaccharides, fungal cell walls with their variable chitin and chitosans, such glycoproteins in higher plants as lectins, enzymes, toxins, allergens, and structural extensions, etc.

"A PLAGUE OF CORN: The Social History of Pellagra", by Daphne A. Roe, xxiii & 218 pp., illus., Cornell University Press, London XLY 1AA & Ithaca, New York 14850. 1973. $11.50.

The dermatologist-author has had a sustained interest in medical bibliography and for the five years prior to this publication has focused on the literature dealing with pellagra, "A disease which was unknown to ancient scholars and which has become unfamiliar to most modern physicians". Figures 3 and 4 in her book are very interesting maps showing the worldwide distribution of pellagra for the period of 1906-1912 and then for 1966-1972. This niacin vitamin deficiency disease seems not to have affected many of the Mayan slaves in Pre-Columbian America, ancestral home of maize, "because that cereal diet was augmented with such protein sources as the corn grub pests, mice and new world beans. Only when seriously deprived people (such as indentured mezzadriads, sharecroppers, fellaheen) have been fed very limited diets of basically maize (or millet) unfamiliar to them has endemic pellagra developed as in Spain, Italy, France, Egypt, South Africa, and the southern United States. "While anyone can cure pellagra with a handful of pills, social progress is hardly measurable if the disease still makes its appearance in the same conditions of misery.

This book makes interesting, pertinent reading that is well documented.

"A FLORA OF THE WHITE MOUNTAINS, CALIFORNIA AND NEVADA" by Robert M. Lloyd and Richard S. Mitchell, iv & 202 pp., illus., University of California Press, London, Los Angeles, California & Berkeley, California 94720. 1973. $8.00.

This concise carefully prepared identification manual with workable diagnostic keys, field data and herbarium citations, is dedicated to Victor Duran who did the most detailed collecting throughout the White Mountains from 1926 to 1933. The authors made collections there from 1965 to 1966.

The book includes a Guide to the Geology by Valmore C. La Marche Jr., a survey of the phytogeography and comparative floristics by the second author, and an analysis of the plant communities and vegetation by H. A. Mooney.

This White Mountains range is about 55 miles long and at the most 20 miles wide, from 4,000 to 14,246 feet high and separated from the central Sierra Nevada range only by the Upper Owens Val-

ley and yet "situated in such a pronounced Sierran rain-shadow that water availability is one of the major limiting factors in all vegetation zones" — desert scrub, pinyon, woodland, subalpine forest, alpine — of distinctly Great Basin character. There are some excellent photographs of the area included. The authors list 815 species of vascular plants.

"THE OLD ENGLISH HERBALS" by Elenour Sinclair Rohde, xii & 243 pp., illus., Facsimile Edition by Dover Publications Inc., New York, N. Y. 10014. 1971. $3.00 paperbound.

This is an "unabridged and unaltered republication" — except for the lack of full color reproduction of the frontispiece — of the original 1922 edition. So few of us who would study and enjoy these herbals and even this excellent survey of them published a half century ago could have easy access to such works were it not for this inexpensive recent offset copy.

It is so carefully organized and researched to be both an historically and biologically reliable source of information about early medicine, herbs, herbals, spices, food, folklore, botany, magic, ethnobotany, etc. It is so interestingly written that it should catch and hold many readers' interest in the Anglo-Saxon manuscript-herbals from the 10th century as well as later printed ones such as those of Turner, Gerard, and Parkinson, to New World ones through the 17th century still-room books.

There is an excellent annotated bibliography of the English herbals and of those non-English ones which have references to the former.

"THREE CENTURIES OF MICROBIOLOGY" by Hubert A. Lechevalier & Morris Solotorovsky, iii & 536 pp., Facsimile Edition by Dover Publications Inc., New York, N. Y. 10014. 1974. $5.00 paperback.

Since this complete republication is of a 1965 work that quotes richly from the discoverers themselves, it can serve for the scientifically interested general reader and for students of microbiology and related fields as time-saving but enriching perusal of the older thinkers, workers and writings of such as Pasteur, Koch, immunology, viruses, rickettsias, fungi, protozoa, genetics, chemotherapy, etc.

"BRAZILIAN SPECIES OF HYLA" text by Bertha Lutz, photographs by Gualtor A. Lutz, xix & 265 pp., illus., University of Texas Press, London WC1B 3BY & Austin, Texas 78712. 1973. $15.00 oversize.

This publication, so reasonably priced, will surely prove to be

the classic treatment of the systematics with evolutionary relationships, ecology, biography, acoustics, life histories, and many other aspects of these 88 species and 53 subspecies of neotropical treefrogs.

The preface starts with "This book should have been written by my father, Dr. Adolpho Lutz", an outstanding leader in tropical and public health medicine and natural history in South America, whose monographs on Bufo, Leptodactylus, etc. are likewise classics. Those privileged to know Dr. Bertha Lutz personally and/or professionally would never infer from this quote that she merely just finished her father's manuscript for printing. A whole, long, highly productive professional lifetime of her own field and laboratory amphibian research has been added. The book is still further enriched by the 74 natural looking color photographs taken by her brother especially since retiring from the field of forensic medicine. The book is dedicated to the memory of her father, her brother and a modest, illiterate laboratory worker, Joaquim Venancio, who was also "a gentleman, a friend and an excellent collaborator" for over thirty years.

The text groups the Hyla species as they seem to place themselves: (1) large species, (2) medium-sized species, (3) Hyla rubra-H. x-signata complex, (4) Hyla catharinae complex, (5) very small species, (6) borderline species, and (7) species with double vocal sacs and irritating secretions. There are appendixes for doubtful species because of lack of confirming specimens or data, for synonymy, and for excluded species belonging to other genera. A list of supplementary references beyond those appearing in the text, citing the original descriptions and earliest publications, is also provided.

A wonderful work!

"FLUORESCENCE TECHNIQUES IN CELL BIOLOGY" edited by A. A. Thaer & M. Sernetz, viii & 420 pp., illus., Springer-Verlag, Heidelberg & Berlin & New York, N. Y. 10010. 1973. $17.00.

These are the proceedings of the conference on Quantitative Fluorescence Techniques as Applied to Cell Biology held at the Battelle Seattle Research Center, Washington, in the spring of 1972.

This valuable, carefully prepared text is printed by a photo-offset process with each of the 38 papers well illustrated and bibliographically documented. The papers are grouped under the following topics: (1) introductory papers on polarized fluorescence lifetime measurement techniques, (2) fluorometry instrumentation on microscale, (3) cytofluorometric determination of cellular substances as of nuclear Feulgen DNA and chromosomes, (4) enzyme reactions through rapid microfluorometry, and (5) fluorescent molecular probes for complex biological molecules as of bilirubin-albumen complexes and nucleic acid structure.

Financially this program and this book have been subsidized by

the Battelle Foundation — a good application of such funds.

"THE GENUS IRIS" by William Rickatson Dykes, 245 pp., illus., Facsimile Edition by Dover Publications Inc., New York, N. Y. 10014. 1974. $20.00 oversize.

This unabridged republication that is one-fifth smaller than the original 1913 edition from the Cambridge University Press is truly a credit to that original work which now is of very limited availability and consequently of very high monetary value. Now many Iris gardeners and botanists with this group interest can hope to purchase or be given this lovely new book that is esthetically, horticulturally and botanically so fine because of the 48 colored plates, 30 line drawings, and well organized text. Much of the information in this work is still useful and all of it is interesting. It covers the literature and bibliography, structure and cultivation, disease control, distribution and the following subgeneric sections: Apogon, Pardanthopsis, Evansia, Oncocyclus, Regelia, Pseudoregelia, Pogoniris, Nepalensis, Juno, Xiphium, Reticulata and Gynandriris, as well as iris hybrids, iris seed propagation, and interesting notes on the uses of orris root obtained from I. germanica and I. pallida.

In proper taxonomic pattern unidentified specific names are listed with their sources and possible disposal. Plants wrongly described as irises are listed with possible or definite identification, most of them assigned to matching species of the genus Moraea.

Unlike most Dover republications, this one is bound not in paper but in deep iris-like purple cloth hard covers. But like most Dover republications, this one is a financial bargain.

"SEED EATING BIRDS AS PETS" by Cyril Rogers, 105 pp. & 11 color plates, Charles Scribner's Sons Publishers, New York, N. Y. 10017. 1975. $7.95.

This British author, like so many of his countrymen, has had appreciative eyes open from early childhood for things and processes in nature around him and consequently his suggestions for selecting, accommodating and feeding have a considerate soundness to them.

In addition to helpful line drawings of cages, aviaries and feeders, beautiful black/white photographs and gorgeous color plates of canaries, budgerigars, parrots, parakeets, lovebirds, some finches, etc, there are informative text, bibliography and index.

Obviously this book will be useful for those who raise or wish to raise these birds. It should be read by (not just sold by) those grubby merchants whose avian merchandise is often so badly mistreated.

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LES VERBÉNACÉES DES MONTS LOMA ET DES RÉGIONS LIMITROPHES (SIERRA-LEONE)

par Paul Jaeger et Harold N. Moldenke

La position géographique et la végétation des monts Loma.

Les monts Loma se situent dans la partie nord-orientale du Sierra-Leone à environ 45 km au nord-ouest de la source du Niger. Ils se rattachent à la chaîne guinéenne ou dorsale Loma-Man dont ils occupent l'extrémité occidentale. Cette chaîne s'étire parallèlement à la côte depuis les premiers contre-forts du Fouta-Djalon jusqu'aux hauteurs de Man en Côte-d'Ivoire (mont Tonkoui 1240 m). A cheval sur la Guinée, la Côte-d'Ivoire et le Libéria se dresse le puissant massif du Nimba qui culmine au mont Richard Molard à 1752 m.

Orientée Sud-Sud-Ouest - Nord-Nord-Est, comprise entre le 9° 00' et le 9°17' Lat. N, le 11°02' et le 11°12' Lg. W, longue d'une trentaine de kilomètres et large, par endroits, de 18 à 20 km, la chaîne du Loma, essentiellement granitique, surgit brusquement d'un pays de plaines et de plateaux évoluant entre 300 et 600 mètres.

Des lignes de fracture orientées à peu près normalement par rapport à l'axe subdivisent ce massif en quatre secteurs qui se succèdent du Nord au Sud: Au Nord de l'entaille orientée sensiblement N-W - S-E que drainent, en sens inverse, les eaux torrentielles du Néji (versant Est) et du Kong-Bundu (versant Ouest), se dresse la puissante pyramide du Pic Bintumane (1924 m) dont le sommet tronqué est occupé par un plateau minuscule bordé par d'imposants escarpements taillés dans une coulée doléritique.

A ce bastion septentrional se rattache vers le sud une vaste surface, le "Plateau", doucement inclinée en direction méridienne (1650 à 1450 m); il est drainé par une série de ruisselets grossièrement parallèles entre eux que jalonne un mince rideau forestier.

Au "Plateau" qui est par excellence de domaine de la prairie d'altitude, fait suite la région la plus accidentée du massif; elle est marquée par toute une série de hauts sommets qui confèrent à ce secteur, vu de loin, une allure en dents de scie. Ce sont les crêtes rocheuses du Da-Oulen (1470 m) et du Fuen-Koli (1400 m) les dômes granitiques du Sarabaldu et du Serelen-Konko (1500 m). Ces sommets qui, comme autant d'îles, émergent au-dessus de l'océan forestier, surprennent par l'originalité de leur peuplement végétal: espèces endémiques, rélictuelles....

Se rétrécissant de plus en plus, le massif du Loma s'achève au Sud, au-delà de la vallée du Wuliko, par un haut-plateau orienté SW-NE qui, vers son extrémité occidentale, est dominé par la coupole granitique du Peran-Konko (860 m).

Jusqu'au-delà de 1000 m le couvert végetal du massif est constitué par une épaisse ceinture forestière; sur le versant ouest,

exposé à la mousson, elle est pratiquement d'une suele pièce; sur le versant Est exposé à l'harmattan, elle est, par contre, trouée d'enclaves herbacées.

Carte 1

Carte 1. Le massif des monts Loma dans le cadre géographique ouest africain.

Empruntant le cours des ravins et des vallées, la forêt se prolonge en direction des sommets par un éventail de galeries forestières d'altitude où domine le Parinari excelsa.

L'étage culminal est occupé par de vastes formations herbacées, savanes submontagnardes ou prairies d'altitude, déchirées par de nombreux affleurements rocheux où prolifèrent les saxicoles.

Les monts Loma ne sont pas habités. Cependant les basses pentes sont souvent cultivées jusque vers 700 m par les Kuranko dont les villages s'égrènent en pays de piedmont. Quelques chasseurs de buffles ou collecteurs de miel mis à part, l'indigène évite de profaner les hauts sommets hantés par les "esprits".

Données écologiques et phytogéographiques

Dans les monts Loma et les pays de piedment nous avons récolté 20 espèces de Verbénacées; ce chiffre peut paraître modeste quand on le compare aux 70 espèces d'Orchidées, aux 85 espèces de Fougères, aux 98 espèces de Graminées, aux 143 espèces de Légumineosales.....inventoiriées dans ce même massif; et cependant, ce nombre de prime abord dérisoire, représente près du tiers de l'ensemble des Verbénacées connues en Afrique Occidentale (14). Parmi ces 20 espèces plus de la moitié appartiennent au genre Clerodendrum, les autres n'étant représentées que par une, deux ou au maximum trois espèces. Nous sommes persuadés qu'une nouvelle prospection, vivement souhaitée des monts Loma, nous permettra de relever non seulement le nombre des espèces de la famille des Verbénacées mais aussi celui de nombreux autres taxons.

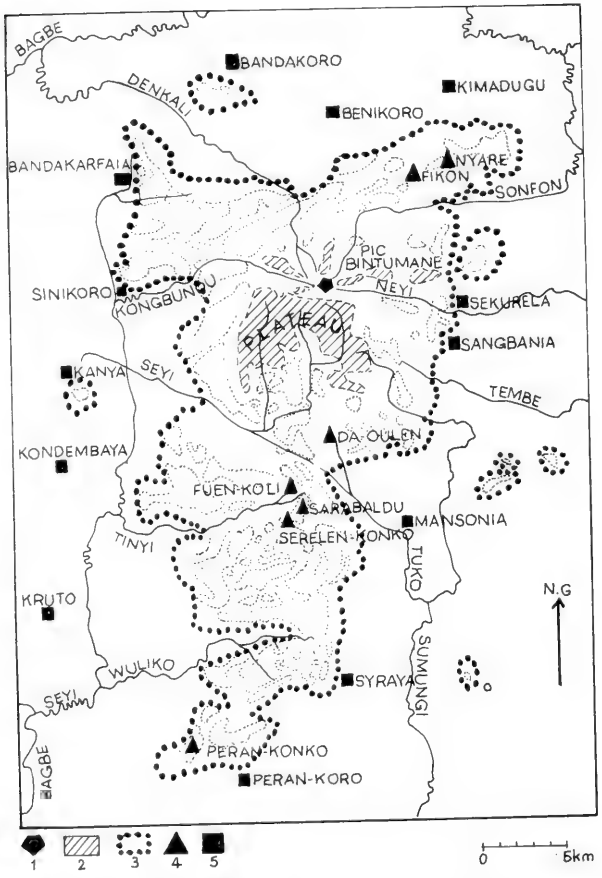
Les Verbénacées des monts Loma sont toutes des plantes vivaces et ligneuses; on distingue des arbres (Vitex, Gmelina), des buissons, des arbrisseaux (Premna, Lantana) parfois sarmenteux (Clerodendrum), ou des herbes dressées à base ligneuse comme Lippia abyssinica, Lantana rhodesiensis, Clerodendrum umbellatum var. asperifolium.

Chez certaines espèces lianescentes ou sarmenteuses le pétiole s'épaissit à la base et persiste après la chute du limbe. Ainsi, chez Clerodendrum buchholzii, il se constitue de fortes épines pétiolaires opposées, droites, longues de 2 cm environ; ce sont des organes d'accrochages caractérisant les lianes dites "grappinantes" (20). Chez Clerodendrum capitatum, le pétiole coudé à la base abandonne, après sa chute, un "chicot subépineux" (6); de minuscules proéminences plus ou moins vulnérantes, persistent également au niveau des noeuds après la chute du pétiole chez C. umbellatum, C. volubile, C. violaceum, C. welwitschii; chez Lantana camara des épines courtes sont insérées sans ordre le long des entre noeuds.

Dans le monts Loma les Verbénacées se rencontrent à toute altitude, de préférence dans les formations secondaires. Ainsi Lantana camara est fréquent au pied de la montagne, dans les stations rudérales à proximité des agglomérations où il s'associe à Bixa orellana, Canna indica, Cassia occidentalis....; dans les savanes incendiées de plaine, en pays de piedmont, on remarque Lippia multiflora, Lantana rhodesiensis. Dans les forêts dégradées, en plaine comme en montagne, on distingue Premna hispida, un arbrisseau aux rameaux densément velus et aux feuilles poilues criblées de points glanduleux; Vitex doniana se tient essentiellement dans les formations secondaires âgées et dans les galeries forestières au pied de la montagne.

Parmi les Clerodendrum du Loma il y en a peu qui soient inféodée à des groupements forestiers intacts; c'est le cas cependant du Clerodendrum capitatum qui, sous la forme de liane ligneuse, fut remarqué dans un lambeau forestier rélictuel à Parinari ex-

Carte 2



Carte 2. Le massif des monts Loma (d'après S. Daveau, modifié). 1) Pic Bintumane, 2) Le "Plateau" et ses contreforts, 3) Limites du Massif, 4) Sommets, 5) Villages

celsa dans le bassin du Denkali vers 1530 m. Cette même liane fut retrouvée autour de 1000 m dans le forêt dense sempervirente à Sapotacées qui couvre de vastes étendues entre les basses pentes du Fuen-Koli et du Da-Oulen. Mais la plupart des Clerodendrum du Loma se rencontrent dans les formations secondaires, en lisière des galeries forestières d'altitude ou dans des groupements boisés

montagnards succédant aux feux; c'est le cas du C. buchholzii, du C. volubile, du C. violaceum; cette dernière est facilement repérable, en mars - avril, grâce à ses fleurs bleues-violacées et ses fruits d'un rouge voyant. Clerodendrum schweinfurthii var. bakeri a été remarqué sur les basses pentes du versant Est dans ses groupements herbacés denses buissonnants, arbustifs, haut de 2 à 3 m succédant à des cultures, en association avec: Harungana madagascariensis, Solanum torvum, Trema guineensis, Albizzia gummifera, Myrianthus libericus, Ficus exasperata, Smilax kraussiana, Hugonia sp., Gloriosa superba, Pteridium aquilinum, Setaria chevalieri, Amaranthus spinosus, Ageratum conyzoides, Bidens pilosa.

Parmi l'ensemble des Verbénacées inventoriées au Loma, il n'y en a pas une qui appartienne en propre à ce massif, ni même au système montagneux ouest africain; toutes possèdent des aires de répartition très vastes englobant la presque totalité de l'Afrique Occidentale et souvent même, une grande partie de l'Afrique tropicale; c'est le cas du Lantana rhodesiensis, du Clerodendrum capitatum, du C. schweinfurthii var. bakeri, du C. umbellatum, du C. violaceum, du Lippia abyssinica, du Vitex doniana. -- Lantana camara, originaire de l'Amérique tropicale, est très largement répandu sous les Tropiques. Premna hispida, par contre, est limité à l'ouest africain où son aire s'étend du Sénégal au Togo (14).

Parmi les Clerodendrum, C. volubile et C. splendens semblent rivés au massif forestier guinéo-congolais, C. sinuatum cependant n'a été signalé que du Sénégal à la Nigéria méridionale; particulièrement digne d'intérêt est le C. welwitschii connu de l'Angola, du Congo, du Cameroun et qui, dans le cul de sac ouest-africain, n'avait pas encore été signalé au-delà de la Nigeria (14). Parmi les essences intentionnellement introduites par l'homme citons le Gmelina arborea et le Tectona grandis. La première originaire de l'Inde, est fréquemment plantée par le Service des Eaux et Forêts le long des pistes en pays de piedmont du Loma; en 1974, au Libéria, nos avons remarqué de vastes plantations de cette Verbénacée entre Yéképa et Grassfield, au pied du versant occidental du Nimba où cette plante sera utilisée comme source de pâte à papier. -- Pour ce qui est du Teck, d'importantes plantations ont été effectuées dans la région de Makeni en Sierra-Leone.

Inventaire des Verbénacées du Loma (1)

Clerodendrum buchholzii Gürke

1634 - Forêt secondaire clairièrée en lisière de la prairie d'alti-

(1) Les numéros compris entre 1 et 10.000 correspondent aux échantillons d'herbier récoltés par l'un d'entre nous (P. Jaeger); les numéron supérieurs à 10.000 se rapportent à la collection de J. G. Adam.

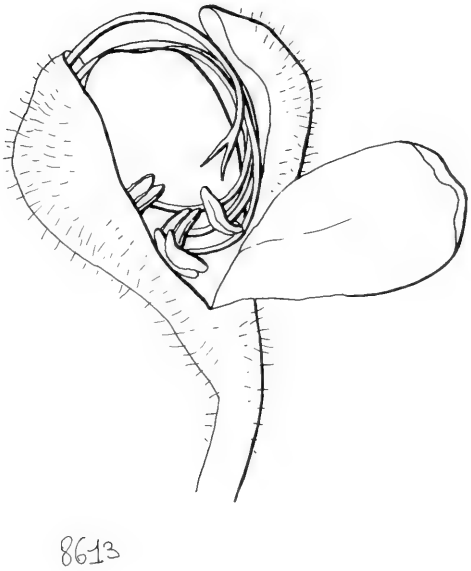
Fig. 1

tude du Serelen-Konko vers 1250 m. — 1698 - Galerie forestière d'altitude (lisière) versant Est du Pic Bintumane vers 1300 m. Fleurs (juillet). — 22.640 - Forêt basse sur palier entre le Da-Oulen et le Serelen-Konko vers 1100 m. Fleurs, jeunes Fruits (déc.).

Biol. - Buisson sarmenteux entièrement glabre, aux rameaux parfois rampants. Feuilles 10 à 18 cm x 5 à 7 cm; pétiole 2 à 4 cm

Fig. 2

Fig. 3



de long. Epines pétiolaires fortement acérées légèrement orientées vers la bas. Inflorescences en panicules à l'aisselle des feuilles supérieures souvent cauliflores sur rameaux rampants. Présence de galles florales induites par une Punaise (Paracopium sp.): la corolle étroitement tubuleuse à l'état normal, s'élargit considérablement, les organes reproducteurs étant en régression.

Distrib. - Ouest Africain: du Fouta-Djalon au mont Cameroun et Fernando-Po. - Gabon, Angola - Est Africain.

Clerodendrum capitatum (Willd.) Schum. & Thonn. var. capitatum

8613 - Forêt dense à Sapotacées du versant Nord du Fuen-koli vers 1200 m avec: Chrysophyllum pruniforme, Blighia welwitschii, Ficus sp., Treculia africana, Macrolobium limba, Anthocleista nobilis, Pteris marginata, Bolbitis acrostichoides .... Fleurs (déc.). — 9824 - Forêt rélictuelle à Parinari excelsa, prairie d'altitude du bassin du Denkali vers 1600 m. Fruits (avril).

Biol. - Sous-arbrisseau sarmenteux du sous-bois de la forêt dense. Tige creuse, limbe mince, poilu, pétiole laissant après sa chute un chicot subépineux (J. Berhaut). Fleurs blanches longuement tubuleuses et glanduleuses (3 à 4 cm;

kita 5 à 6 cm), groupées en capitules terminaux. Sépales ciliés soudés à la base. Fruits: 4 nucules de taille inégale, d'un noir luisant. Calice persistant.

Distrib. - Afrique occidentale: du Sénégal et du Mali (massif de Kita) au Cameroun. Afrique Centrale et Orientale.

Clerodendrum triplinerve Rolfe

23.754 - Formations secondaires des basses pentes du versant Est du Loma près de Mansonia vers 500 m. Feuilles (février).

Biol. - Buisson sarmenteux aux entre-noeuds creux et aux ramuscules finement pubescents. Feuilles glabres 4 à 10 cm x 2 à 5 cm, pétiole 1 à 2 cm. Inflorescence: une panicule terminale ombelliforme. Fleurs à corolle blanche et tube court (4 à 5 mm); étamines 2 à 3 fois de longueur

Fig. 4

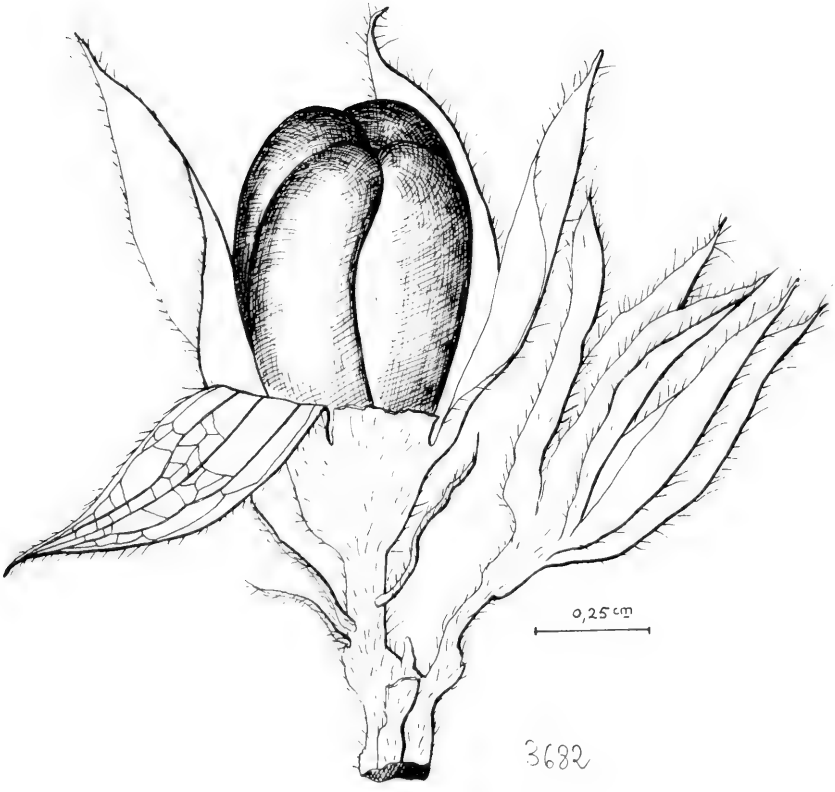
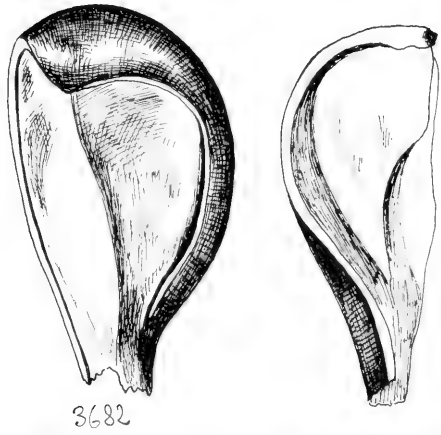


Fig. 5



des lobes de la corolle. Les entre-noeuds creux de l'échantillon cueilli par Stuhlmann en 1891 dans la région des Grands Lacs, hébergaient des fourmis (Crematogaster) et communiquaient avec l'extérieur par des orifices circulaires.

Distrib. - Afrique Occidentale: de la Guinée au Cameroun - Dorsale: Loma (J. G. Adams) Tonkoui (Aké Assi). Afrique Centrale et Orientale.

Clerodendrum schweinfurthii var. bakeri (Gürke) Thomas

9886 - Basses pentes du versant Est du Loma vers 700 m; formations secondaires à Solanum torvum, Spathodea campanulata..... succédant à des cultures.

Biol. - Buisson sarmenteux, la base du tronc souvent rampante. Espèce caractérisée par les inflorescences denses capituliformes richement fleuries et longuement pédonculées. Fleurs blanches odorantes, tube corollin 33-36 mm.

Distrib. - Afrique Occidentale: Sud du Nigeria, Cameroun - Afrique Centrale et Orientale.

Clerodendrum sinuatum Hook.

1317 - Forêt secondaire de versant Nord du Da-Oulen vers 1100 m.

Biol. - Buisson sarmenteux; rameaux pubescents; indumentum velouté brun-ferrugineux à la face inférieure du limbe. Fleurs flétries (août); infrutescences denses en capitules terminaux (août).

Distrib. - Afrique Occidentale: du Sénégal (Ouassadou) à la Nigéria méridionale. Côte d'Ivoire: forêt rélictuelle près Assakra (L. Aké-Assi); Oroumbo-Boka (G. Man-

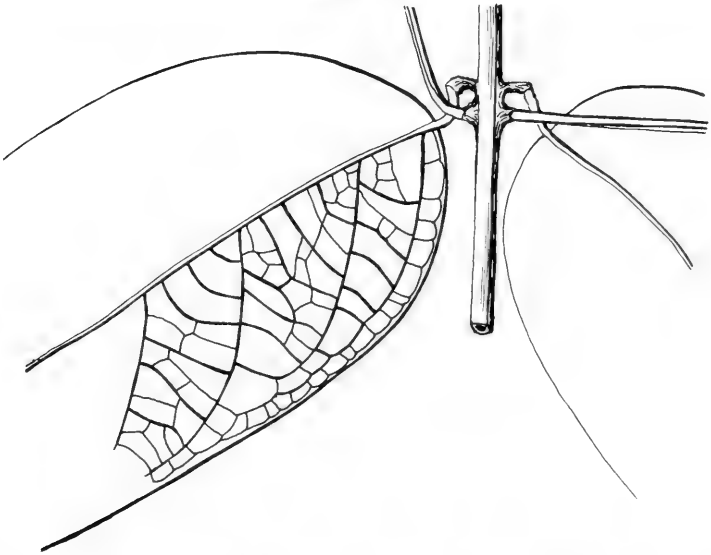
Fig. 6

genot et L. Aké-Assi).

Clerodendrum splendens G. Don

1257 - Galerie forestière d'altitude (lisière) du versant N-E du Pic Bintumane vers 1500 m. -- 4305 - Galerie forestière en piedmont Nord Loma (entre Yalamba et Bandakarfaïa) vers 450 m. Fleurs (février). -- 9016 - Forêt secondaire à l'ouest de Bandakarfaïa vers 500 m. Fleurs (janvier). -- 9046 - Forêt secondaire des basses pentes près de Sini-Koro, piedmont ouest Loma vers 350 m. Fleurs (janvier).

Fig. 7



Biol. - Liane ligneuse glabre. Face inférieure du limbe parsemé de nombreuses ponctuations glanduleuses. Tige 4-angulaire creuse, brun-cannelle; le pétiole après sa chute abandonne un moignon trapu. Fleurs rouge-vif, corolle à préfloraison quinconciale.

Distrib. - Afrique Occidentale: du Sénégal (Casamance) au Cameroun. - Gabon, Congo, Angola.

Clerodendrum umbellatum Poir.

9126 - Forêt secondaire des basses pentes du versant occidental du Loma près de Sini-Koro vers 400 m. Fleurs (janvier).

Biol. - Buisson sarmenteux; rameaux creux, brun cannelle. Face inférieure du limbe parsemé de nombreuses ponctuations glanduleuses; le pétiole en tombant laisse un moignon.

Inflorescences terminales amples, ramifiées. Le calice persistant passe au rouge lie de vin. Corolle pas vu.

Distrib. - Afrique Occidentale: de la Guinée au Cameroun et Fernando-Po. Afrique Centrale et Orientale.

Fig. 8

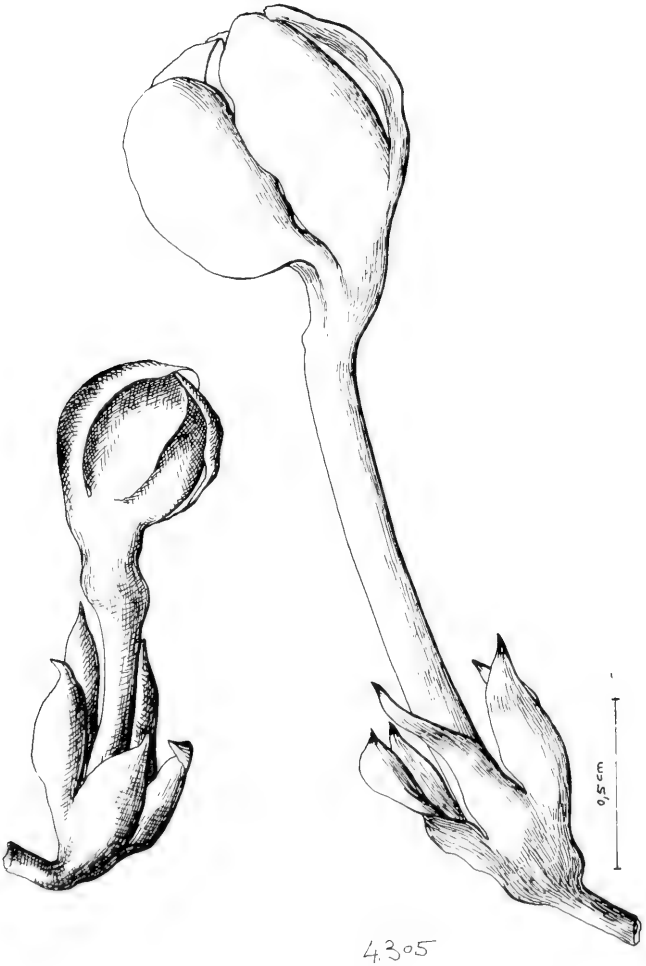
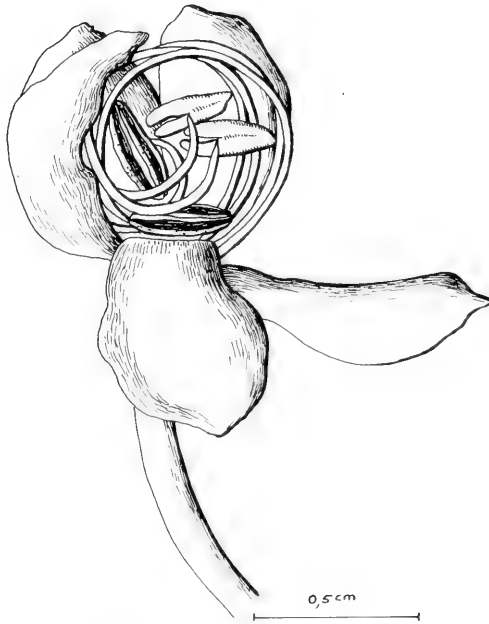


Fig. 9



4305

Clerodendrum umbellatum var. asperifolium (Thomas) Mold.

860 - Savane guinéenne à Lophira lanceolata, Pterocarpus erinaceus, Cussonia barteri..... près de Bambaya (Haut Niger). Fleurs (août).

Biol.- Herbe dressée à base ligneuse haute de 2 à 3 m. Jeunes tiges couvertes d'un indumentum brun-ferrugineux. Feuilles poilues à bords ciliés. Inflorescences en cimes lâches terminales. Fleurs nombreuses, blanches, odorantes, 1 cm de longueur. On remarque fréquemment s'enrouler autour de la tige, de gauche à droite, une Convolvulacée volubile, Hewittia sublobata aux corolles d'un jaune clair, marquées au fond d'une tache rouge foncé.

Distrib. - Afrique Occidental: Haute Volta, Sierra-Leone, Libéria. Afrique Central et Orientale: Rep. Afr. Cent., Zaire, Burundi, Tanzania.

Clerodendrum violaceum Gürke

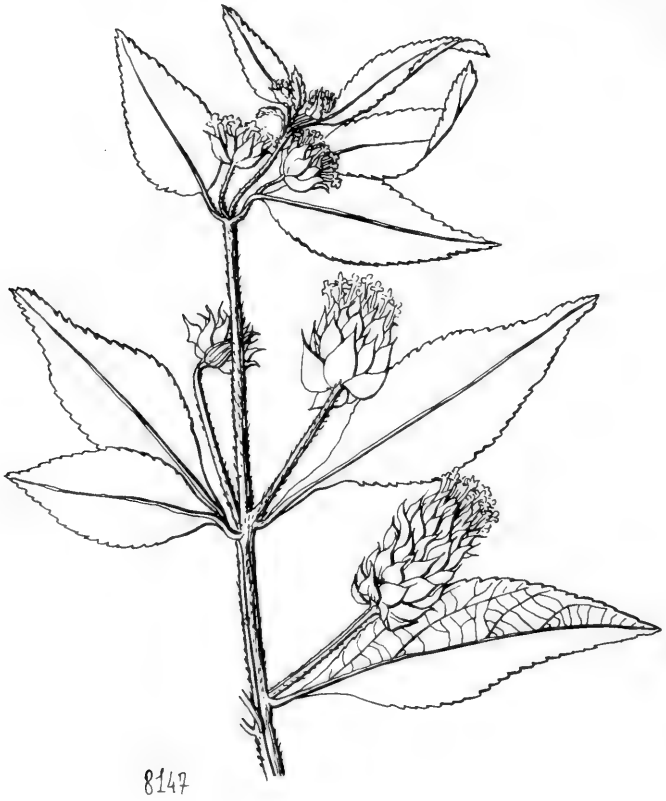
9792 - Galerie forestière d'altitude du Denkali vers 1450 m, façade Nord du Pic Bintumane avec: Parinari excelsa, Bos-

queia angolensis, Oricia suaveolens, Coffea ebracteolata, Drypetes sp., Coccinea barteri.... Fleurs (avril).

Biol. - Buisson sarmenteux; des feuilles froissées se dégage une odeur vireuse. Inflorescence en panicules terminales; les fleurs violettes, zygomorphes et les fruits rouges forment un ensemble très voyant (avril).

Distrib. - Région forestière de l'Afrique occidentale: de la Guinée au Cameroun. Afrique Centrale et Orientale: Congo, Rhodésie sept.

Fig. 10



Clerodendrum volubile P. Beauv.

8515 - Forêts claires, sèches à Gaertnera paniculata vers 1100 m. Fleurs et fruits (déc.) — 8813 - Galerie forestière d'altitude du Néji versant Est du Pic Bintumane vers 1000 m (lisière). Fleurs et fruits (janvier). — 9105 - Forêt secondaire piedmont W Loma vers 400 m entre Sini-Koro et Kania avec: Anisophyllum laurinum, Baissea multiflora, Ouratea sp. Fleurs et fruits (janvier).

Biol. - Buisson sarmenteux. Feuille glabres avec épines pétiolaires se développant après la chute du limbe. Inflorescences corymbiformes, généralement terminales, aux axes velus: fleurs jaunes: calice persistant, évasé, blanc-verdâtre.

Distrib. - Afrique occidentale: du Sénégal au Cameroun et Fernando-Po. - Gabon, Congo, Angola.

Fig. 11

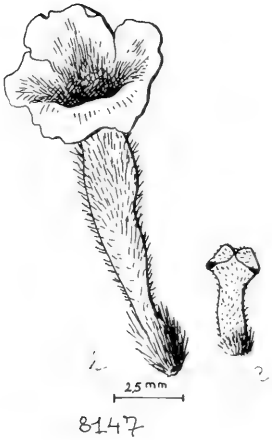
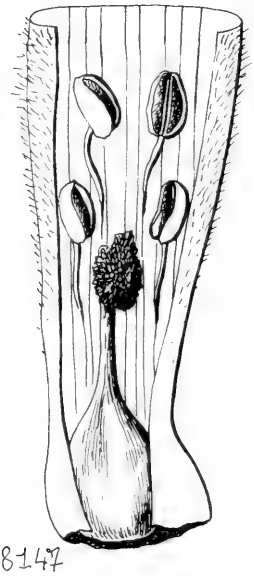


Fig. 12



Clerodendrum welwitschii Gürke

8509 - Forêt dense secondarisée au pied du versant Nord du Da-Oulen vers 1150 m avec: Garcinia polyantha, Cola digitata, Dichapetalum sp., Milletia pallens, Scleria spiciformis...

Biol. - Buisson sarmenteux, rameaux pubescents, feuilles ovales-elliptiques pubescents, acuminées (10 x 15 cm), pétiolées (2 à 8 cm); le pétiole, lors de sa chute, abandonne un

moignon peu ou pas vulnérant. Fleurs pas vu.
Distrib. - Afrique Occidentale: de la Nigéria méridionale au Cameroun. Afrique Central: Congo - Angola.

Lantana camara L.

Buisson de 1,50 à 2 m de haut; rameaux quadrangulaires, pubescents surtout vers le haut; entre-noeuds garnis de nombreuses protubérances recourbées vers le bas et disposées sand ordre. Feuilles opposées, ovales aux bords régulièrement denticulés. Face supérieure du limbe scabre, face inférieure pubescente et glanduleuse. Fleurs nombreuses groupées en corymbes axillaires, denses, voyants, vivement colorés. Nucules d'un noir-violacé luisant.

Verbénacée originaire d'Amérique tropicale; fréquent à proximité des agglomérations au pied du Loma où on la trouve avec: Canna indica, Bixa orellana, Cassia occidentalis, Solanum torvum, Amaranthus spinosus, Acanthospermum hispidum.....

Lantana glandulosissima Hayek

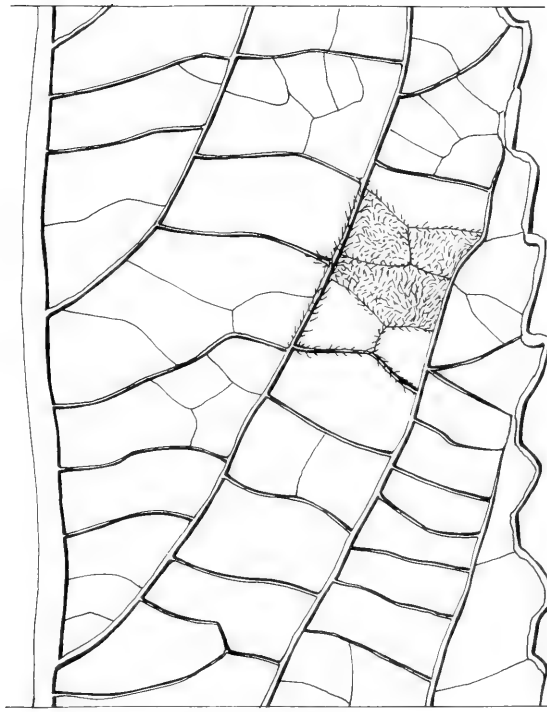
Une espèce très proche de la précédente et originaire du Méxique est, par contre, très rare en Afrique occidentale où nous l'avons récoltée au base des falaises gréseuses près de Douentza (Mali).

Lantana rhodesiensis Mold

896 - Savane guinéenne entre Kamaro et Masadugu (Dierra-Leone NE), fleurs (août), avec: Lophira lanceolata, Cussonia barteri, Terminalia glaucescens, Crossopteryx febrifuga..... — 8147 - Savane guinéenne pâturée piedmont Est Loma vers 600 m près de Sekurela, fleurs et fruits (nov.) avec: Lophira lanceolata, Terminalia glaucescens, Ficus glumosa, Piliostigma thonningii, Nauclea latifolia, Bridelia ferruginea, Hymenocardia acida, Cissus doeringii, Lippia multiflora, Chasmopodium caudatum, Andropogon gayanus, Beckeropsis uniseta, Laggera alata.....
Biol. - Herbe érigée à base ligneuse ou buisson de 1,50 à 2 m. Tige brunâtre, non épineuse, mais anguleuse, pleine et densément poilue - hirsute vers le sommet. Feuilles courtement pétiolées, ovales à bord crénelé. Face supérieure scabre, face inférieure densément pubescente, parsemée de points glanduleux, nervures en relief. Inflorescences axillaires en épis d'abord globuleux puis étirés. Fleurs pourpres marquées à la gorge d'une tache jaune; tube sensiblement de même longueur (3 mm env.) que les bractées mères. Fruit drupe et pourpre, somestible.
Distrib. - Afrique Occidentale: de la Guinée à la Nigéria. - Largement répandue dans les savanes de l'Afrique tropi-

cale.

Fig. 13



Lippia multiflora Mold.

3955 - Abondant en savane guinéenne au Nord du Loma (région de Yalamba) avec: Lophira lanceolata, Ficus glumosa, Zyzygium guineense var. macrocarpa, Entada abyssinica, Piliostigma thonningii, Bridelia ferruginea, Hymenocardia acida, Crossopteryx febrifuga, Chasmopodium caudatum, Loudetia sp., Andropogon sp., Lactuca capensis, Elephantopus mollis, Borreria ramisparsa, Laggera alata..... Fleurs (janv.). — 6831 - Savane guinéenne du versant du Est du Loma vers 840 m avec: Terminalia glaucescens, Cussonia barteri, Markhamia tomentosa, Kotschya lutea.....; résidus d'infrutescences (juillet).

Biol. - Herbe érigée 2-3 m de haut, vivace, à base ligneuse; tige

anguleuse, striée, ramifiée vers le haut, glabre faiblement pubescente. Feuilles opposées, souvent verticillées par trois. Face supérieure avec nombreux poils tecteurs couchés; face inférieure glanduleuse. Inflorescences en épis terminaux ombelliformes globuleuses ou étirées cylindriques; bractées obtuses, courtement mucronées. Corolle blanc-crème, ne dépassant pas les bractées; fleurs légèrement odorantes. (janvier). -- La plante n'est pas touchée par le bétail.

Distrib. - Savanes de l'Afrique tropicale.

Premna hispida Benth.

765 - Galerie forestière d'altitude (lisière) vers 1300 m avec: Canthium horizontale, Hibiscus panduriformis, Hypolytrum cacuminum..... (massif du Serelen-Konko). -- 1293/1298 - forêt dégradée au pied du versant Nord du Da-Oulen vers 1100 m avec Vismia guineensis, Rutidea parviflora, Tetracera alnifolia, Gaertnera paniculata, Smilax kraussiana.... -- 1510 - bush montagnard dégradé à Dissotis leonensis du Fuen-Koli vers 1300 m. -- 4288 - Buisson ou sous-arbrisseau de 2 à 3 m, sous-bois d'un îlot forestier dégradé du piedmont Nord du Loma (rég. de Yalamba). Fleurs (mars). -- 9478 - Buisson ou sous-arbrisseau, fleurs et boutons floraux (mars); rochers granitiques du rebord W du "Plateau" avec: Psorospermum febrifugum, Psychotria calva, Pavetta lasioclada, Craterispermum laurinum, Canthium henriquesianum.....

Biol. - Petit arbre, sous arbrisseau ou buisson sarmenteux des formations secondaires en plaine et en montagne (Fouta-Djalon, Loma, Nimba, Man). Jeunes rameaux velus-hispides d'un brun ferrugineux, glabrescents par la suite. Feuilles opposées à limbe oblong ou largement oboval, densément pubescent et planduleux à la face inférieure. Inflorescence en corymbes terminaux richement fleuris aux axes hirsutes. Fleurs blanc-jaunâtres zygomorphes, petites. Drupes globuleuses vertes, jaunes puis noires enchâssées dans le calice persistant.

Aire - Afrique Occidentale: du Sénégal au Togo.

Vitex doniana Sweet [V. cuneata Schum. & Thonn.; V. cienkowskii Kot. & Peyr.]

9258 - Arbuste 4 m. Feuilles. Jeunes fruits (février). Galerie forestière de la Bagbé entre Kruto et Yiffin - vers 340 m à l'ouest du Loma; avec: Rinorea sp., Psychotria calva, Xylopia parviflora, Pachystela brevipes, Phyllanthus sp., Aphanostylis mannii, Hibiscus comoensis, Hypolytrum heteromorphum.... 1401 - Lisière forestière (centre Loma) avec: Stereospermum acuminatissimum, Sterculia tragacantha, Hugonia planchonii, Bombax buonopozense.... -- 1756 - Sa-

vane sub-montagnarde (région du Perankonko) lisière vers 800 m avec: Pterocarpus erinaceus, Dracaena arborea, Markhamia tomentosa, Bridelia micrantha, Mussaenda erythrophylla, Dolichos dinklagii, Cissus doeringii, Triumfetta sp.

Biol. - Le plus grand des Vitex de l'Afrique Occidentale (j. 25 m); feuilles opposées, composées-palmées aux folioles obovées à sommet obtus, glabres coriaces, pétiolées. Inflorescences en cimes tomenteuses abondamment fleuries. Fleurs odorantes. Fruit: drupe globuleuse accompagnée du calice persistant.

Aire - Afrique Occidentale: du Sénégal au Cameroun; très répandu en Afrique tropicale de préférence en savane et en terrain découvert.

Vitex grandifolia Gürke

23585 - Galerie forestière de la Bagbé piedmont W Loma, pont de Yiffin près Kruto vers 375 m avec: Ficus ottoniifolia, Xylopia parviflora, Pachystela brevipes, Baissea zygodioides, Aphanostylis mannii, Phyllanthus sp., Hibiscus comoensis, Psychotria calva, Hypolytrum heteromorphum...

Biol. - Arbuste 4 m. Feuilles, fruits mûres et en maturation (février).

Distrib. - de la Casamance au Gabon.

Vitex oxycuspis Bak.

22634 - Sous-bois d'une forêt basse sur palier à Gaertnera paniculata. Feuilles (déc.)

Biol. - Espèce proche de V. micrantha dont elle se distingue par ses feuilles plus grandes, grossièrement dentées et longuement acuminées.

Distrib. - Afrique Occidentale: Sierra-Leone, Libéria, Côte d'Ivoire, S. Nigéria. Dorsale: Loma (J. G. Adam), Nimba (R. Schnell), Angola.

Cet inventaire qui comprend 18 espèces de Verbénacées, dont 11 Clerodendrum, répandues à l'état spontané dans le massif du Loma, mérite d'être complété par deux autres, plantées en pays de piedmont, à savoir: Gmelina arborea et Tectona grandis.

Conclusions

It peut paraître étonnant qu'un massif montagneux tel que le Loma qui couvre à peine 500 km^2 et dont la prospection est loin d'être terminée, recèle une proportion aussi importante de Verbénacées; particulièrement frappante est la richesse en espèces de Clerodendrum. Sur les trente espèces de Clerodendrum consignées dans Flora of West Tropical Africa, onze sont représentées au Loma ou dans les pays limitrophes. Cette richesse surprend d'autant

plus que d'autres régions et massifs montagneux ouest-africains s'avèrent, à première vue, bien plus pauvres en Verbénacées et tout particulièrement en espèces appartenant au genre Clerodendrum.

Ainsi, dans tout le Sénégal, Casamances comprise, J. Berhaut ne dénombre que 7 espèces de Clerodendrum. Sur onze espèces de Verbénacées inventoriées en 1957 dans les forêts claires subsoudanaises et soudanaises de la Côte d'Ivoire septentrionale, E. Adjanohoun et L. Aké-Assi ne relèvent que quatre Clerodendrum; et, selon J. L. Guillaumet ce chiffre tombe à trois dans la région du bas Cavally. Dans le massif du Vogel-Peak en Nigéria septentrionale, F. N. Hepper récolte quatre Verbénacées dont un Clerodendrum, le C. capitatum. Plus importantes sont les récoltes de R. Schnell au Nimba où cet auteur reconnait avec Premna hispida, quatre espèces de Clerodendrum et six espèces de Vitex.

Les collections constituées, tant en saison pluvieuse qu'en saison sèche, au cours de cinq séjours dans les monts Loma, sont étudiées systématiquement en vue de la mise sur pied d'une florule des végétaux vasculaires de ce massif. Ainsi se dégage, définitivement, la richesse floristique de cette chaîne, au même titre que son importance dans le cadre phytogéographique ouest-africain.

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Liste des Figures

A - Clerodendrum capitatum (Willd.) Schum. et Thonn. var. capitatum
Fig. 1 - Rameau feuillé et florifère (no. 8613 Herbier P. Jaeger)
Fig. 2 - Bouton floral avancé (no. 8613 Herbier P. Jaeger)
Fig. 3 - Disposition des étamines et du style à l'intérieur du bouton floral (no. 8613 Herbier P. Jaeger)
Fig. 4 - Fragment de rameau fructifère. Le fruit formé de 4 nucules est entouré par le calice persistant (no. 3682 Herbier P. Jaeger)
Fig. 5 - Nucules isolées (no. 3682 Herbier P. Jaeger)

B - Clerodendrum splendens G. Don
Fig. 6 - Rameau feuillé et florifère (no. 4305 Herbier P. Jaeger)
Fig. 7 - Bases foliaires montrant l'articulation du pétiole

(no. 9016 Herbier P. Jaeger)

Fig. 8 - Boutons floraux à divers stades de développement (no. 4305 Herbier P. Jaeger)

Fig. 9 - Disposition des étamines et du style à l'intérieur du bouton floral (no. 4305 Herbier P. Jaeger)

C - Lantana rhodesiensis Mold.

Fig. 10 - Rameau feuillé et florifère (no. 8147 Herbier P. Jaeger)

Fig. 11 - a) fleur à l'état de bouton; b) fleur épanouis (no. 8147 Herbier P. Jaeger)

Fig. 12 - Coupe longitudinale intéressant la moitié inférieure d'une fleur montrant l'androcée et le pistil (no. 8147 Herbier P. Jaeger)

Fig. 13 - Etude de la nervation de la face inférieure du limbe (no. 8147 Herbier P. Jaeger)

NOTES ON CERTAIN TAXA OF THELYPTERIS SCHMIDEL (THELYPTERIDACEAE) OF ASIA.

G. Panigrahi

Regional Botanist,Botanical Survey of India at the Royal Botanic Gardens,Kew.

During my studies involving the genus Thelypteris Schmidel of the Indian region (see Panigrahi,1975 a,b), the follwing furth -er notes on certain species occurring in Asia have been prepared.

I. THELYPTERIS SUBPUBESCENS (Bl.)K.Iwats.

Blume(1828) described Aspidium subpubescens based on plants ".. ad rivulos circa Batavium etc."He recognised within it three more varieties viz. B,C & D, of which var.B came from " in umbrosis insulae nusae Kambang". He also described plants from " in humidis Javae et Moluccarum" which he wrongly identified as Aspidium amboinense Willd.

A thorough search at the Rijksherbarium,Leiden and at the herbaria at Utrecht,Geneva,Paris,British Museum(N.H.) and Kew brought to light only two sheets viz.908337-179 and 908337-184 at Leiden,L) from Java labelled Aspidium subpubescens Bl.(but not in Blume's handwriting).The sheet -179 has one frond from the stipe, -184, two separate fronds also from the stipe mounted on either side of one entire plant with + erect caudex bearing two fronds (Plate I).All the fronds are fertile,herbaceous in texture,pinnae c.half-way cut towards the costae,only one pair of veins anastomo -sing and a deeply lobed terminal pinna not much more prominent than the largest lateral pinna.The pinnae are rather sparse and the entire plant is + glabrous,not subpubescent.These two sheets were labelled at the Rijksherbarium,Leiden as the " Type Duplicate" and " Type" of Aspidium subpubescens Bl. and photographs of these were sent to different herbaria (viz.BM,K).Prof. Holttum who examined these types on loan from Leiden identified and described some Malayan plants as Cyclosorus subpubescens (Bl.)Ching (see Holttum,1954,1971 a).

Further search in the Europaen herbaria mentioned above brought up a number of specimens from Java labelled Aspidium amboinense W., presumably by Korthals, but none by Blume himself. Of these, the specimen on a double-size sheet (viz.910327-113 at Leiden) bears a label in Blume's own handwriting.It reads: " Aspidium puberum [nom.nud] aan de Kanten der rivier op Tanjong Krukot Batavia". This specimen (Plate II) bears another label " 307 Aspidium amboinense W.,Java,Bl." written by Korthals as stated earlier and has an erect caudex with tufted fronds,7-8 in number,coarser in texture,pinnae cut less than 1/4 towards the

costae, 2-2½ pairs of veins anastomosing, a more prominent terminal pinna,pinnae more numerous,acute and rigid. Thus,it fits more appropriately with Blume's description of Aspidium subpubescens than the other two sheets from Java (cf.Plate I),except for the fact that the latter have " serraturis profundioribus", which,amongst others,according to Blume (1828:149, CBS.), A.subpubescens differs from A.amboinense [.... pinnis numerosioribus,acutioribus,rigidioribus,serraturis profundioribus, rachi stipiteque angulatis]. We have no specimens from Java which can definitely be ascribed to A.amboinense sensu Blume,non Willd. (1810); Blume's descriptions of both the species are not precise enough to fix firmly these two specific epithets to either one or the other set of specimens from Java represented by Plate I and Plate II. It is natural that in view of the presence of two sets of specimens at Leiden, the typification of Aspidium subpubescens Bl. should have posed a problem to the taxonomists from time to time and thereby caused so much confusion in the identification of certain taxa of Thelypteris from South-East Asia and the Indian region (see Ching,1938,Holttum,1954,1971 a,Panigrahi 1960, 1975a and K.Iwatsk.,1965 amongst others).

Panigrahi(1960) and Holttum(1971,a) have,however,treated the specimen on the double-size sheet (Plate II) as the holotype of Aspidium subpubescens Bl. on the ground (see Holttum,l.c.) that this specimen i) fits better with the description; ii) the data regarding the exact locality in Java as given by Blume (1828 :149) is almost the same as recorded on the sheet; iii) from among the plants referred to var.B,var.C and var.D by Blume, we have at Leiden the var.B and var.C labelled by Blume himself. This selection of the double-size sheet as the holotype leaves out the question of the identity and nomenclatural status of the two specimens from Java labelled as Aspidium subpubescens Bl. and treated hitherto as as the " Type" and " Type duplicate" of the species. I,therefore,consider A.subpubescens Bl. as comprising two heterogenous elements of which the specimen on the double-size sheet must be treated as lectotype. And since there is no substantial difference between the other element and Polypodium dentatum Forssk.(1775) except with regard to the degree of hairiness of the fronds, the second element is identified with Thelypteris dentata (Forssk.) E.St.John (1936) (= Christella dentata (Forssk.) Brownsey & Jermy,1973; see also Holttum,1971a). This lectotypification of Aspidium subpubescens Bl. would necessitate certain corrections in the citations of synonyms for T.subpubescens (Bl.)K.Iwats(1965),as set out below:

THELYPTERIS SUBPUBESCENS (Bl.) K.Iwats. in Mem.Coll.Sci.Univ. Kyoto,Ser.B,31(3):173(1965) pro parte,quoad typum tantum,excl. synon et descr. Basionym: Aspidium subpubescens Bl.,Enum.Pl.Jav. 2:149(1828).Type: Java:aan de Kanten der rivier op Tanjong Krukot Batavia,Blume s.n. [910327-113,L,selected here as lectotype]. Synonyms: Nephrodium molle var.major Bedd.Handb.Ferns Brit.India,Ceylon,Malaya Penins.Suppl.:76(1892) pro parte,quoad

pl. Sumatra (BM); Dryopteris sumatrana v.A.v.Ros.,Malayan Ferns: 227(1909).Type: Sumatra in Herb.Nat.Hist.Mus.(BM,selected by Holttum (1954:276) as the "appropriate type"; Cyclosorus sumatranus (v.A.v.R.) Ching,Bull.Fan Mem.Inst.Biol.Bot.10:249(1941);Holttum,Rev.Fl.Mal.2:275(1954) et Panigrahi & Manton in Journ.Linn.Soc. Bot.55:729-743(1958); Thelypteris sumatrana (v.A.v.R.) K.Iwats.in Acta Phytotax.Geobot.22:101(1967);Reed in Phytologia 17:318 (1968); non Cyclosorus subpubescense sensu Holttum,l.c.91954)nec Panigrahi et Manton l.c. (1958).

Distribution: Java,Sumatra,Malaya and India (Eastern). Specimens from India examined: Assam,G.Mann s.n.(labelled Nephrodium molle) (L); Darrang Dist.,Balipara forest,Daimukh,1889,G.Mann s.n. (L); Meghalaya: Khasi Hills,Cherrapunji,in woods,1889,G.Mann s.n. (L); Garo Hills,300 m,Apr.1888,G.Mann s.n. (L).

2. DRYOPTERIS ACUMINATA ROSENSTOCK

Rosenstock (1917) described Dryopteris acuminata based on Zollinger 735 from Java and identified with it the plant from nusae Kambang labelled by Blume Aspidium puberum (nom.nud.) var.B (L). Rosenstock's species which may be assigned to the subgenus Cycloso-riopsis K.Iwats.(1965) and to the genus Christella Lev.(see Holttum,1971 b) is characterised by + herbaceous texture, a few pairsof basal pinnae gradually reduced, rhachis and costae + hairy; pinnae caudate-acuminate and pinnules strongly oblique, 1.5 - 2 pairs of veins anastomosing and the sinus with long callus. Thelypteris acuminata(Panz.in Christem et Panz.)Morton,on the other hand,based on a different type from Japan is assigned to the subgenus Cyclosorus (Link)Morton (see K.Iwats.,1965:135,184,186). It has coriaceous or rigidly chartaceous texture, its lowest pinnae not or slightly reduced,only 1-pair of veins anastomosing with an excurrent veinlet running to the sinus and sori confined to the lobes of the pinnae. The two species are distinct.On transfer to the genus Thelypteris Schmidel,D.acuminata Rosenst. needs a new name. T.blumei nom.nov.is herein proposed,after Blume who first suspected his var.B to represent a different species:

THELYPTERIS BLUMEI Panigrahi,nom.nov.Synonyms: Dryopteris acuminata Rosenst.in Med.Rijks.Herb.no.31:7(1917).Type: Java, Zollinger 735(L); Aspidium subpubescens Bl.var.B Bl.,Enum.Pl.Jav.2: 149(1828).Type: Java,nusae Kambang,Blume s.n.(labelled Aspidium puberum var.B) (L).

3. DRYOPTERIS PSEUDOAMBOINENSIS ROSENST.

Another species occurring in Java and Sumatra and almost approaching Thelypteris subpubescens (Bl.)K.Iwats.,proparte(= T.sumatrana (v.A.v.R.) K.Iwats.) and sometimes confused with it in herbaria if the rhizome is not present,is Dryopteris pseudoamboinensis Rosenst. based on Korthals'specimens from Java and Sumatra. Although the two species resemble each other in frond form in having 2-3 pairs of lower pinnae gradually reduced (but not to mere

auricles), a prominent terminal pinna, 2-2½ pairs of veins anastomosing, T.subpubescens has a distinctive erect caudex with tufted habit bearing 8-9 fronds, the fertile fronds sometimes sub-dimorphic with a longer stipe and more remotely-borne fertile pinnae on rhachis, pinnae crenate and entirely glabrous. It is a tetraploid species and produces sterile F_1 hybrids when crossed with T.dentata Forssk.) E.St.John (=Cyclosorus dentatus (Forssk.)Ching from Madeira as also with C.subpubescens sensu Holttum (1954) from Malaya and its erect caudex breeds true and remains as such under cultivation over a period of years (cf.Panigrahi & Manton,1958). Dryopteris pseudoamboinensis Rosenst.(Plate III),on the other hand, is characterised by a creeping rhizome which puts up solitary fronds in succession,its rhachis,costae and margins of pinnae are provided with short crisped hairs on the upper surface and short papillate hairs on the lower surface.

On transfer to Thelypteris Schmidel, the nomenclatural citations are:

THELYPTERIS PSEUDOAMBOINENSIS (Rosenstock) Panigrahi,comb.nov. Dryopteris pseudoamboinensis Rosenstock,Med.Rijks.Herb.no.31 :7(1917). Syntype: Sumatra,Korthals 270,selected here as lectotype).(L); non Cyclosorus pseudoamboinensis sensu Panigrahi,Rapp.Huit.Inter.Bot.Cong.Paris:9-10:82(1954) nom.nud.

Distribution: Java,Sumatra,Malaya and India. Specimens from India examined: Tamil Nadu: Shevroy Hills,1372 m,Turrell 28(P);. Uttar Pradesh: Kumaon Daon Doon,1875,Hope 44 (P); Dehar Dun,Bank of Song river,above Lachenwala,610 m,Dec.1886,Hope 187 (P); Nepal frontier,Jalesain nala,29 Apr.1900,Inayat 23916 (P). West Bengal: Darjeeling,Ryang,610 m,Clarke 13662 B (P).

4. THELYPTERIS TERMINANS (J.Sm.ex Hook.f.) Panigrahi,comb.nov. Nephrodium terminans J.Sm.ex Hook.f.,Sp.Fil.4:73(1862) (pro parte, quoad typum,excl.synon; Bedd.,Ferns South India:32,t.90(1864).Type: India,Kumaon,Wallich 386 (K,holotype).N.pteroides Baker in Hook.et Bak.,Syn.Fil.:289(1868); Bedd.,Handb.Ferns Brit.India,Ceylon and Malaya Penins.: 269(1883),non Polypodium pteroides Retz.(1791). Amphineuron terminans (Wall.ex Hook.) Holttum in Amer.Fern Journ.63: 82(1973). Aspidium terminans Wall.ex Kunze in Linnaea 23: 230(1846),nom.nud. Nephrodium terminans J.Sm.in Bot.Mag.72 Compan.:32(1846) nom.nud.

Distribution: India,Sri Lanka and Burma.Some of the specimens from India examined are: Orissa,Mayurbhanja district,Bahreipani, 900 m,20 Feb.1958,Panigrahi 12679 (K);Andhra Pradesh,Godavari Dist. Rampa Hill,600 m,Feb.1885,Gamble 15929 (K). Tamil Nadu: Nilagiri Hills,1860,Beddome 137 (K).Karnatak: Annamalallys,1000 m, Beddome s.n.(type of F.S.I.t.90).

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_____& I.Manton.1958. Cytological and taxonomic observations on some members of Cyclosorus parasiticus complex Journ.Linn.Soc.Bot.London 55:729-743.

Rosenstock, E .1917. Filices Palaeotropicae novae Herbarii Lugduno - Batavi.Meded.Rijks Herb.,Leiden no.31:1-8.

Plate I. Aspidium subpubescens Bl. Type material from Java, pro parte = Thelypteris dentata (Forssk.) E.St. John (L, photo,K).

Plate II. Aspidium subpubescens Bl. Type material collected by Blume from Java, mounted on the double-size sheet at Leiden and labelled Aspidium puberum Bl. nom.nud.]; selected here as lectotype: = Thelypteris subpubescens (Bl.)K.Iwats.p.p.

Plate III. Thelypteris pseudoamboinensis (Rosenst.) comb.nov. (= Dryopteris pseudoamboinensis Rosenst. Syntype: Sumatra, Korthals 270 (L), selected here as lectotype).

A REVISION OF THE GENUS CISSAMPELOS

Donald G. Rhodes

INTRODUCTION

The genus Cissampelos is a member of the Family Menispermaceae, Tribe Cocculeae. It is difficult to find a genus within the Angiosperms so completely vegetatively heteromorphic as Cissampelos. Extremes are found in the diverse habit of the plants, in texture and form of leaves, degree of pubescence, and various types of inflorescences. Fortunately the flowers are uniform enough at the species level to delimit natural taxa.

The extreme reduction found in flowers of Cissampelos separates the group from related genera such as Antizoma and Stephania.

This revision is an extract from a dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy from Southern Illinois University and was under the direction of Dr. Robert H. Mohlenbrock. For the brevity of publication only a portion of the 200 page dissertation is presented. The complete dissertation is microfilmed and filed in the library of Southern Illinois University.

Material from the following herbaria was used for this study: Southern Illinois University (SIU), Gray Herbarium (GH), Missouri Botanical Garden (MO), U.S. National Museum (US), Chicago Natural History Museum (F), University of California at Los Angeles (LA), Stockholm (S), Berlin (B), the British Museum (BM), and the New York Botanical Garden (NY).

MORPHOLOGY

For the most part Cissampelos consists of subherbaceous or suffrutescent twiners. Only one species, C. ovalifolia DC., is a perennial upright herb.

The leaves within the genus are petiolate, and either basifixed or peltately inserted upon the lamina to the extent of 4 cm as in Cissampelos grandifolia Triana and Planch. This is quite a variable intraspecific character. A tendency exists for those species with a suborbicular leaf to be conspicuously peltate. The leaf shape is quite variable both within and between the species. The most prevalent leaf shape is cordate but the form can vary from deltoid to orbicular. The lamina ranges in size from 2-15 cm long and wide. The pubescence varies from glabrous to tomentose or sometimes sericeous. Color of the hairs ranges from brownish-red to brown, yellow, or white. The hairs are usually uniseriate and bicellular. The margin of the lamina varies from crenate to entire. The apex is most often obtuse. Broadly ovate or suborbicular leaf types will frequently be emarginate at the apex. All species of Cissampelos possess a mucronate apex. The base is usually cordate but may also be rounded, truncate, or retuse. The base is rarely attenuate. The texture is most often membranous or subcoriaceous, occasionally

chartaceous. Basifixed leaves tend to be palmately 5- to 7-nerved while those with the petiole inserted within the lamina usually are palmately 10- to 12-nerved. The veins are often prominent below. The lamina is usually dark above and pale below.

The petiole length varies from 0.5 to 18.0 cm, and may become swollen distally and proximally. It is frequently twisted proximally. The proximal and distal ends may also exhibit a denser pubscence than the remainder of the petiole. The pubescence of the petiole ranges from glabrous to tomentose.

The staminate inflorescence can be quite variable even within a species. Figure 1 illustrates the types of arrangements that can be found in the genus. Pathway A, B, C, D, E, and F indicates the reduction series which apparently occurs in the pantropic Cissampelos pareira L. Type A is a compound secondary branch with reduced leaves supporting many dichasia. Type B is a racemiform secondary branch with reduced leaves and axillary dichasia. Type C consists of a secondary branch, reduced leaves grading to reniform bracts with axillary dichasia, and the addition of dichasia at the base of the secondary branch. Type D is similar to Type C, but the secondary branch is much reduced. In Type E the secondary branch is absent and replaced by numerous dichasia axillary from a normal leaf. Type F is similar to Type E except the number of dichasia is reduced. Type F appears to represent the most advanced type of inflorescence. The C. pareira pathway may deviate to Type C1 which consists of a racemiform secondary branch with reniform bracts exclusively. C. grandifolia Triana and Planch. exhibits pathway A and A1. Type A1 is paniculiform but ebracteate. C. andromorpha DC. and C. fasciculata Benth. follow pathway A, B, C, C1, C2, and C3 or pathway A, A1, C2, and C3. Type C2 is a racemiform secondary branch but is ebracteate. Type C3 is the same as Type F but apparently originating from a different source. C. sympodialis Eichl. and C. glaberrima St. Hil. follow pathway C, C1, C2, and C3. C. tropaeolifolia DC. illustrates types A, B, C, C1, C2, and C3. C. laxiflora Moldenke is represented by Types C1 and C2. C. ovalifolia DC. follows pathway C1 directly to C3. The African and Asian species closely parallel the development found in the New World species. C. torulosa E. Mey., C. owariensis Beauv., and C. mucronata A. Rich. illustrate a trend from Type C through Types C1 and C2 to Type C3. C. rigidifolia (Engl.) Diels has inflorescence Types A and A1. C. nepalensis Rhodes exhibits Type C1 only, while C. nigrescens Diels and C. friesiorum Diels support Type F or C3.

The staminate flower consists of four sepals. Some specimens will have five sepals, but this is quite uncommon. The corolla varies from cupulate to patelliform. Rarely the corolla is deeply lobed or, it consists of free petals. The synandrium is sessile or stalked and the number of anthers is usually four but, in some species, such as Cissampelos mucronata, the number ranges from six to nine.

The pistillate inflorescence consists of individual flowers fasciculate on bracteate or ebracteate racemiform of paniculiform secondary branches.

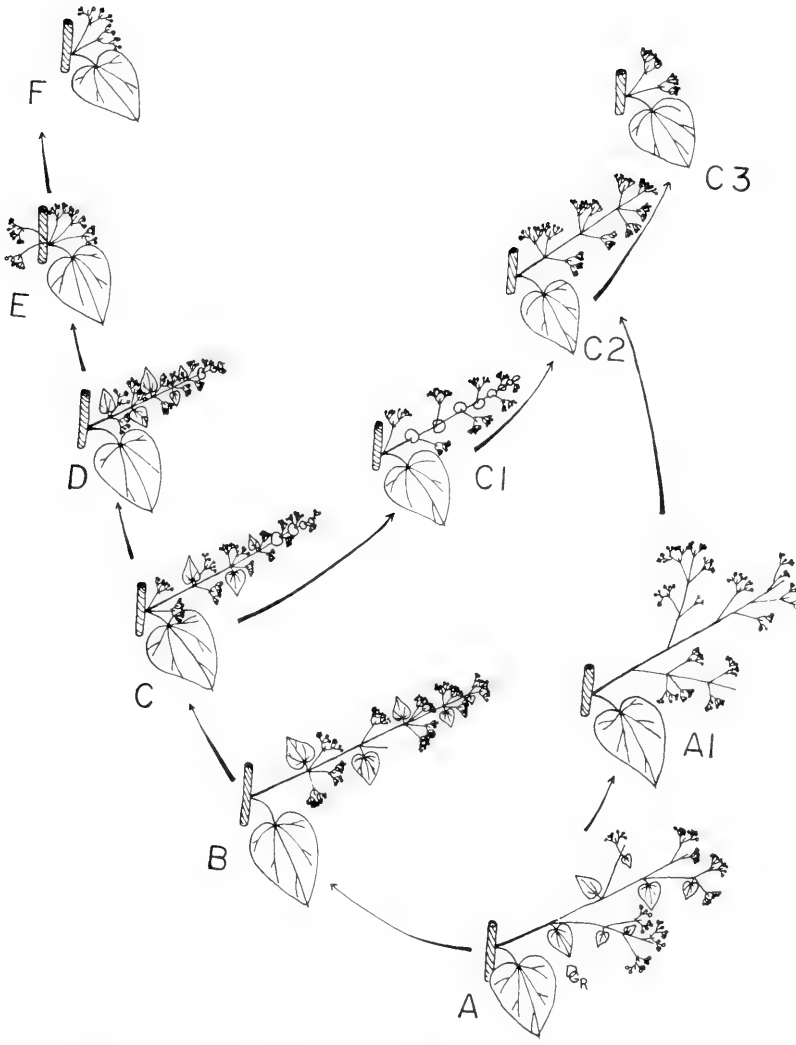

Figure 1. Inflorescence types of Cissampelos.

The pistillate flower consists of one sepal which is usually obovate, a single petal that is most often reniform, and a single gibbose carpel.

It is possible that the ancestral flowers of Cissampelos were bisexual, possessed several perianth appendages, nine or more free stamens, and three or more carpels. In the staminate flower the perianth appendages were reduced in number with four persisting to form a cupulate corolla. The patelliform type of corolla probably was derived from the cupulate form. The synandrium evidently was formed by the fusion of at least nine stamens. The number of anthers was then reduced, in most instances, to a minimum of four. The synandrial stalk progressively became shorter. The most advanced staminate flower possesses four sepals, a patelliform corolla, and a sessile synandrium of four anthers. In the pistillate flower reduction has occurred to a single sepal, petal, carpel, and ovule.

The fruit is an obovoid drupe which is usually red in color and pubescent.

SYSTEMATIC TREATMENT

Cissampelos L. Sp. Pl. 1031. 1753 (Type: C. pareira L.).
Dissopetalum Miers, in Ann. Nat. Hist. ser. 3. 17:267. 1866.

Twining shrubs, rarely erect. Leaves alternate, petiolate, more or less peltate or basifixed. Staminate inflorescence axillary, generally fasciculate, normally originating in a leafy axil as milti-flowered dichasia or the dichasia originating on axillary secondary branches in axils of reduced leaves or bracts. Staminate flowers 2-merous, actinomorphic: sepals 4, free, usually exteriorly pubescent; petals connately cupulate; stamens 4-9, monadelphous, the anthers sessile on a column formed by the connate filaments, dehiscence transverse. Pistillate flowers zygomorphic, fasciculate in the axils of reduced leaves or bracts upon secondary, frequently fasciculate, axillary branches: sepal 1, obovate, exteriorly pubescent usually; petal 1, antesepalous; carpel 1, free, gibbose, the style short, the stigma 3- to 5-lobed. Drupes subglobose, laterally compressed; endocarp osseous, verrucose, ribbed.

North and South America, Africa, and Asia.

In the species descriptions, mean character values are provided if more than ten specimens were available for study. The extremes for these species are presented in parentheses. Since many species of Cissampelos are quite heterogeneous, the characters of a typical specimen are often obscured by the extremes of variability presented in a conventional description. The mean values should afford more confidence in correct determination of the specimen most commonly collected.

Key to the Species

KEY TO THE SOUTH AMERICAN SPECIES

a. Erect perennial herbs. . . . . 1. C. ovalifolia
aa. Twiners or scramblers. . . . . b
  b. At least some or all parts of plant with sericeous pubescence; leaves peltate to 35 mm. . . . . 2. C. tropaeolifolia
  bb. Plants not sericeous or, if vegetative portions sericeous, then flowers puberulent or pilose, not sericeous; leaves seldom peltate to 35 mm c
c. Leaves strongly peltate, rarely basifixed. . . . . d
cc. Leaves basifixed or subpeltate to 1.5 cm or less. . . . . f
  d. Glabrous throughout, rarely puberulent; leaves usually suborbicular, sometimes glaucous . . . . . 3. C. glaberrima
  dd. Portion or all of plant pubescent; leaves usually ovate to deltoid, never glaucous . . . . . e
e. Leaves broadly ovate to suborbicular, 6-15 cm long; staminate and pistillate inflorescence ebracteate and paniculiform; staminate sepals 1.0-1.3 mm long; . . . . . 4. C. grandifolia
ee. Leaves usually deltoid, 2-6 mm long; staminate sepals 0.5-0.8 mm long; pistillate inflorescence bracteate, pistillate and staminate inflorescence never paniculiform . . . . . 5. C. sympodialis
  f. Pistillate flowers verticillate, to 15 per node; pubescence appressed. . . 6. C. verticillata
  ff. Pistillate flowers not verticillate, less than 10 per node; pubescence usually spreading. . . . . g
g. Flower and leaf completely glabrous; leaves dark and shiny; the apex acuminate, conspicously mucronate . . . . . .7. C. laxiflora
gg. Flower and leaf pubescent, rarely glabrous; leaves not dark and shiny, the apex acute to obtuse, rarely acuminate, not conspicously mucronate. . . . . h
  h. Sepals of staminate flower usually not reflexed, glabrous to pilose, corolla cupulate and glabrous, synandrium to 0.9 mm long; petal of pistillate flower glabrous; inflorescence frequently fasciculate from old wood; leaves usually ovate to cordate . . . . . .8. C. andromorpha

hh. Sepals of staminate flower spreading, pilose to tomentose, corolla pilose and patelliform or rarely cupulate, synandrium usually sessile or essentially so; petal of pistillate flower pilose; inflorescence rarely from old wood; leaves usually cordate to suborbicular. i

i. Pistillate and staminate inflorescence paniculiform or racemiform, usually ebracteate or, if bracts present, frequently involute; leaves usually with short whitish pubescence, usually basifixed, generally over 10 cm. in length. . . . . 9. C. fasciculata

ii. Pistillate and staminate inflorescence rarely paniculiform, bracteate with the bracts rarely involute; leaves rarely with short, whitish pubescence, usually slightly peltate, generally less than 10 cm. in length . . . . . .10. C. pareira

KEY TO AFRICAN AND ASIAN SPECIES

a. Synandrium 6- to 9-locular; stigma 5-lobed. . . . . .11. C. mucronata

aa. Synandrium 4-, rarely 5- to 6-locular; stigma 3-lobed . . . . . b

b. Leaves conspicously peltate to 1.7 cm c

bb. Leaves basifixed or subpeltate to 4 mm. . . . . d

c. Glabrous; leaves never obscurely 3-lobed. . . . . 12. C. tenuipes

cc. All or some portion of plant pubescent; leaves frequently obscurely 3-lobed. . . . . 13. C. owariensis

d. Inflorescence paniculiform . . . . . .14. C. rigidifolia

dd. Inflorescence not paniculiform . . . . . e

e. Leaves frequently deltoid, base of nerves below with tuft of hairs; flowers glabrous; corolla of staminate flowers sometimes lobed or with free petals. . . . . 15. C. torulosa

ee. Leaves rarely deltoid, tuft of hairs absence from base of nerves below; flowers usually pubescent; corolla of staminate flower rarely lobed, never with free petals . . . . . f

f. Leaves usually ovate; corolla of staminate flowers cupulate . . . . . g

ff. Leaves usually cordate to suborbicular; corolla of staminate flowers patelliform, rarely cupulate . . . . . h

g. Plants puberulent; veins of leaves and sepals with phelloidal outgrowths; sepals of staminate flowers 0.6-0.8 mm long, corolla glabrous . . . . . 16. C. nepalensis

gg. Plants sericeous, especially the petioles; veins without phelloidal outgrowths; sepals of staminate flowers 1.1-1.4 mm long, corolla pilose. . . . . .17. C. friesorum
h. Inflorescence, flowers, and fruit glabrous. . . . . .18. C. hirta
hh. Inflorescence, flowers, and fruit pubescent i
i. Leaves frequently dark and shiny above; pubescence of short hairs; synandrium of staminate flowers about 0.5 mm long . . . . 19. C. nigrescens
ii. Leaves not dark and shiny above; pubescence typical; synandrium of staminate flowers usually sessile . . . . . .10. C. pareira

1. Cissampelos ovalifolia DC. Syst. 1:537. 1818 (Figure 2).

Cissampelos crenata DC. Syst. 1:537. 1818, ex char.

Cissampelos ovalifolia DC. B. cinerascens St. Hil. in Pl. Uteis Bras. t. 34, 1824.

Cissampelos obracteata St. Hil. in Pl. Uteis Bras. t. 35. 1824, ex char. (Type: St. Hilaire s.n.).

Cissampelos ovalifolia DC. a. cinereo-viridis St. Hil. in Fl. Bras. Merid. 1:51. 1825.

Cissampelos communis St. Hil. in Fl. Bras. Merid. 1:52. 1825, ex char. (Type: St. Hilaire s.n.).

Cissampelos velutina St. Hil. in Fl. Bras. Merid. 1:52. 1825 (Type: St. Hilaire s.n.).

Cissampelos subtriangularis St. Hil. in Fl. Bras. Merid. 1:52. 1825 (Type: St. Hilaire s.n.).

Cissampelos suborbicularis St. Hil. in Fl. Bras. Merid. 1:52. 1825 (Type: St. Hilaire s.n.).

Cissampelos assimilis Miers, in Kew Journ. Bot. 3:114. 1851.

Cissampelos amazonica Miers, in Kew Journ. Bot. 3:114. 1851. (Type: Spruce 353!).

Cissampelos vestita Triana & Planch. in Ann. Sc. Nat. 4, 17:44. 1862 (Type: Goudot s.n.).

Cissampelos rotundata Pohl ex. Engler, in Fl. Bras. 13, 1:186. 1864, nom. nud.

Cissampelos mallophylla Miers, in Ann. Nat. Hist. ser. 3. 17:169. 1866, ex char. (Type: Goudot s.n.)

Cissampelos ovalifolia DC. f. ovato-mucronata Chod. and Hassl. in Bull. Herb. Boiss. 2, 3:421. 1903 (Type: Hassler 5070).

Cissampelos ovalifolia DC. f. latifolia Chod. and Hassl. in Bull. Herb. Boiss. 2, 3:421. 1903 (Type: Hassler 4356!).

Cissampelos ovalifolia DC. f. reniformis Chod. and Hassl. in Bull. Herb. Boiss. 2, 3:421. 1903 (Type: Hassler 8038!).

Cissampelos ovalifolia DC. var. longepetiolata Chod. and Hassl. in Bull. Herb. Boiss. 2, 3:421. 1903 (Type: Hassler 4856).

Unbranched erect perennial herbs; stems striate, 1.3(-2) m high, tomentose. Leaves petiolate, basifixed, ovate to suborbicular, rarely elliptic, obovate, reniform or cordate, entire to undulate, the apex obtuse to rounded, rarely acute or emarginate, mucronate, the base cordate, truncate or rounded, rarely attenuate, (2-)5.6 (-10) cm long, (3-)4.3(-9) cm wide, subcoriaceous, palmately 5- to 7-nerved, glabrous to tomentose above, paler below and tomentose, rarely pilose, with the nerves usually prominent; petioles (0.5-) 0.8(-3.0) cm long, tomentose. Staminate inflorescence multi-flowered cymose dichasia in fascicles of 1-5 in the leaf axils; bracts minute or wanting; bracteoles linear, at length 0.5 mm long. Staminate flowers greenish-yellow: sepals 4, obovate, (1-)1.5(-2) mm long, (0.6-)0.9(-1.2) mm wide, exteriorly glabrous to pilose; corolla patelliform, (1.0-)0.9(-1.2) mm in diameter or cupuliform and 0.5 mm in height, 0.6-0.8 mm in diameter, glabrous; synandrium sessile to 0.5 mm high, anthers 4, glabrous. Pistillate inflorescence composed of 3-5 individual flowers fasciculate in the axils of bracts upon 1-2 secondary branches per leaf axil; bracts minute to large and foliaceous, basifixed, sessile or obscurely petiolate, ovate to suborbicular, mucronate, entire to undulate, 0.8(-1.6) cm long, 0.9(-1.9) cm wide, membranous, glabrous to tomentose above, pilose to tomentose below. Pistillate flowers: sepal 1, obovate, (1.4-)1.8(-2.0) mm long, (0.8-)1.0(-1.2) mm wide, the exterior glabrous to pilose; petal 1, subreniform, subquadrangular or broadly obovate, (0.5-)0.6(-0.7) mm long, (0.9-)1.0(-1.1) mm wide, glabrous; carpel 1, gibbose, (0.8-)1.0(-1.3) mm long, pilose. Drupe red or orange, obovoid, (6.0-)7.0(-8.5) mm long, (5.0-)5.6(-6.0) mm wide, pilose; peduncle 2 mm long.

South America.

BOLIVIA: Without Precise Locality: Cardenas 1921 (US,NY), Williams 519 (US,NY).

BRAZIL: CEARÁ: without precise locality, Gardner 1445 (NY). FEDERAL DISTRICT: Sobradinho, Irwin, Sousa and Santos 12120 (NY); Taguatinga, Irwin, Souza and Santos 10623 (NY); without precise locality, Irwin, Souza and Santos 8086 (NY). GOIÁS: Goiás, Macedo

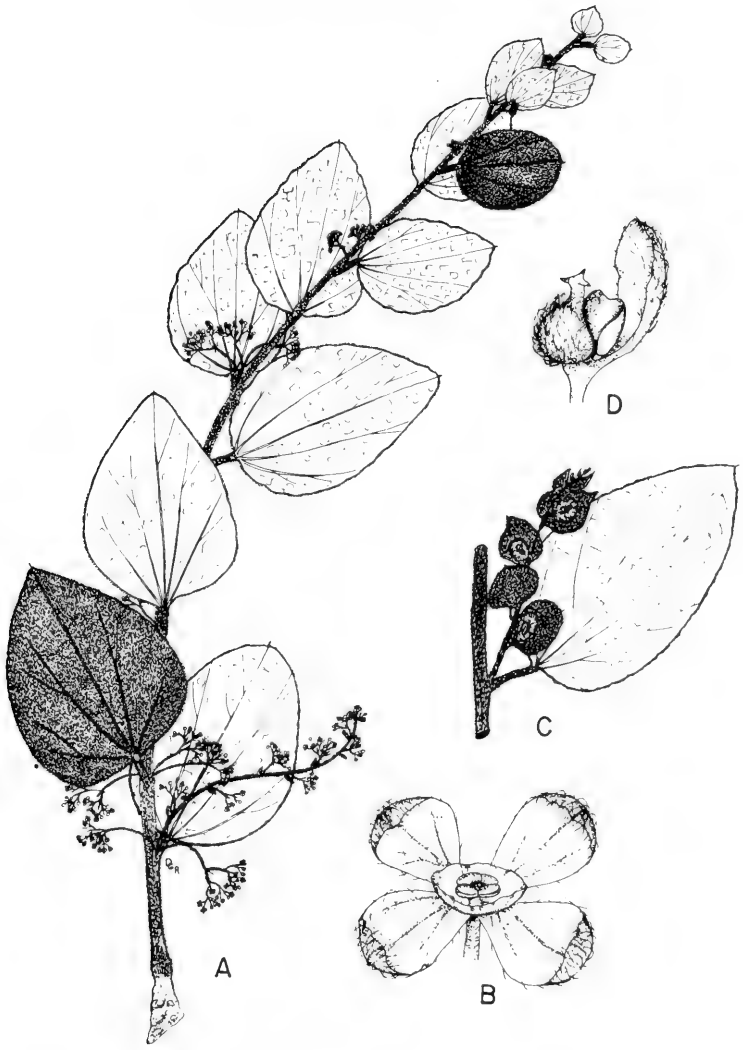

Figure 2. Cissampelos ovalifolia DC. A: Staminate plant, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescence and leaf, X 1/2; D: Pistillate flower, X 15.

3455 (US,NY); Cristalina, Irwin, Souza and Santos 9256 (NY); Planaltina, Irwin, Souza and Santos 9256 (NY). MATO GROSSO: Cuiabá, Malma 1132 (GH), Kuhlmann 243-K (NY); without precise locality, H. Smith 351 (NY). MINAS GERAIS: Belo Horizonte, Williams 5453 (GH), 6086 (GH), 5233 (GH), Barreto 6349 (F), 6353 (F), 9871 (NY), Sampaio 6406 (NY); Santa Luzia, Assis 38 (GH); Ituiutaba, L.B. Smith 4671 (US); Diamantina, Barreto 9871; Caldas, Regnell III-256 (US); Varzea do Palma, Duarte 7499 (NY); without precise locality, Regnell 296 (US), Cochran 29 (US), Macedo 581 (MO), Glaziou 18127 (NY), Claussen 66 (NY). PARÁ: Santarém, Spruce s.n. Froes 20458 (NY); Serra do Cachinbo, Pires, Black, Wurdack and Silva 6431 (NY); Alto de Cumina, Sampaio 5930a (NY). PARANÁ: Sao Bento, Schwacke 174 (NY); Jaquariaiva, Dusen 10612 (GH,MO); Lapa, Reitz and Klein 17.404 (MO), Hatschbach 6434 (US); Tibagí, Hatschbach 2841 (US); without precise locality, Dusen 7573 (F), 7512 (NY), 7155 (GH). PARAÍBA: Areia, Moraes 890 (US). PIAUI: without precise locality, Gardner 1445 (NY). SÃO PAULO: Campinas, J. and N. Mattos 8291 (US); São Paulo, Pickel 2411 (NY), Moldenke 19661 (NY); São José dos Campos, Mimura 55 (NY); without precise locality, Loefgren 12993 (NY). Without precise locality: Ule 380 (NY), Blanchet 3437 (NY).

BRITISH GUIANA: Takutu River and Kanuku Mountains, L.B. Smith 3229 (F,NY); without precise locality, Schomburgk 124 (F).

COLOMBIA: BOYACÁ: OROCUÉ, Haught 2649 (US,NY). VICHADA: Hermann 10971 (GH). Without Precise Locality: Haught 3952 (F,NY).

PARAQUAY: Without Precise Locality: Hassler 4356 (F), 9960 (NY)

SURINAM: Without Precise Locality: Jonker 511 (F,MO).

VENEZUELA: ARAGUA: without precise locality, Pittier 12138 (US). BOLÍVAR: Gran Sabana south of Mt. Roraima, Steyermark 59155 (F,NY); Santa Elena, Lasser 1342 (NY), Tamayo 2636 (F); La Gran Sabana, Pena 315 (US); without precise locality, Williams 11874 (US). CARABOBO: San Joaquín, Pittier 8037 (GH). LARA: between La Piedad and Sarare, José Saer 411 (F). MÉRIDA: Tovar, Fendler 1891 (GH). YARACUY: Urachiche, Steyermark 56850 (F).

Cissampelos ovalifolia DC. is the only species of the genus which is an upright perennial herb and consequently is quite distinctive.

Some authors (Saint Hilaire, 1825; Chodat and Hassler, 1903; Diels, 1910) maintained varieties for the species based primarily upon the degree of leaf pubescence. Intergradation, however, occurs to such an extent between the varieties that they appear taxonomicall impractical.

2. Cissampelos tropaeolifolia DC. Syst. 1:532. 1818 (Type: Dombey s.n.) (Figure 3).

Cissampelos fluminensis Eichl. in Menisperm. Am. Fl. 47:382. 1864 (Type: Martius s.n.).

Cissampelos sympodialis Eichl. var. grandifolia Britton, in Bull. Torr. Club 16:15. 1889 (Type: Rusby 1443!).

Cissampelos peltata Ruiz ex Diels, in Engl. Pflanzen. 4(94):299. 1910, nom. nud.

Cissampelos mucronata Poeppig ex Diels, in Engl. Pflanzen. 4(94):299. 1910, nom. nud.

Cissampelos tropaeolifolia DC. var. fluminensis (Eichl.) Diels, in Engl. Pflanzen. 4(94):300. 1910.

Cissampelos ciliata Rusby, in Mem. N.Y. Bot. Gard. 7:240. 1927 (Types: Bang 2074!, Cardenas 17972!, Rusby 811!).

Subherbaceous twiners to 10 m; stems straite, sericeous or sometimes glabrous, rarely pilose. Leaves petiolate, conspicously peltate to 35 mm, ovate to suborbicular or rarely cordate, entire to crenate, the apex acute to rounded, rarely caudate or acuminate, mucronate, the base truncate or rounded, rarely cordate, (3-)7.1(-15) cm long, (3-)6.1(-12) cm wide, membranous, palmately 9- to 12-nerved, usually prominent below, sericeous with long whitish hairs or glabrous, paler and occasionally glaucous below; petioles (2-)6(-16) cm long, glabrous to sericeous. Staminate inflorescence multi-flowered fasciculate dichasia in the leaf axils or upon secondary racemiform, rarely paniculiform, axillary branches to 23 cm within the axils of reduced leaves or bracts, the two forms frequently occurring together; 1-many dichasia per fascicle; peduncle of cymes at length 2 cm long, sericeous; bracts of secondary branches large, foliaceous, basifixed, sessile or petiolate to 2 mm, cordate to reniform, entire to undulate and frequently ciliate, mucronate, (2-)6.3(-16) mm long, (2-)7.7(-20) mm wide, membranous, sericeous, rarely glabrous or pilose; bracteoles linear, about 0.5 mm long, pilose. Staminate flowers whitish-green or cream: sepals 4, sometimes connate at base, elliptic to obovate, (1.0-)1.3(-2.4) mm long, (0.9-)1.1(-1.3) mm wide, glabrous or exteriorly sericeous; corolla patelliform, (0.7-)1.0(-1.4) mm in diameter or cupuliform and 0.4-0.8 mm in height, 1.0-1.3 mm in diameter, glabrous; synandrium sessile to 0.5 mm long, anthers 4, glabrous. Pistillate inflorescence composed of individual flowers fasciculate in the axils of bracts upon racemiform secondary bracteate axillary branches to 34 cm; bracts large and foliaceous, basifixed, sessile or petiolate to 5 mm, ovate to reniform, rarely suborbicular, entire to undulate and frequently ciliate, mucronate, (3-)14.3)(-25) mm long, (4-)17.9(-30) mm wide, membranous, sericeous, rarely glabrous or pilose. Pistillate flowers: sepal 1, ovate to obovate, (0.9-)1.2(-1.6) mm long, (0.7-)0.9(-1.1) mm wide, glabrous or rarely slightly sericeous exteriorly; petal 1, elliptic to suborbicular, (0.5-)0.6(-0.9) mm long, (0.5-)0.8(-1.1) mm wide, glabrous; carpel 1, gibbose, (0.6-)0.8(-1.0) mm long, sessile, glabrous, rarely sericeous or pilose, the stigma 3-lobed. Drupe red, obovoid, (4-)5.2(-6) mm long, (4-)4.7(-5) mm wide, sericeous, rarely glabrous; fruiting stalk (2-)3.3(-5) mm long.

Mexico, Central America, and northern South America.

MEXICO: CHIAPAS: Palenque, Matuda 3686 (F); Escuintla, Matuda 16542 (F); Corcega, Matuda 17892 (NY). GUERRERO: Atoyac, Matuda 1407 (F,MO). OAXACA: Tolosita, Williams 9638 (MO); Choapan, Mexia 9199 (F,MO); Ubero, Williams 9295 (F), 9308 (F) Tuxtepec, Martínez-Calderón 213 (GH), 242 (GH); Calea, Galeotti 4621 (US), 4625 (NY): Yaveo, Mexia 9230a (US), 9199 (NY); without precise locality, Conzatti 3802 (US). QUINTAMA ROO: Cozumel Island, vicinity of San Miquel de Cozumel, Lewis 6864 (NY). VERACRUZ: Coatzacoalcos River, Williams 9683 (F). Without Precise Locality: Liebmann 332 (US), 807 (US).

BRITISH HONDURAS: STANN CREEK: Middlesex, Schipp 352 (F,MO,NY). TOLEDO: without precise locality, Peck 602 (GH).

COSTA RICA: GUANACASTE: Buenos Aires, Tonduz 8535 (US). HEREDIA: Guapiles, León 698 (F). LIMON: Suretha, Dunlap 594 (F); Siquirres, Stork 2295 (F). SAN JOSE: El General, Skutch 3958 (GH,MO,NY), 2977 (US), 4944 (MO). Without Precise Locality: United Fruit Co. 185 (US).

EL SALVADOR: SAN SALVADOR: San Salvador, Carlson 322 (F).

GUATEMALA: ALTA VERAPAZ: Coban, Turckheim 1792 (NY); Panzos, Goll 233 (US). CHIQUIMULA: Chiquimula, Watson 11 (GH). HEUHUETENANGO: Ixcan, Steyermark 49437 (F). IZABAL: Izabal, Steyermark 39015 (F), 38698 (F); Puerto Harrios, Standley 72915 (F), 24858 (US), Steyermark 39312 (F). QUEZALTENANGO: between Santa María de Jesús and Calahuaché, Steyermark 33535 (F); between Finca Pirineos and Patsulín, Standley 86815 (F); Finca Pireneos, Standley 68424 (F); near Calahuaché, Steyermark 33316 (F), 33857 (F). RETALHULEU: Chivolandica, Standley 87212 (F). SACATEPEQUEZ: Finca Moca, Skutch 1573 (F), 1583 (F). SAN MARCOS: Río Cabus near Malacatán, Standley 68858 (F); Volcan Tajumulco, Steyermark 37234 (F).

HONDURAS: ATLANTIDA: La Ceiba, Yuncker, Koepper and Wagner 8289 (F).

NICARAGUA: CHINANDEGA: El Viejo, Shimek and Smith 484 (F).

PANAMA: BOCAS DEL TORO: Columbus Island, Wedel 23 (F,MO); Old Bank Island, Wedel 2083 (GH,MO), 1985 (GH,MO); 1888 (GH,MO), 1991 (GH,MO); Bocas del Toro, Wedel 383 (GH,MO); Chiriqui Lagoon, Wedel 1490 (GH,MO), 1853 (GH,MO), 1372 (GH,MO), 1035 (GH,MO), 381 (GH), 1376 (MO), 673 (GH,MO), 381 (MO), 382 (GH,MO), 1119 (GH,MO), 1819 (GH,MO), Seibert 1563 (US,MO); Isla de Colón, Wedel 46 (GH,MO), 2947 (GH,MO). CANAL ZONE: Barro Colorado Island, Shattuck 430 (F), Standley 41002 (US); Gatún, Stevens 1342 (US); Mount Hope Cemetery, Standley 28789 (US); mouth of R. Chagres, Allen 897 (MO); between Mt. Hope and Santa Rita Trail, Cowell 94 (NY). COLON: Catival, Standley 30345 (US). CHIRIQUI: Conception, Ebinger 760 (MO); between R. Tinta and R. Tabasará, Woodson, Seibert and Allen 414 (MO); Remedios, Woodson, Allen and Seibert 1187 (F,NY,MO); San Felix, Pittier 5458 (US,NY). DARIEN: Cana, Stern, Chambers, Dwyer, Ebinger 475 (MO), 638 (MO), Williams 778 (NY); Paca below Cana, Williams 767 (NY). PANAMA: R. Corso, Duke 12041 (NY). SAN BLAS: Achituppu, Lewis, Dwyer, Elias, Solís 129 (MO); Mandinga, Duke 8907 (MO).

BOLIVIA: BENI: Junction of Río Beni and Madre de Dios, Rusby 1443 (US,NY); Rurrenabaque, White 811 (US). COCHABAMBA: Without precise locality: Steinbach 6823 (GH). LA PAZ: Coroico to Río Yolasa, Mexia 7796 (F), 4275 (GH,MO); Coroico, Buchtein 758 (F,MO), 3683 (F,NY); Coripata, Bang 2074 (F,MO,NY).

BRAZIL: AMAZONAS: Maués, Pires 137 (NY); Tabatinga, Jobert-Schwacke 524 (NY); Humaita, Krukoff 6740 (F,NY); without precise locality, Schultes 7174 (US). MARANHÃO: Candido Mendes, Froes 1731 (GH). RIO GRANDE DO SUL: São Salvador, Leite 721 (NY).

COLOMBIA: ANTIOQUIA: Medellín, Toro 382 (NY), Archer 764 (US,NY); Cáceres, Daniel 2082 (US); Jardin, Daniel 2966 (US); Fredonia, Archer 521 (US); Copacabana, Daniel 747 (US); Dabeiba, Johnson and Barkley 18C674 (US). BOYACÁ: Mt. Chapon near Bogotá, Lawrence 49 (NY); without precise locality, Lawrence 249 (F,MO). CALDAS: Salamina, Tomas 1981 (US). CAUCA: La Gallera, Killip 7831 (NY); Coconuco to Popayan, Pennell 6904 (NY); Micay, Killip 7845 (GH,NY); without precise locality, André 2419 (F,NY). CHOCÓ: between Río Curiche and Alto Curiche, Duke 9606 (NY); Rio San Juan at junction of Río Condoto, Killip 35107 (US); Quibdó, Archer 1723 (US), 1737 (US); without precise locality, Molina and Barkley 19Ch062 (US). CUNDINAMARCA: without precise locality, Dugand and Jaramillo 3869 (US). META: Villavicencio, Pennell 1383 (GH), Schiefer 782 (US). SANTAMDER: Sarare, Cuatrecasas 13346 (F).

ECUADOR: GALAPAGOS ISLANDS: Academy Bay, Schimpff 32 (NY); Santa Cruz, Hagen 36 (NY); without precise locality, Andersson s.n. (NY). LOS RIOS: Vinces, Mexia 6599 (F), 6620 (US); Hacienda Clementina on Río Pita, Asplund 5586 (US,NY). MANABI: Jipijapa, Haught 3444 (US); Portoviejo, Rose and Rose 23435 (US). Without Precise Locality: Eggers 15468 (F).

PERU: AYACUCHO: Kimpitiriki, Killip and Smith 22391 (US). HUANUCO: Churubamba, Mexia 8192 (NY,MO), 8108 (MO); Huanuco, Mexia 8109 (F,NY); Puente Durand, Soelnik 1104 (US); near Huanuco, Stork and Horton 9593 (F); Tingo Maria, Woytkowski 5300 (F,MO). Allard 22407 (US), 22317 (NY), Asplund 12056 (US), Ferreyra 6810 (US). JUNIN: Mercedes, Killip and Smith 23443 (F,NY), Mexia 8192 (F,GH). LORETO: Gamitanacocha, Río Mazan, Schunke 327 (F,NY); San Antonio, Killip and Smith 29497 (F,NY); Iquitos, Río Itaya, Killip and Smith 29384 (F), Williams 3374 (F), 3400 (F); Mishuyacu near Iquitos, Klug 773 (F,NY); Caballococha, Williams 2405 (F); Sanango, Ferreyra 4911 (US); Pumayacu near Balsapuerto, Klug 3230 (F,NY), MacBride 5059 (F); lower Río Huallaga, Williams 3936 (F). SAN MARTIN: Pasaraya to Saposoa, Woytkowski 5068 (MO); San Roque, Williams 7456 (F). Without Precise Locality: MacBride 4594 (F), Isern 2416 (F).

VENEZUELA: BOLIVAR: Río Nichare, Steyermark and Gibson 95708 (NY).

Cissampelos tropaeolifolia DC. resembles C. grandifolia Triana & Planch., C. pareira L., and C. glaberrima St. Hil., in rare instances but overall is morphologically distinct. The most distinguishing characters include the ovate leaf which is peltate, the

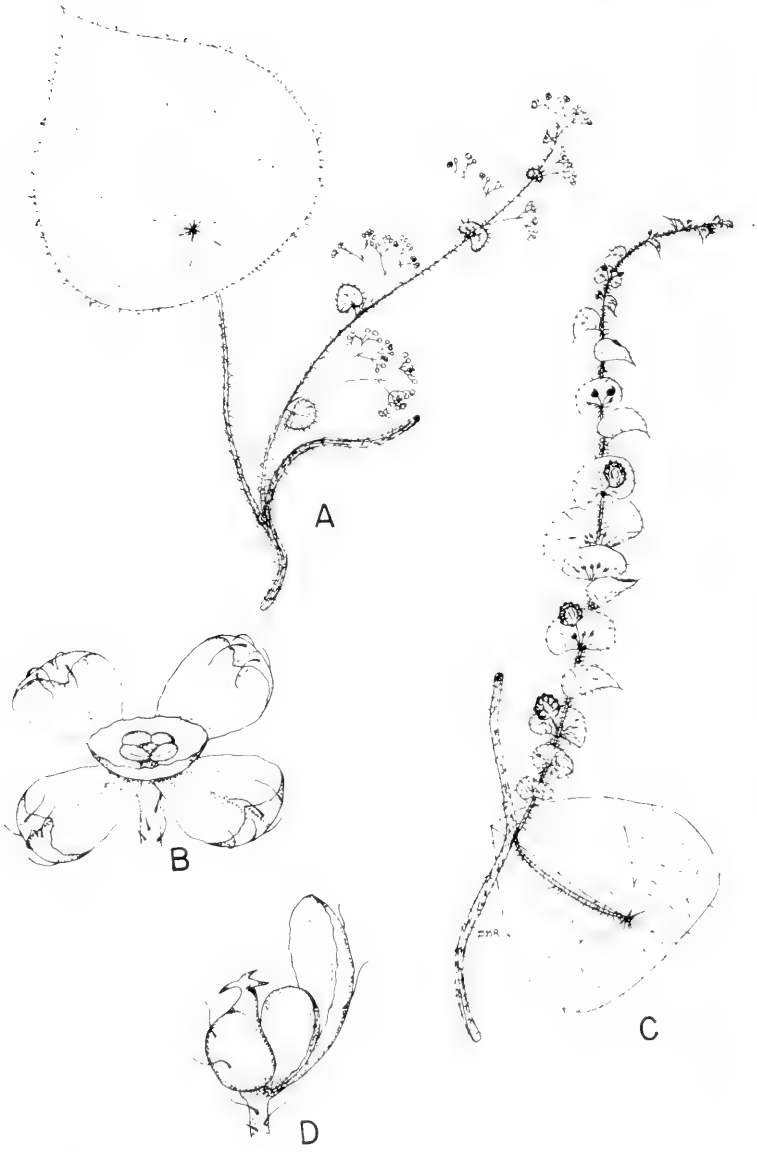

Figure 3. Cissampelos tropaeolifolia DC. A: Staminate inflorescence and leaf, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescence and leaf, X 1/2:, D: Pistillate flower, X 15.

large and foliaceous bracts, and sericeous pubescence.

The plant is known locally in Guatemala as "alcotan" or "aspirino", in Mexico as "curarina", and Bolivia as "quitis utar manti".

The species is often found as a twiner in dense forests or thickets but on occasion as a twiner on shrubs in open areas.

3. Cissampelos glaberrima St. Hil. in Fl. Bras. Merid. 1:46. 1825 (Figure 4).

Cissampelos parreira Vell. Fl. Flum. 10. t. 138. 1827, ex char.

Cissampelos clematidea Presl, Botan. Bemerk. 7. 1844, ex char.

Cissampelos errabunda Miers, in Ann. Nat. Hist. er. 3. 17:138. 1866 (Type: Swainson s.n.).

Cissampelos glaberrima St. Hil. var. orbicularis Chod. and Hassl. in Bull. Herb. Boiss. 2, 3:421. 1903 (Types: Hassler 4749!, 4787!).

Cissampelos galapagensis Stewart, in Proc. Calif. Acad. Sci. ser. 4. 1:66. 1911 (Type: Stewart 1519!).

Twiners to 3 m; stems striate, glabrous or essentially so. Leaves petiolate, conspicuously peltate to 20 mm, broadly ovate to suborbicular, entire to crenate, the apex acute to rounded, mucronate, the base truncate to rounded, (2.5-)4.6(-7.5) cm long, (2.5-)4.6(-7.0) cm wide, membranous, palmately 5- to 12-nerved, conspicuous below, glabrous, dark green above, silvery and sometimes glaucous below; petioles (2.5-)5.0(-6.0) cm long, glabrous or rarely pilose. Staminate inflorescence multi-flowered fasciculate dichasia arranged in an ebracteate racemiform manner to 10 cm in length or as cymose clusters axillary from normal leaves or rarely cymose clusters within the axils of reduced leaves or bracts of secondary axillary branches; 1-2 dichasia per fascicle; peduncle of cymes at length 2 cm long, glabrous or rarely pilose; bracts of secondary branches large and foliaceous, basifixed, petiolate to 8 mm, broadly ovate to cordate, entire to undulate, to 13 mm long and 15 mm wide, membranous, glabrous; bracteoles linear, about 0.5 mm long, glabrous. Staminate flowers white or greenish: sepals 4, elliptic to obovate, (1.0-)1.4(-1.7) mm long, (0.7-)0.8(-0.9) mm wide, glabrous or essentially so; corolla cupuliform, (0.5-)0.8(-0.9) mm high, (0.5-)0.8(-1.0) mm in diameter, or rarely patelliform, 1.0 mm in diameter, glabrous; synandrium sessile to 0.8 mm high, anthers 4, glabrous. Pistillate inflorescence composed of individual flowers fasciculate in the axils of bracts upon racemiform secondary bracteate axillary branches to 15 cm; 1-2 flowers per fascicle; bracts large and foliaceous, often silvery and terminally grouped, basifixed, sessile or petiolate to 10 mm, reniform, rarely cordate or broadly ovate, entire to undulate, mucronate, (3-)10.4(-18) mm long, (3-)12.5(-21)

mm wide, membranous, glabrous. Pistillate flowers: sepal 1, slliptic to obovate, (1.4-)1.6(-1.8) mm long, (0.8-)0.9(-1.0) mm wide, glabrous; petal 1, reniform to deltoid, (0.6-)0.7(-0.8) mm long, (0.8-)0.9(-1.0) mm wide, glabrous; carpel 1, slightly gibbose, (0.8-)1.0(-1.1) mm long, sessile, glabrous, stigma 3-lobed. Drupe red, obovoid, (4-)4.3(-5) mm long, (3-)3.5(-4) mm wide, glabrous, rarely puberlent, sometimes glaucous; fruiting stalk 3-4 mm long.

Central America and South America.

COSTA RICA: SAN JOSÉ: El General, Skutch 4944 (NY).

GUATEMALA: HUEHUETENANGO: San Isidro, Krukoff 112 (NY).

BRAZIL: CEARÁ: Guaramiranga, Cutler 8307 (GH,MO); without precise locality, Gardner 1444 (GH), Guedes 485 (NY). GOIÁS: Corumba de Goiás, Irwin, Souza and Santos 10798 (NY), 10965 (NY). MARANHÃO: Maracassumé River, Froes 1731 (NY). MATO GROSSO: São Luiz de Cáceres, Hoehne 1049 (NY); without precise locality, Moore 555 (NY). MINA GERAIS: Ribeirão, Sampaio 6954 (NY); Belo Horizonte, Barreto 6347 (F), Williams 5292 (GH), 5656 (MO); Santa Luzia, Assis 223 (GH); Lagoa Santa, Hoehne 6217 (NY); Vicosa, Kuhlmann 2117 (NY), Mexia 4152 (GH,MO,NY); Pocos de Caldas, Regnell 257 (US); without precise locality, Sampaio 436 (NY). PERNAMBUCO: Tapera, Pickel 875 (GH,NY), 184 (GH). RIO DE JANEIRO: Parahiba do Sul, Diogo 82 (NY). SAU PAULO: Rio Preto, Diels 4517 (NY), Campinas, Santoro 848 (US), 860 (US), Novaes 1004 (US). Without Precise Locality: De Moura 42 (US), Maceda 595 (US), Miers 4222 (US).

COLOMBIA: ATLANTICO: Barranquilla, Elias 1470 (GH). EL CAUCA: San Antonio, Pennel and Killip 7338 (NY).

ECUADOR: GALÁPAGOS ISLANDS: Indefatigable Island, Academy Bay, Svenson 3 (F), Howell 9038 (GH), Stewart 1519 (US,MO).

PARAGUAY: ALTO PARANÁ: without precise locality, Fiebrig 6341 (US). CAAGUAZÚ: Igatimí, Hassler 4787 (F), 4749 (GH). CENTRAL: Villa Elisa, Pedersen 4208 (US). CORDILLERA: Altos, Fiebrig 643 (F), Hassler 3492 (GH,NY). SAN PEDRO: without precise locality, Woolston 1151 (US,NY), 312 (NY). Without Precise Locality: Hassler 10269 (NY), 1269 (NY).

PERU: LORETO: Iquitos, Killip and Smith 29384 (NY).

VENEZUELA: BOLÍVAR: Upata, Steyermark 57710 (F).

The distinguishing features of this species are suborbicular leaves which are frequently glaucous and have an overall glabrous condition. Some specimens of Cissampelos tropaiolifolia DC. approach C. glaberrima St. Hil., but the former can be distinguished by a degree of sericeous pubescence and a patelliform corolla. At least one collection resembles C. laxifolia Mold. in that it possesses a shiny ovate leaf with an acuminate apex, but the floral structure is typically that of C. glaberrima.

The species is normally found trailing over shrubs or rocks in open areas or at edges of thickets. It is also found as a twiner in woodlands.

In Brazil the plant is known as "orelha de onca".

Specimens from the Galapagos Islands differ from mainland forms in that the corolla tends to be patelliform instead of the typical

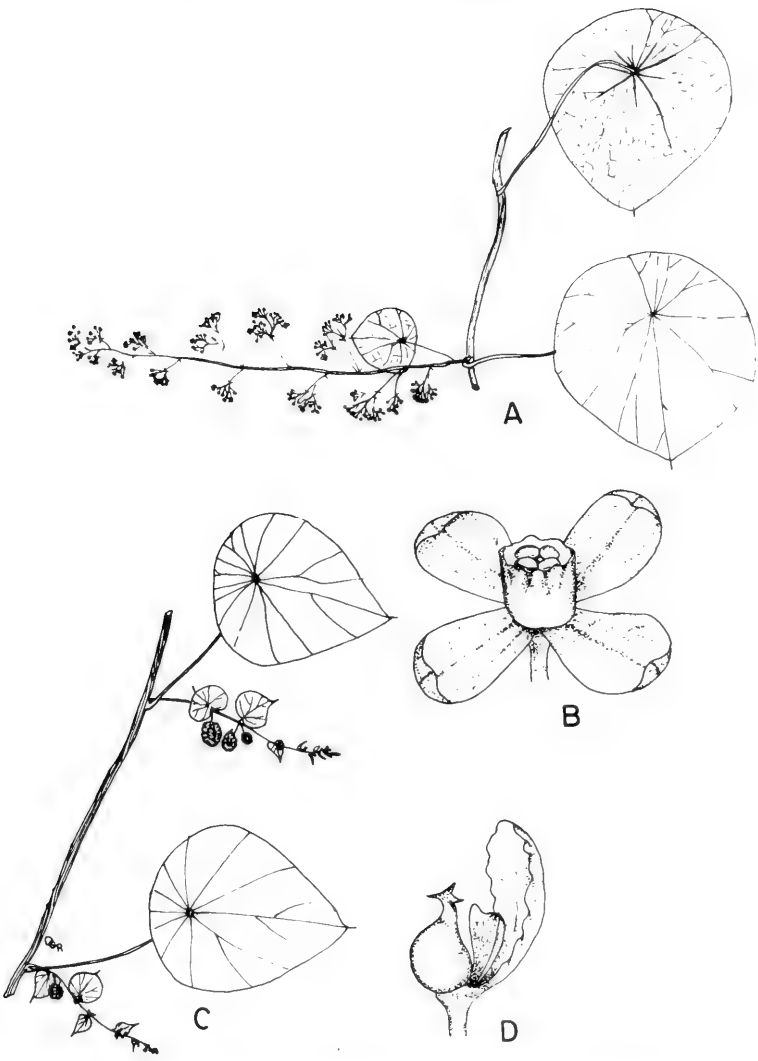

Figure 4. Cissampelos glaberrima St. Hil. A: Staminate inflorescence and leaves, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescences and leaves, X 1/2; D: Pistillate flower, X 15.

cupulate type. Considering all features of the species, however, this character alone is not sufficient for species delimitation. Stewart (1911) in his description of these specimens as Cissampelos galapagensis did not consider the corolla form in his justification but mentioned that male flowers are in cymes, thus differing from C. glaberrima where panicles exist. A racemiform type of inflorescence does exist on mainland individuals but also axillary cymes occur. Orbicular-rhombic sepals, according to Stewart, delimits material of the Galapagos Islands from the lanceolate sepals of the mainland C. glaberrima but orbicular-rhombic sepals do occur on the latter individuals. For reasons stated, C. glaberrima is retained as the valid name by priority and C. galapagensis is considered as a synonym.

4. Cissampelos grandifolia Triana and Planch. in Ann. Sc. Nat. ser. 4. 17:44. 1862 (Type: Triana s.n.) (Figure 5).

Cissampelos acuta Triana and Planch. in Ann. Sc. Nat. ser. 4. 17:43. 1862. (Type: Triana 4695).

Woody twiners to 5 m; stems striate, puberulent to pilose. Leaves petiolate, conspicously peltate to 40 mm, broadly ovate to suborbicular, entire to undulate, the apex acute to obtuse, rarely acuminate or rounded, mucronate, the base truncate to rounded or rarely cordate, (6-)10.2(-15) cm long, (4-)10.1(-15) cm wide, membranous, palmately 9- to 12-nerved, frequently prominent below, glabrous to pilose above, paler and puberulent to densely pilose below; petioles (4-)11.6(-18) cm long, puberulent to tomentose, sometimes tomentose only distally and proximally. Staminate inflorescence multi-flowered fasciculate dichasia arranged in frequently branched ebracteate panicles to 35 cm, frequently terminal; 1-4 dichasia per fascicle; peduncle of cymes at length 2 cm long. Staminate flowers: sepals 4, sometimes connate at the base, obovate, (1.0-)1.1(-1.3) mm long, (0.6-)0.8(-1.0) mm wide, pilose exteriorly; corolla patelliform, (0.6-)0.9(-1.1) mm in diameter, glabrous or essentially so; synandrium (0.1-)0.3(-0.5) mm in height, anthers 4, glabrous. Pistillate inflorescence composed of 2-8 individual flowers fasciculate upon frequently branched ebracteate, rarely bracteate, panicles to 25 cm long. Pistillate flowers: sepal 1, elliptic to obovate, (1.0-)1.5(-2.0) mm long, (0.7-)0.8(-1.8) mm wide, the exterior pilose; petal 1, deltoid or reniform, (0.5-)0.6 (-0.8) mm long, (0.7-)0.8(-1.0) mm wide, exteriorly puberulent; carpel 1, gibbose, (0.8-)0.9(-1.1) mm long, pilose to tomentose. Drupe red, obovoid, (4-)4.3(-6) mm long, (4-)4.2(-5) mm wide, puberulent to pilose; fruiting stalk 2-3 mm long.

Central and South America, Mexico, and West Indies.

COSTA RICA: GUANACASTE: Talamanca Mountains, Tonduz 11404 (US, NY), 9617 (US), 12980 (US), 8663 (US). SAN JOSE: El General, Skutch 2696 (GH,MO,NY), 2833 (GH,MO,NY).

HONDURAS: ATLÁNTIDA: San Alejo, Standley 7706 (F); Tela, Standley 52748 (F), 10506 (NY), 53726 (F), Bangham 222 (GH);

Lancetilla, Yuncker 4521 (F,MO); bank of Rio Esperanza near Elvirs Plantation, Wilson 403 (NY).

MEXICO: CHIAPAS: Ecuintla, Matuda 1800 (MO).

PANAMA: BOCAS DEL TORO: Rio Teribe between Quebrada Huron and Quebrada Schlunjik, Kirkbride and Duke 482 (MO). DARIÉN: Cana, Stern, Chambers, Dwyer, Ebinger 475 A (MO).

PORTO RICO: ARECIBO: Arecibo, Heller 332 (NY).

COLOMBIA: BOYACÁ: northwest of Bogotá, Lawrance 226 (F,MO,NY). CALDAS: Salento, Pennell 9387 (NY); Santa Cecilia, Sneidern 5154 (US); Tabeja, Pennell, Killip and Hazen 8603 (US,NY). CAUCA: San Antonio, Pennell 7634 (NY); Popayan, Sneidern 4822 (US,NY); Carpinterías, Arbeláez and Cuatrecasas 6154 (US). CUNDINAHARCA: San Bernardo, Durand and Jaramillo 3975 (US); Santana, Durand and Jaramillo 3884 (US); Tequendama, Killip 34038 (US), Cuatrecasas 97 (US). HUILA: La Plata, Sneidern 2266 (GH,NY). NARIHO: Umbría Klug 1908 (F,NY,MO). TOLIMA: El Eden to La Plamilla, Killip and Hazen 9626 (NY); Mariguita, Cuatrecasas 9404 (US); Quindío Highway, Killip and Varela 35657 (US). Without Precise Locality: Sneidern 4588 (US), Dryander 2816 (US).

ECUADOR: LOS RIOS: Vinces, Mexia 6599 (NY). NAPO-PASTAZA: Zatzayacu, Mexia 7091 (US); Archidona, Mexia 7248 (US); Tena, Asplund 8864 (US), 9159 (NY). SARTIAGO ZAMORA: Zamora to Yanzasa, Mathias and Taylor 5243 (LA), 5233 (LA), 5222 (LA), 5248 (LA), 5213 (LA), 5247 (LA); near Zamora, Mathias and Taylor 5212 (LA). Without Precise Locality: Schimpff 982 (GH,MO).

PERU: HUÁNUCO: vicinity of Tingo María, Mathias and Taylor 4052 (LA), 5320 (LA), Zavortink 3019 (LA), 3011 (LA), 3020 (LA), 3022 (LA), 3048 (LA), 3001 (LA), 3025 (LA), 3023 (LA). LORETO: Leticia, Williams 3051 (GH); Balsapuerto, Klug 2911 (GH,MO,NY). SAN MARTÍN: Fundo Consuelo, 181 km. from Pucallpa on Tingo María road, Zavortink 3045 (LA). Without Precise Locality: Tessmann 4981 (NY).

VENEZUELA: MERIDA: Jají, Steyermark 55963 (GH,NY).

Cissampelos grandifolia Triana and Planch., known as "bejuco amargos" in Venezuela, is a climber most frequently found in dense forests or at the edge of thickets. The species is easily distinguished by the large broadly ovate to suborbicular peltate leaves, the large paniculate inflorescence, and small, densely pubescent flowers.

Triana and Planchon (1892) described Cissampelos acuta and C. grandifolia in the same work. However, the species are synonymous. Traditionally the species should be called C. acuta as this description precedes that of C. grandifolia by one page. However, since C. grandifolia is so well established within the literature and no precise ruling exists in the rules of nomenclature in respect to page order, it appears taxonomically practical to retain C. grandifolia as the valid name.

5. Cissampelos sympodialis Eichl. in Flora 47:392. 1864 (Type: Gardner 1234!) (Figure 6).

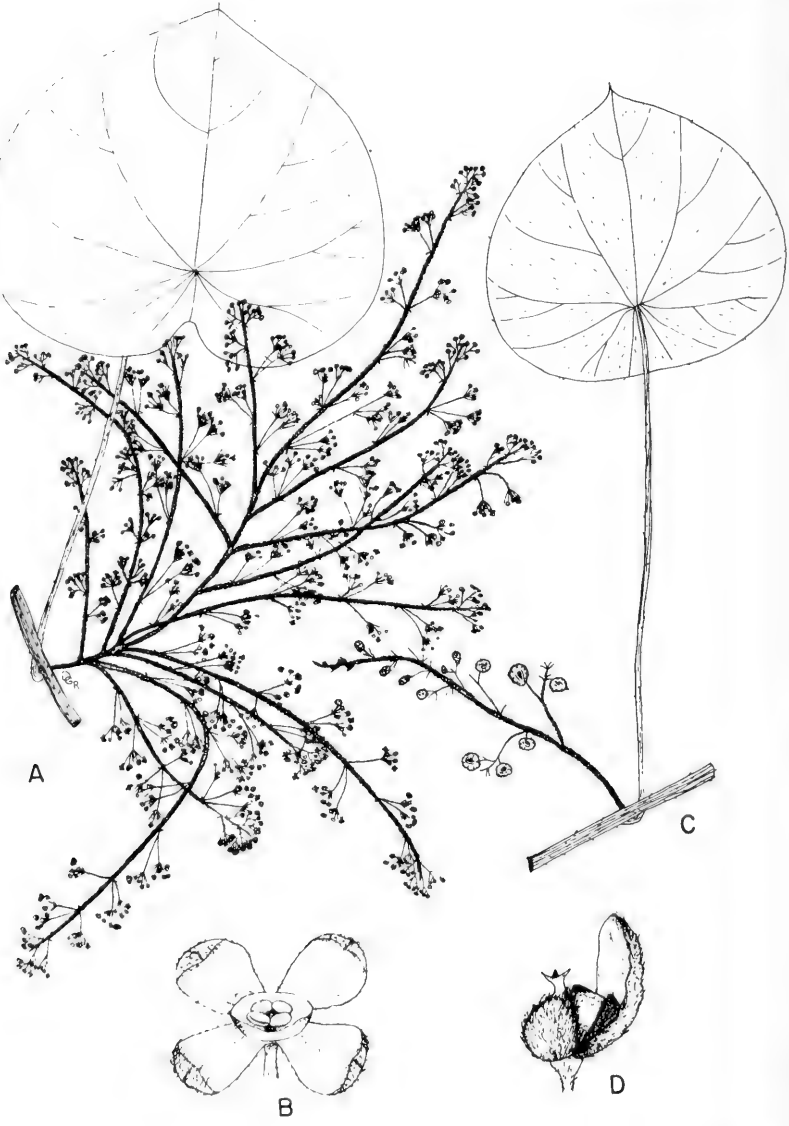

Figure 5. Cissampelos grandifolia Triana and Planch. A: Staminate inflorescence and leaf, X ⅔; B: Staminate flower, X 15; C: Pistillate inflorescence and leaf, X ⅔; D: Pistillate flower, X 15.

Twiners; stems striate, glabrous to tomentose. Leaves petiolate, peltate to 20 mm, ovate to deltoid, entire to undulate, the apex acute to obtuse, rarely emarginate, mucronate, the base truncate to rounded, rarely cordate, 2.2-6.1 cm long, 1.4-6.0 cm wide, membranous to subcoriaceous, palmately 5- to 12-nerved, prominent below, glabrous, rarely puberulent; petioles 0.8-4.5 cm long, glabrous to densely pilose. Staminate inflorescence multi-flowered fasciculate dichasia arranged in an ebracteate racemiform manner to 12 cm in length or as cymose clusters axillary from normal leaves or within axils of reduced leaves or bracts of secondary axillary branches; 1-3 dichasia per fascicle; peduncle of cymes at length 1 cm long, pilose; bracts, when present, ovate, basifixed, petiolate to 2 mm, ovate, mucronate, entire, 5 mm long and wide, pilose; bracteoles about 1 mm long. Staminate flowers greenish; sepals 4-5, obovate to elliptic, 0.5-0.8 mm long, 0.5-0.6 mm wide, exteriorly pilose, the interior glabrous; corolla patelliform, 0.8 mm in diameter, glabrous; synandrium to 0.2 mm high, anthers 4-5, glabrous. Pistillate inflorescence composed of 3-6 individual flowers fasciculate on bracteate racemiform secondary axillary branches; bracts basifixed, petiolate to 5 mm, ovate to cordate, entire, mucronate, 5-15 mm long, 4-12 mm wide, sometimes grading to minute, membranous, glabrous to pilose. Pistillate flowers: sepal 1, obovate, 0.8 mm long, 0.7-0.8 mm wide, exteriorly pilose, the interior glabrous; petal 1, reniform, 0.4-0.5 mm long, 0.7-0.8 mm wide, glabrous; carpel 1, gibbose, 0.5 mm long, glabrous. Drupe pyriform, 5 mm long, 4 mm wide, glabrous; fruiting stalk 1 mm long.

South America.

BRAZIL: ALAGOAS: without precise locality, Gardner 1234 (GH). CEARA: Fortaleza, Ducke 2570 (NY); Sierra de Maranguape, Ducke 2587 (NY), 2513 (NY); Sierra de Aratanha, Ducke 2393 (NY); without precise locality, Allemao s.n. (NY). MINAS GERAIS: Pocos de Caldas, Regnell 298 (US). Without Precise Locality: Glaziou 10236 (US).

Cissampelos sympodialis Eichl. is an uncommon species of Brazil, characterized by small, glabrous, strongly peltate, ovate or deltoid leaves.

6. Cissampelos verticillata Rhodes, sp. nov. (Type: Triana s.n.!) (Figure 7).

Plantae volubiles; caules straiti, caules juvenes pilosi usque tomentosi pilis appressis. Folia petiolata, basifixa vel obscure peltata, cordata usque suborbiculata, integra, apex acutus usque rotundatus, mucronatus, basis truncata usque cordata, saepe retusa, 5.3-10.5 cm longa, 5.5-9.0 cm lata, membranacea usque subcoriacea, palmatim 7-9 nervata, infra prominentia, supra glabra usque puberula, infra pallidiora et dense pilosa usque tomentosa pilis appressis; petioli 3.0-7.0 cm longi, tomentosi. Inflorescentia staminata et flores ignoti. Inflorescentia pistillata floribus 5-15, verticillatis in ramis racemosis vel paniculatis bracteatis secundariis axillaribus usque 20 cm, ramis 1-3 per axillam folii, vel flores verticillati in

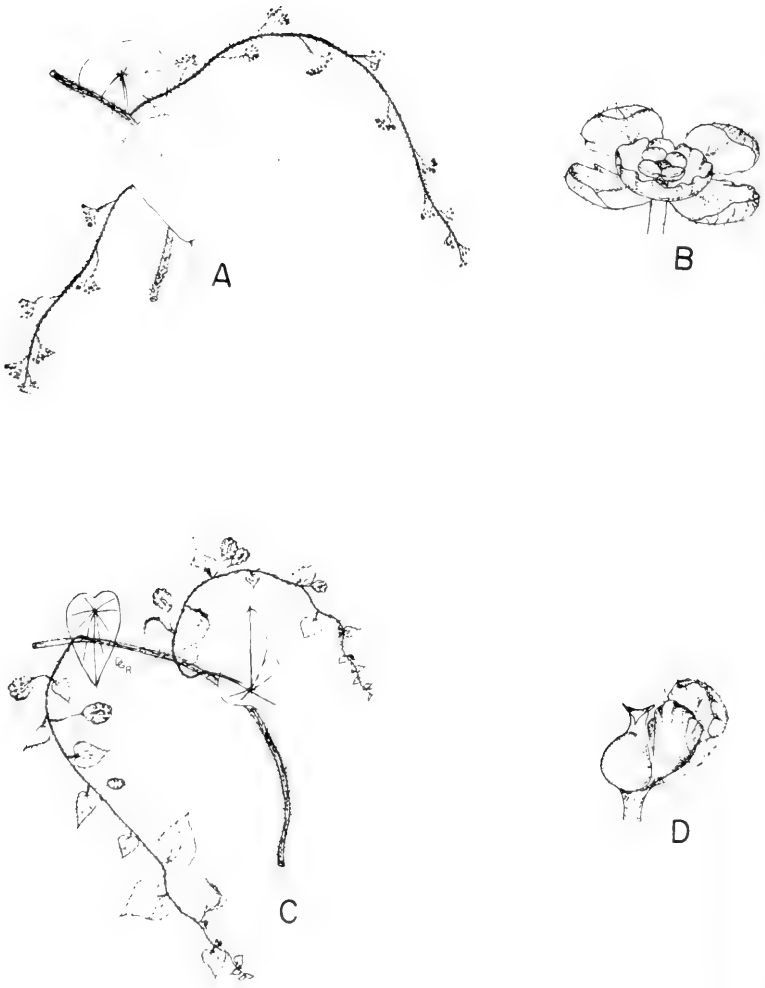

Figure 6. Cissampelos sympodialis Eichl. A: Staminate inflorescences and leaves, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescences and leaves, X 1/2; D: Pistillate flower, X 15.

axillis foliorum reductorum ramorum secundariorum axillarium; bracteae basifixae, petiolatae usque 3 mm, reniformes usque obcordatae, integrae, mucronatae, 5-10 mm longae, 4-6 mm latae, membranaceae, pilosae supra, dense pilosae usque tomentosae infra. Flores pistillati: sepalum 1, obovatum, 1.0 mm longum, 0.7 mm latum, extus dense pilosum; petalum 1, quadrangulatum, 0.5 mm longum, 0.5 mm latum, extus pilosum; carpellum 1, parum gibbosum, 0.7 mm longum, dense pilosum. Drupa obovoidea, 3-4 mm longa, 3-5 mm lata, pilosa; pedicellus fructifer 5-7 mm longus.

South America.

COLOMBIA: CUNDINAMARCA: without precise locality, Gutierrez 130 (GH). VALLE DEL CAUCA: Cisneros, Killip 35544 (US); Cordillera Central, Río Palo, Cuatrecasas 19474 (GH). Without Precise Locality: Triana s.n. (US).

Cissampelos verticillata Rhodes is a species from Colombia distinguished by the pistillate inflorescence which consists of clusters of 5-15 flowers arranged in a verticillate manner.

7. Cissampelos laxiflora Moldenke, in Phytologia, 2:215. 1947 (Type: Pires and Black 949!) (Figure 8).

Twiners; stems striate, puberulant to glabrous. Leaves petiolate, peltate to 6 mm or basifixed, cordate to reniform or broadly ovate, entire to undulate, the apex acuminate to rounded, conspicuously mucronate, the base truncate to retuse, 2.5-12.0 cm long, 3.5-10.5 cm wide, chartaceous, palmately 5- to 9-nerved, the nerves conspicuous, glabrous or essentially so, dark and shiny above in drying; petioles 2-8 cm long, puberulent. Staminate inflorescence multi-flowered fasciculate dichasia arranged in a bracteate or ebracteate racimiform manner to 12 cm in length; 1-4 dichasia per fascicle; peduncle of cymes at length 1.5 cm, puberulent to appressed pilose; bracts small, basifixed, petiolate to 2 mm, broadly ovate, entire, 4 mm long, 4 mm wide, grading to minute, puberulent. Staminate flowers yellowish-green: sepals 4, elliptic, 0.9 mm long and wide, glabrous; corolla patelliform, rarely cupulate, 0.8 mm in diameter, glabrous; synandrium to 0.5 mm high, anthers 4-6. Pistillate inflorescence composed of 1-6 individual flowers fasciculate in the axils of bracts upon racemiform axillary branches to 18 cm long or on paniculate terminal branches; bracts foliaceous, petiolate to 2 mm, reniform to suborbicular, entire, conspicuously mucronate, 4-8 mm long, 5-10 mm wide, glabrous or puberulent. Pistillate flowers pedicellate to 4 mm: sepal 1, obovate, 1.6 mm long, 0.8 mm wide, exteriorly pilose, the interior glabrous; petal 1, reniform to suborbicular, 0.6 mm long, 1.0 mm wide, glabrous; carpel 1, gibbose, 0.6-1.0 mm long, pilose to glabrous. Drupe pyriform, 4-6 mm long, 4-5 mm wide, puberulent; fruiting stalk 3-5 mm long.

South America.

BRAZIL: AMAZONAS: São Paulo de Olivenca, Krukoff 9038 (NY). Froés 20737 (NY); Tabatinga, Pires and Black 939 (NY), 947 (NY), 949 (NY), 1072 (NY); Tefé, Pires 1377 (NY); Camatian, Froés 23992

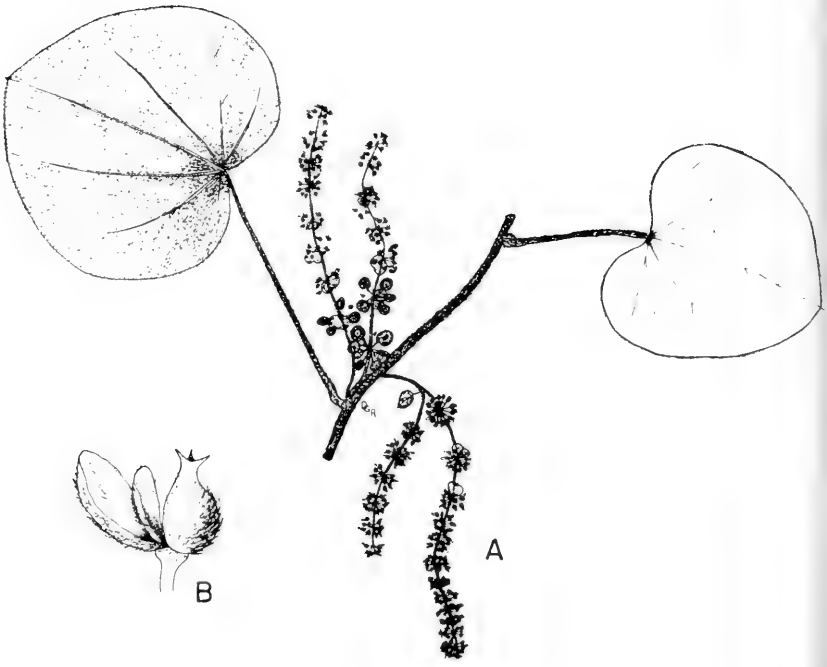

Figure 7 . Cissampelos verticillata Rhoces. A: Pistillate inflorescences and leaves, X ½; B: Pistillate flower, X 15.

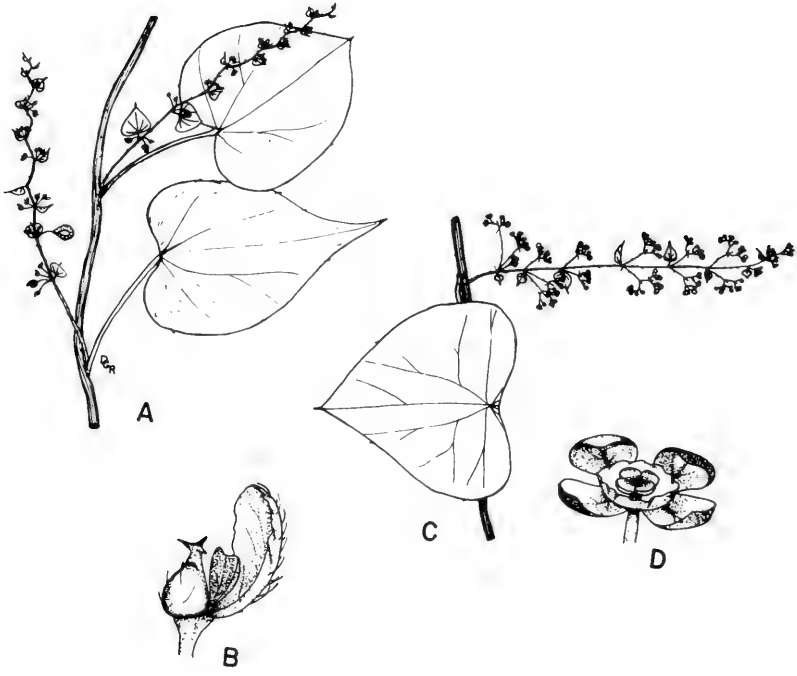

Figure 8 . Cissampelos laxiflora Moldenke. A: Pistillate inflorescences and leaves, X ½; B: Pistillate flower, X 15; C: Staminate inflorescence and leaf, X ½; D: Staminate flower, X 15.

(NY). Without Precise Locality: Leite 2099 (GH).

COLOMBIA: CALDAS: Santa Cecilia, Sneidern 5152 (NY,US). META: Villavicencio, Pennell 1562 (NY,GH). VALLE DEL CAUCA: Río Calima, La Trojita, Cuatrecasas 16510 (NY).

ECUADOR: SANTIAGO-ZAMORA: Zamora to Yanzasa, Mathias and Taylor 5259 (LA), 5244 (LA).

PARAGUAY: GUAIRÁ: Villarrica, Jorgensen 4254 (US,MO,NY).

PERU: LORETO: Río Putumayo at mouth of Río Zubineta, Klug 2322 (F,US,NY,MO); Florída, Klug 2029 (F,MO); Pumayacu, Klug 3230 (F,MO); Requena, Vigo 6254 (LA).

URUGUAY: CERRO LARGO: without precise locality, Rosenguett B1717 (GH).

A species very close morphologically to Cissampelos andromorpha DC., but differing in the more shiny, acuminately tipped leaves which bear conspicuous mucros, the smaller flowers, and in the inflorescences which do not occur in a fasciculate manner from the old wood.

8. Cissampelos andromorpha DC. Syst. 1:539. 1818 (Type: Patris s.n.) (Figure 9).

Cissampelos caapeba Vell. Fl. Flum. 10. tab. 139. 1827, non L. (1753).

Cissampelos denudata Miers, in Kew Journ. Bot. 3:115. 1851 (Type: Miers 4522).

Cissampelos ramiflora Miers, in Contrib. Bot. 3:163. 1871 (Type: Spruce 3165!).

Shrubby twiners to 7 m; stems striate, young glabrous to pilose, rarely sericeous. Leaves petiolate, basifixed or peltate to 10 mm, ovate to cordate, rarely reniform to suborbicular, entire to undulate, the apex acuminate to obtuse, rarely rounded or caudate, sometimes emarginate, mucronate, the base cordate to truncate, rarely attenuate or rounded, (3-)7.0(-12) cm long, (3-)6.5 (-11) cm wide, membranous to subcoriaceous, palmately 5- to 12-nerved, prominent below, glabrous to pilose above, rarely sericeous, paler below and puberulent to densely pilose, rarely glabrous or sericeous; petioles twisted and swollen proximally, (2-)5.7(-10) cm long, glabrous to tomentose. Staminate inflorescence multi-flowered fasciculate dichasia arranged normally in an ebracteate paniculiform or racemiform manner to 26 cm in length, frequently from old wood, or as cymose clusters axillary from normal leaves or rarely cymose clusters within the axils of reduces leaves or bracts of secondary axillary branches; 1-6 dichasia per fascicle; peduncle of cymes at length 3 cm long, puberulent to pilose; bracts of secondary branches basifixed, sessile or petiolate to 5 mm, ovate or rarely cordate to reniform, mucronate, entire and sometimes involute, 5-13 mm long, 4-13 mm wide, membranous to subcoriaceous, pilose, rarely puberulent or tomentose; bracteoles about 1 mm long, pilose. Staminate flowers

greenish, white or yellow: sepals 4, obovate to elliptic, (0.9-)1.3(-2.0) mm long, (0.5-)0.9(-1.3) mm wide, exteriorly glabrous to pilose; corolla cupuliform, rarely patelliform or lobed, (0.3-)0.6(-1.0) mm in height, (0.5-)1.0(-1.5) mm in diameter, glabrous or rarely puberulent exteriorly; synandrium sessile to 0.9 mm long, anthers 4, glabrous. Pistillate inflorescence composed of 4-10 individual flowers fasciculate on ebracteate, rarely bracteate, racemiform or paniculiform secondary branches; bracts of secondary branches basifixed, sessile or petiolate to 3 mm, ovate to suborbicular, entire and sometimes involute, mucronate, 2-8 mm long, 2-9 mm wide, membranous to subcoriaceous, glabrous to tomentose. Pistillate flowers: sepal 1, obovate to elliptic, (1.0)1.5(-1.8) mm long, (0.6-)0.9(-1.2) mm wide, exteriorly pilose; petal 1, obovate to reniform, (0.6-)0.9(-1.1) mm long, (0.5-)1.0(-1.7) mm wide, glabrous or rarely puberulent exteriorly; carpel 1, gibbose, (0.6-)0.8(-1.0) mm long, glabrous to tomentose. Drupe red, obovoid, (3-)4.9(-7) mm long, (3-)4.2(-5) mm wide, glabrous to pilose; fruiting stalk (2-)4.7(-17) mm long.

Central and South America.

COSTA RICA: SAN JOSE: El General, Skutch 4944 (F,MO); Without Precise Locality: Eggers 824 (GH), Imary 207 (GH).

GUATEMAL: ALTA VERAPAZ: Cobán, Standley 69244 (F).

PANAMÁ: PANAMÁ: Cerro Azul, Duke 8907 (NY).

BOLIVIA: LA PAZ: Copacahana, Krukoff 11142 (F,MO,NY); near Mapiri on left bank of Rio Mapiri, Krukoff 10764 (F,MO,NY); San Carlos near Mapiri, Buchtein 1769 (US); without precise locality, Bang 1553 (F,MO,NY), Williams 583 (NY).

BRAZIL: AMAZONAS: São Paulo de Olivanca, Froes 20575 (NY); Humaitá, Krukoff 6521 (F), 6690 (US,MO,NY), 6740 (US,MO), 7274 (NY); Nazareth, Rio Negro, Schultes and Lopez 9241 (US); Nassau, Lanjouw and Linderman 2347 (NY); Guaporé, Porto Velho, Silva 413 (NY); Maués, Pires 139 (NY); Rio Icana, Cachoeira Macarico, Froes 28022 (NY); without precise locality, Froes 21053. BAHIA: Bela Vista, Froes 12695/60 (GH). CEARÁ: Baturite, Ule 9035 (US). MARANHÃO: Island São Luis, Krukoff 11764 (NY). MINAS GERAIS: Minas Gerais, Krukoff 1629 (NY); Belo Horizonte, Barreto 9933 (F); Vicosa, Mexia 4410 (GH,MO,NY), 5281 (F,US,MO,NY), 4174 (NY), Irwin 2679 (F), 2050 (NY). PARÁ: Arredores de Belém, Froes 20771 (NY); Belém, Pires and Black 346 (NY), 439 (NY), Archer 7777 (NY); Maraba, Froes and Black 24664 (NY). PARANÁ: Dusen 17324 (F,NY), 7041 (F), 13420 (GH), 15772 (US,MO), 7009 (NY), 6997 (US,MO); Paranaguá, Hatschbach 2020 (US). RIO DE JANEIRO: Rio de Janeiro: Glaziou 18129a (F), Duarte 45715 (NY). RIO GRANDE DO SUL: Cucador on road to Taquara, Smith and Reitz 9095 (US,NY), 5545 (NY); Cascata, Lindman 885 (GH). SANTA CATARINA: San Francisco do Sul, Reitz and Klein 6293 (NY); Lajes, Smith and Klein 5545 (US), 6293 (US); Ibirama, Klein 944 (US); Brusque, Rodriguez C1895; Itajaí, Rodriguez C1489 (GH); Tijucas, Ule 4226 (NY). SÃO PAULO: São Paulo, Goncalves 29918 (NY); Butantan, Hoehne 1061 (NY); Campinas, Novaes 1005 (US). Without Precise Locality: Foeppig 2743 (F), Burchell 8863 (GH,NY), Irwin 2679 (NY), Reitz and Klein 3900 (NY).

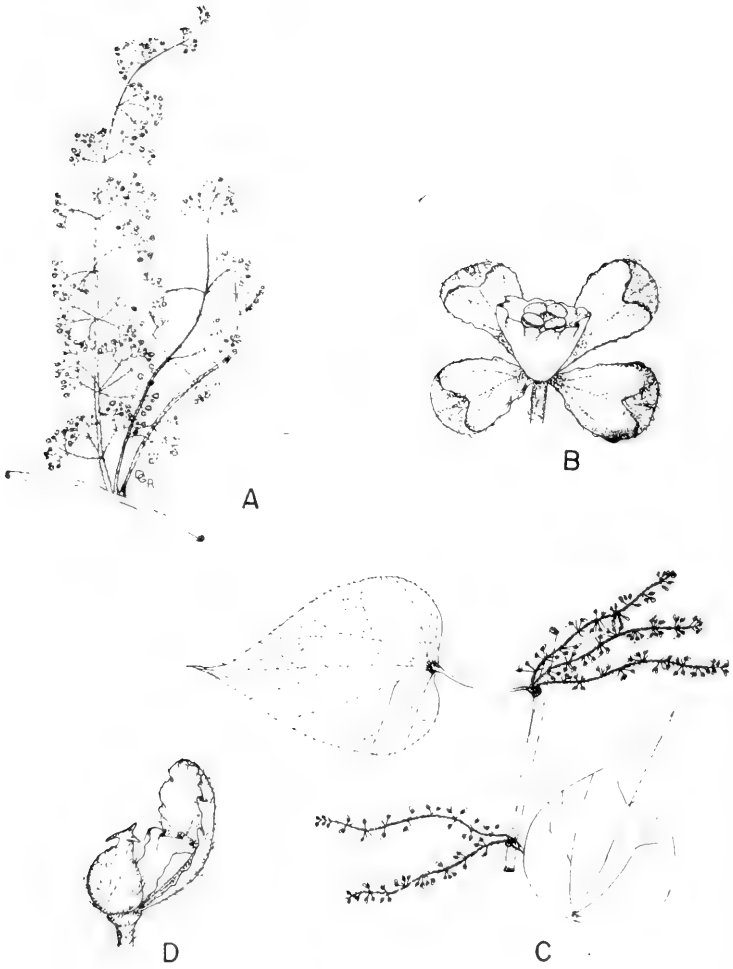

Figure 9. Cissampelos andromorpha DC. A: Staminate inflorescences and leaf, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescences and leaves, X 1/2; D: Pistillate flower, X 15.

BRITISH GUIANA: Pomeroon District, Moruke River, De La Cruz 4562 (F,MO,NY); Rockstone, Gleason 840 (GH,NY); Issorora, Aruka River, Hitchcock 17576 (US,NY); Northwest District, Mabaruma Compound, Archer 2301 (US); without precise location, Fanshawe 4802 (US).

COLOMBIA: AMAZONAS: Rio Hamacayacu between Amazon and Putumayo watersheds, Schultes 8244 (US). BOYACÁ: Bogotá, Lawrance 667 (F, MO); Mt. Chapon, Lawrance 425 (F,MO,NY). CAQUETÁ: Cordillera Oriental, Cuatrecasas 9130 (F); Florencia, Cuatrecasas 8798 (F). CAUCA: Popayán, Cuatrecasas 13853 (F). CHOCÓ: Tutunendo near Quibeó, Archer 2139 (US,NY); La Concepción near Quibdó, Archer 2212 (US); without precise location, Fernández 265 (US). META: Villavicencio, Cuatrecasas 4507 (US), 4681 (US). PUTUMAYO: Umbría, Klug 1656 (F). TOLIMA: El Eden to La Palmilla, Killip and Hazen 9626 (GH). VALLE DEL CAUCA: La Trojita, Cuatrecasas 16510 (F), 16235 (F,NY). VAUPES: San Joaquín, Fernández 2017 (US).

ECUADOR: LOS RÍOS: Vinces, Mexia 6621 (GH). NAPO-PASTAZA: Tena, Mexia 7146 (US,NY). SANTIAGO-ZAMORA: Zamora to Yanzasa, Mathias and Taylor 5258 (LA).

PERU: HUÁNUCO: Rondos, Vigo 5886 (LA); Tingo María, Woytkowski 5329 (F,MO), 5397 (US,MO); Zavortink 3024 (LA), Vigo 6183 (LA). LORETO: Punchana, Dodson 2840 (MO); middle Ucayali, Tessmann 3183 (NY); Aquaytia, Woytkowski 5344 (F,MO); Balsapuerto, Klug 2893 (F, NY,MO); Mishuyaca near Iquitos, Klug 967 (F,NY), 1498 (F,NY), 981 (US), 1008 (US,F,NY); Leticia, Williams 3094 (F); Iquitos, Tessmann 5067 (NY), Williams 8098 (F); lower Río Nanay, Williams 405 (F), 518 (US); Caballo-cocha, Williams 2085 (F); Rio Napo near Mazán, Mexia 6463a (GH); San Juan near Iquitos, Asplund 14403 (US). Without Precise Locality: Poppig 29rb (F).

SURINAM: Coppename Creek, Lanjouw and Ooststroom 465 (US); east-west road at Morico Creek, Kramar and Hekking 3166 (NY); Nassau, Lanjouw and Lindeman 2347 (NY).

VENEZUELA: AMAZONAS: Solano, Williams 14784 (F); San Carlos, Williams 14528 (F,NY), Schultes and Lopez 9377 (US,NY). BOLÍVAR: west of La Laja along Río Karuai, Steyermark 60765 (GH,NY); Gran Sabana, Tamayo 2976 (US); Santa Klena de Uairén, Lasser 1647 (NY).

Cissampelos andromorpha is known locally in Peru as "macotilla", in Venequela as "macumi", and in Brazil as "jorro-jorro". The species is distinguished by the yellowish staminate flowers with sepals usually not reflexed, cupulate corolla, and stalked synandrium. The frequently ebracteate pistillate and staminate inflorescences are often fasciculate from old wood.

9. Cissampelos fasciculata Benth. in Lond. Journ. Bot. 2:361. 1843 (Types: Schomburgk 677, 221) (Figure 10).

Cissampelos scutigera Triana and Planch. in Ann. Sc. Nat. ser. 4. 17:42. 1862, ex char. (Type: Triana 4695).

Cissampelos andromorpha Eichl. in Fl. Bras. 13. 1:195. 1864, non DC. (1818).

Cissampelos floribunda Miers, in Ann. Nat. Hist. ser. 3. 17:135. 1866 (Type: Poppig 2916).

Cissampelos coriacea Standl. in Field Mus. Pub. Bot. 18:437. 1937 (Type: Brenes 6720!).

Suffrutescent twiners to 15 m from thick, deep-set rhizomes; stem striate, pilose to tomentose, rarely glabrous. Leaves petiolate, basifixed or peltate to 10 mm, rarely to 23 mm, cordate, rarely ovate or suborbicular, entire to undulate, the apex acuminate to obtuse, rarely emarginate, mucronate, the base cordate to truncate, (6-)11.0(-16) cm long, (6-)10.8(-16) cm wide, membranous to subcoriaceous, palmately 7- to 9- nerved, rarely 12-nerved, glabrous to pilose above, paler below and pilose to tomentose, frequently with whitish hairs; petioles (4-)6.8(-11) cm long, pilose to tomentose, sometimes tomentose only distally and proximally. Staminate inflorescence multi-flowered fasciculate dichasia arranged in a bracteate or ebracteate racemiform or paniculiform manner to 20 cm in length or as cymose clusters axillary from normal leaves or rarely cymose clusters within axils of reduced leaves or bracts of secondary axillary branches to 34 cm in length; 2-6 dichasia per fascicle; peduncle of cymes at length 3 cm long, tomentose; bracts basifixed, petiolate to 6 mm, ovate to cordate, entire and frequently involute, 2.5-4.0 mm long, 1.8-5.0 mm wide, membranous, pilose to tomentose; bracteoles linear, about 1 mm long, tomentose. Staminate flowers white or greenish: sepals 4, elliptic to obovate, (0.6-)1.0(-1.4) mm long, (0.5-)0.7(-0.9) mm wide, exteriorly pilose to tomentose, often with short whitish hairs; corolla patelliform, (0.7-)0.9(-1.1) mm in diameter, the exterior pilose; synandrium sessile or essentially so, anthers 4, glabrous. Pistillate inflorescence composed of 4-6 individual flowers fasciculate or bracteate racemiform or paniculiform secondary branches, 1-3 branches per leaf axil or sometimes terminal; bracts basifixed, sessile or petiolate to 3 mm, ovate to cordate, entire and frequently involute, (4-)7.7(-18) mm long, (4-)6.7(-13) mm wide, membranous to coriaceous, tomentose. Pistillate flowers: sepal 1, obovate, (1.0-)1.3(-1.6)mm long, (0.7-)0.8(-0.9) mm wide, exteriorly pilose to tomentose; petal 1, deltoid, obovate, suborbicular or quadrangular, (0.6-)0.8(-1.0) mm long and wide, pilose exteriorly; carpel 1, gibbose, (0.7-)1.0(-1.3) mm long, tomentose or rarely pilose. Drupe orange or red, obovoid, (4.5-)4.7(-5.0) mm long, (4.0-)4.2(-4.5) mm wide, pilose; fruiting stalk (1-)1.5(-2) mm long.

Mexico, Central and South America.

MEXICO: VERACRUZ: Orizaba, Nelson 183 (US). YUCATAN: Tuxpeña, Campeche, Lundell 973 (NY).

COSTA RICA: ALAJUELA: Atenas, Smith P2488 (NY); San Antonio de Zarcero, Smith 313 (US), A105 (F), H270 (F), H271 (MO); San Carlos,

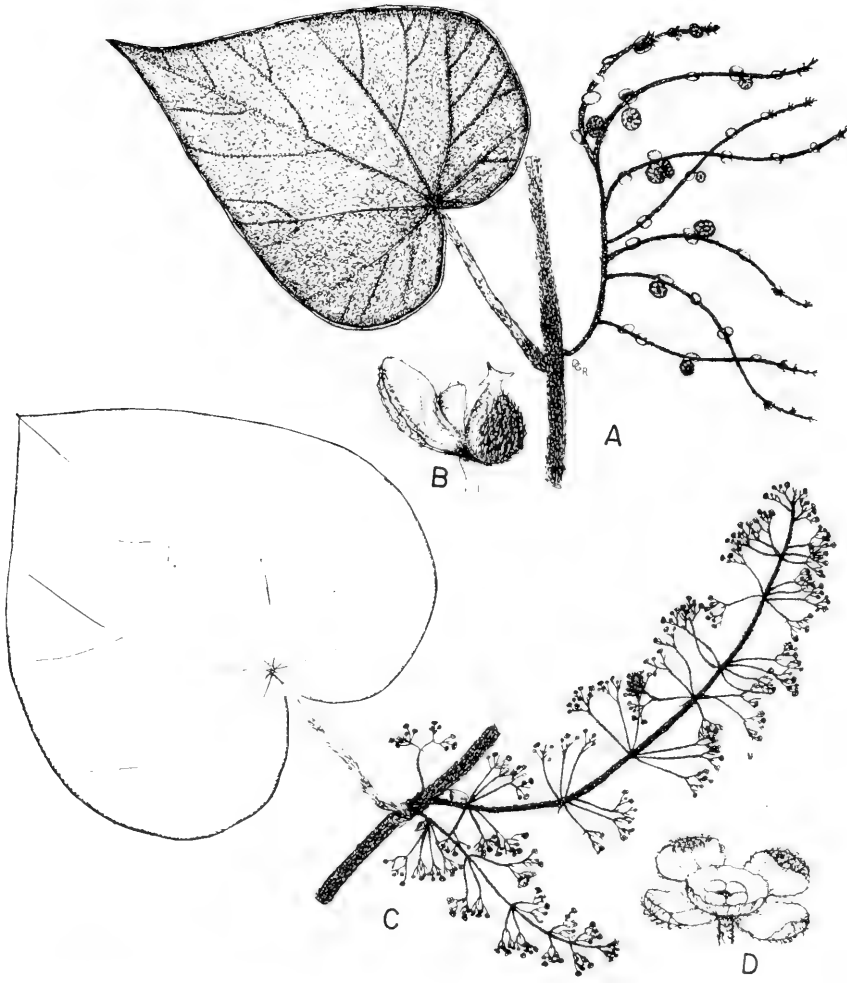

Figure 10. Cissampelos fasciculata Benth. A: Pistillate inflorescences and leaf, X 1/2; B: Pistillate flower, X 15; C: Staminate inflorescences and leaf, X 1/2; D: Staminate flower, X 15.

Smith F1857 (F, MO,NY); San Luis de Turcero, Smith NY1368 (F,NY); San Ramón, Brenes 6720 (F), 6126 (F), Echeverria 4125 (F); Bruissons, Tonduz 11.403 (US). SAN JOSÉ: Cóncavas, Laukeke 333 (F); Vara Blanca de Sarapiquí, Skutch 3400 (GH), 3642 (NY); San Pedro, Godfrey 67217 (MO).

GUATEMALA: SUCHITEPEQUEZ: Volcán Santa Clara, Steyermark 46679 (F).

PANAMÁ: BOCAS DEL TORO: Shepherd Island, Von Wedel 2691 (GH). CHIRIQUÍ: Boquete, Dwyer and Hayden 7624 (MO). PANAMÁ: El Llano, Duke 5659 (MO).

BRAZIL: AMAZONAS: Madeira River, Rusby 1442 (NY). MINAS GERAIS: Ituiutaba, Macedo 1178 (NY).

COLOMBIA: CAUCA: Cuatro Esquinas, Pennell and Killip 6320 (NY). EL VALLE: Miraflores, Killip 6118 (NY). HUILA: Pitalito, Fosberg 20050 (NY,US), 19997 (NY). NARIÑO: Umbría, Klug 1666 (F,NY,MO). SANTANDER: Las Vegas, Killip and Smith 16106 (NY).

ECUADOR: LOS RÍOS: Babahoyo, Schimpff 313 (MO). NAPO-PASTAZA: Oriente, Gill 20a (NY). PICHINCHA: between Volcán Atacaso and Volcán Pichincha, Steyermark 52551 (US). SANTIAGO-ZAMORA: between Campanas and Arenillas, Steyermark 53566 (NY).

A species sometimes confused with Cissampelos andromorpha DC. but differing in the larger and more densely pubescent leaves, the patelliform corolla and sessile synandrium of the staminate flower, and the presence of the staminate or pistillate inflorescence on recent growth.

10. Cissampelos pareira L. Spec. Pl. 1031. 1753 (Figure 11).

Cissampelos pareira L. a. Spec. Pl. 1031. 1753.

Cissampelos caapeba L. Spec. Pl. 1032. 1753, ex char.

Menispermum orbiculatum L. Spec. Pl. 341. 1753, ex char.

Cissampelos cocculus Poir. in Lam. Encycl. 5:9. 1804, ex char.

Cissampelos convolvulacea Willd. Spec. Pl. 4:863. 1805 (Type: Klein s.n.).

Cissampelos mauritiana Thou. in Desv. Journ. Bot. 2:65 tab. 3 and 4. 1809.

Cissampelos heterophylla DC. Syst. 1:534. 1818 (Type: Thibaud s.n.).

Cissampelos orbiculata DC. Syst. 1:537. 1818.

Cissampelos microcarpa DC. Syst. 1:537. 1818 (Type: Swartz s.n.).

Cissampelos hirsuta Buch. ex. DC. Syst. 1:535. 1818, ex char. (Type: Buchanan s.n.).

Cissampelos discolor DC. Syst. 1:534. 1818 (Type: Lambert s.n.).

Cissampelos tomentosa DC. Syst. 1:535. 1818.

Cocculus orbiculatus DC. Syst. 1:523. 1818 (Type: Rheede s.n.).

Cissampelos tamoides Willd. ex. DC. Syst. 1:536. 1818.

Cissampelos argentea HBK. Nov. Gen. & Sp. 5:67. 1821, ex char. (Type: Humboldt and Bonpland 1508).

Cissampelos guayaquilensis HBK. Nov. Gen. & Sp. 5:67. 1821, ex char. (Type: Humboldt and Bonpland 3847).

Cissampelos orinocensis HBK. Nov. Gen. & Sp. 5:68. 1821.

Cissampelos gracilis St. Hil. Fl. Bras. Mer. 1:56. 1825, ex char. (Type: St. Hilaire s.n.).

Cissampelos monoica St. Hil. Fl. Bras. Mer. 1:55, 1825 (Type: St. Hilaire s.n.).

Cissampelos australis St. Hil. Fl. Bras. Mer. 1:54. 1825.

Cissampelos litoralis St. Hil. Fl. Bras. Mer. 1:54. 1825.

Cissampelos obtecta Wall. Cat. 4981. 1827. (Type: Wallich 4979).

Cissampelos hernandiifolia Wall. Cat. 4979 partim. 1828.

Cocculus villosus Wall. Cat. 4957 partim. 1828, ex char.

Cissampelos caapeba Roxb. Fl. Ind. 3:842. 1832, ex char.

Cissampelos tetrandra Roxb. Fl. Ind. 3:842. 1832, ex char. (Type: Roxburgh s.n.).

Cissampelos haenkeana Presl. Reliqu. Haenk. 2:80. 1836.

Cissampelos hirsutissima Presl, Reliqu. Haenk. 2:80. 1836, (Type: Poppig 1293).

Cissampelos kohautiana Presl, Reliqu. Raenk. 2:81 1836, ex char.

Cissampelos acuminata Benth. Pl. Hartw. 415. 1840 (Type: Hartweg 445).

Cissampelos canescens Miq. Sert. Exot. 7. t.4. 1842 (Type: Coulter 659).

Cissampelos nephrophylla Bojer, in Ann. Sc. Nat. 2. ser. 20:54. 1843.

Cissampelos cordifolia Bojer, in Ann. Sc. Nat. 2. ser. 20:54. 1843.

Cissampelos cumingiana Turcz. in Bull. Soc. Imp. Des. Nat. 27:283. 1854, ex char. (Type: Cuming 691).

Cissampelos pannosa Turcz. in Bull. Soc. Imp. Des. Nat. 27:283. 1854, ex char. (Type: Linden 1809).

Cissampelos smalzmanni Turcz. in Bull. Soc. Imp. Des. Nat. 27:284. 1854, ex char. (Type: Smalzmann s.n.).

Cissampelos discolor DC. var. cardiophylla Gray, Bot. Unit. St. Expl. Exped. 38. 1854.

Cissampelos eriocarpa Triana & Planch. in Ann. Sc. Nat. ser. 4. 17:40. 1862 (Type: Triana s.n.).

Cissampelos glaucescens Triana & Planch. in Ann. Sc. Nat. ser. 4. 17:41. 1862 (Type: Goudot s.n.).

Cissampelos subreniformis Triana & Planch. in Ann. Sc. Nat. ser. 4. 17:41. 1862 (Type: Triana s.n.).

Cissampelos pareira L. a pareira Eichl. in Mart. Fl. Bras. 13. 1:190. 1864.

Cissampelos pareira L. B caapeba Eichl. in Mart. Fl. Bras. 13. 1:190. 1864.

Cissampelos pareira L. ∂ racemiflora Eichl. in Mart. Fl. Bras. 13. 1:190. 1864.

Cissampelos pareira L. δ monoica Eichl. in Mart. Fl. Bras. 13. 1:190. 1864.

Cissampelos pareira L. var. orbiculata (DC.) Miq. in Ann. Mus. Lugd. Bat. 4:85. 1868 (Type: Roxburgh s.n.).

Dissopetalum mauritianum Miers, in Ann. Nat. Hist. 3. ser. 17:267. 1866; in Contrib. Bot. 3:203. 1871.

Cissampelos longipes Miers, in Ann. Nat. Hist. ser. 3. 17:134. 1866, nom. nud; in Contrib. Bot. 3:139. 1871 (Type: Rohr s.n.)

Cissampelos testudinum Miers, in Ann. Nat. Hist. ser 3. 17:134. 1866, nom. nud; in Contrib. Bot. 3:143. 1871. (Type: Darwin 239).

Cissampelos limbata Miers, in Ann. Nat. Hist. ser. 3. 17:134. 1866, nom. nud.; in Contrib. Bot. 3:143. 1871 (Type: Holton 668).

Cissampelos benthamiana Miers, in Ann. Nat. Hist. ser. 3. 17:144. 1866, nom. nud; in Contrib. Bot. 3:144. 1871, ex char. (Type: Hartweg 445).

Cissampelos auriculata Miers in Ann. Nat. Hist. ser. 3. 17:135. 1866, nom. nud.; in Contrib. Bot. 3:158. 1871. (Type: Tweedie s.n.).

Cissampelos hederacea Miers in Ann. Nat. Hist. ser. 3. 17:135. 1866, nom. nud.; in Contrib. Bot. 3:159. 1971 (Type: Tweedie s.n.).

Cissampelos consociata Miers, in Ann. Nat. Hist. ser. 3. 17:135. 1866, nom. nud.; in Contrib. Bot. 3:167. 1871 (Type: Wilson s.n.).

Cissampelos diffusa Miers, in Ann. Nat. Hist. ser. 3. 17:136. 1866, nom. nud.; in Contrib. Bot. 3:168. 1871 (Type: Gouan s.n.).

Cissampelos madagascariensis Miers, in Ann. Nat. Hist. 3. ser. 17:136. 1866, nom. nud.; in Contrib. Bot. 3:181. 1871, non (Baill.) Diels (1910) (Type: Thompson s.n.).

Cissampelos bojeriana Miers, in Ann. Nat. Hist. ser. 3. 17:182. 1866, nom. nud.; in Contrib. Bot. 3:182. 1871, ex char.

Cissampelos diversa Miers, in Ann. Nat. Hist. ser. 3. 17:137. 1866, nom. nud.; in Contrib. Bot. 3:187. 1871.

Cissampelos elata Miers, in Ann. Nat. Hist. ser. 3. 17:137. 1866, nom. nud.; in Contrib. Bot. 3:187, ex char.

Cissampelos grallatoria Miers, in Ann. Nat. Hist. ser. 3. 17:137. 1866, nom. nud.; in Contrib. Bot. 3:189. 1871, ex char. (Type: Wallich 4977).

Cissampelos discolor Miers, in Ann. Nat. Hist. ser. 3. 17:138. 1866, nom. nud.; in Contrib. Bot. 3:191. 1871, non DC. (1818) (Type: Cuming 1440).

Cissampelos delicatula Miers, in Ann. Nat. Hist. ser. 3. 17:138. 1866, nom. nud.; in Contrib. Bot. 3:197. 1871. (Type: Hadras 60).

Cissampelos subpeltata Thwait. ex. Miers in Contrib. Bot. 3:195. 1871 (Type: Thwaites 168).

Cissampelos pareira L. var. peltata Scheff. in Nat. Tijdsch. 32:401. 1873, ex char.

Cissampelos boivini Baill. in Bull. Soc. Linn. Paris. 58:460. 1885, ex char. (Type: Boivin s.n.).

Cissampelos pareira L. var. mucronata (A. Rich.) Engl. subvar. crassifolia Engl. in Engl. Bot. Jahrb. 26:394. 1899.

Cissampelos pareira L. var. mucronata (A. Rich.) Engl. subvar. usambarensis Engl. in Engl. Bot. Jahrb. 26:395. 1899 (Type: Buchwald 627).

Cissampelos pareira L. var. transitoria Engl. subvar. madagascariensis (Miers) Engl. and subvar. wakefieldii Engl. in Engl. Bot. Jahrb. 27:396. 1899.

Cissampelos pareira f. reniformis Chod. & Hassl. in Bull. Herb. Boiss. ser. 2. 3:420. 1903 (Type: Hassler 5477).

Cissampelos pareira f. emarginato-mucronata Chod. & Hassl. in Boiss. ser. 2. 3:420. 1903 (Type: Hassler 6198).

Cissampelos pareira L. var. α. typica Diels, in Engl. Pflanzen. 4(94):288. 1910.

Cissampelos pareira L. var. β. laevis Diels, in Engl. Pflanzen. 4(94):292. 1910 (Type: Plumier s.n.).

Cissampelos pareira L. var. ν. haenkeana (Presl) Diels, in Engl. Pflanzen. 4(94):292. 1910.

Cissampelos pareira L. var. δ. nephrophylla (Bojer) Diels, in Engl. Pflanzen. 4(94):292. 1910.

Cissampelos pareira L. var. ε. mauritiana (Thou.) Diels, in Engl. Pflanzen. 4(94):293. 1910.

Cissampelos pareira L. var. ϱ. caapeba (L.) Diels, in Engl. Pflanzen. 4(94):293. 1910.

Cissampelos pareira L. var. η. tamoides (Willd.) Diels, in Engl. Pflanzen. 4(94):293. 1910.

Cissampelos pareira L. var. ϑ. gardneri Diels, in Engl. Pflanzen. 4(94):294. 1910. (Type: Gardner 2012).

Cissampelos pareira L. var. ι. australis (St. Hil.) Diels, in Engl. Pflanzen. 4(94):294. 1910.

Cissampelos ellenbeckii Diels, in Engl. Pflanzen. 4(94):296. 1910 (Type: Ellenbeck 361c!).

Cissampelos tomentocarpa Rusby, Desc. Sps. So. Am. 17. 1920. (Type: Williams 616).

Cissampelos violaefolia Rusby, in Mem. N.Y. Bot. Gard. 7:240. 1927 (Type: Cardenas 2015!).

Cissampelos piolanei Gagnep. in Hubert Suppl. Fl. Gen. 1:137. 1938, ex char.

Suffrutescent twiners to 8 m from thickened root, sometimes forming mat on the ground or scrambling on undergrowth and rocky ledges; stems striate, young stems glabrous to tomentose, rarely sericeous. Leaves petiolate, basifixed or peltate to 15 mm, cordate to suborbicular, rarely deltoid, entire to undulate, the apex acute to rounded, rarely acuminate, frequently emarginate, mucronate, the base cordate to truncate or rounded, rarely attenuate, (3-)6.0(-15) cm long, (3-)6.0(-17) cm wide, membranous, palmately 5- to 12-nerved, usually prominent below, glabrous to pilose or sericeous above, rarely densely pilose or tomentose, paler below and pilose or sericeous to tomentose, rarely glabrous or puberulent; petioles (1-)4.2(-13) cm long, puberulent to tomentose, rarely sericeous or glabrous. Staminate inflorescence multi-flowered fasciculate dichasia arranged as cymose clusters axillary from normal leaves or upon secondary bracteate or ebracteate racemiform or paniculiform axillary branches to 27 cm or as cymose clusters within the axils of reduced leaves of secondary branches; 1-6, rarely indefinite, dichasia per fascicle; peduncle of cymes at length 3 cm long, pilose to tomentose, rarely puberulent; bracts of secondary branches, if present, basifixed, sessile or petiolate to 10 mm, reniform to ovate, rarely suborbicular, mucronate, entire or rarely involute, at length 28 mm long and wide, membranous, pilose to tomentose, rarely puberulent or sericeous; bracteoles about 1 mm long, pilose. Staminate flowers various hues of green, white or yellow: sepals 4, obovate to elliptic or rarely ovate, (0.7-)1.1(-1.8) mm long, (0.5-)0.7(-1.3) mm wide, exteriorly puberulent to pilose; corolla patelliform, (0.6-)0.9(-1.3) mm in diameter, rarely cupuliform, glabrous to pilose exteriorly; synandrium sessile to 0.8 mm long, anthers 4 or rarely 5-6, glabrous. Pistillate inflorescence composed of 5-10 individual flowers fasciculate on bracteate, rarely ebracteate, racemiform secondary branches; bracts basifixed, sessile or petiolate to 10 mm, usually remiform but varying from cordate to suborbicular, entire or sometimes undulate, rarely involute, mucronate, at length 2.4 cm long, 2.6 cm wide, frequently grading to minute, membranous, puberulent to tomentose, rarely glabrous or sericeous. Pistillate flowers greenish-yellow: sepal 1, obovate, elliptic or suborbicular, (0.8-)1.3(-2.0) mm long, (0.4-)0.9(-1.2) mm wide, exteriorly pilose; petal 1, rarely bilobed, quadrangulate to deltoid, sometimes reniform or suborbicular, (0.4-)0.6(-0.9) mm long, (0.4-)0.8(-1.5) mm wide, exteriorly pilose, rarely puberulent or glabrous; carpel 1, gibbose, (0.5-)0.7(-1.0) mm long, pilose to tomentose. Drupe red or yellowish, obovoid, (3-)4.1(-6) mm long, (3-)3.9(-5) mm wide, puberulent to pilose, rarely sericeous or glabrous; fruiting stalk (1-)2.6(-5) mm long.

North, Central, and South America, Asia and Africa.

UNITED STATES: FLORIDA: Snapper Creek, 12 miles south of Miami, Simpson s.n. (US), Small and Mosier s.n. (NY); Matheson Hammock near Miami, Marquand s.n. (NY).

BAHAMAS: ANDROS I: Nicholl's Town, road to Louisa Coppice, Bruce 6897 (F,NY), 6716 (F,NY).

BARBADOS: Bathsheba, Waby 47 (F); Pine Estate, Freemen 218 (NY).

CUBA: CAMAGUEY: La Gloria, Shafer 206 (GH,NY); Jaqüeyal, Eggers 4755 (US). LA NABANA: Loma de Cosilla, León 2431 (NY); La Habana, Ekman 678 (NY); Isla de Pinos, Blain 52 (F), Taylor 143 (NY), Curtiss 283 (F,GH,NY), Britton and Wilson 15129 (F,NY), Jennings 567 (GH,NY), Britton, Britton and Wilson 14967 (US,NY); San Antonio de los Baños, Hermann 827 (F,NY). LAS VILLAS: Cienfuegos, Combs 278 (NY,F,MO), Jack 5288 (GH), 6691 (GH), 5877 (GH), 4976 (GH); Trinidad, Morton 4174 (US); Cumanayagua, Senn 348 (GH), Howard 5653 (GH); San Blas, Rehder 1146 (GH), Jack 5919 (GH), Salvoza 644 (GH) Smith, Hodgdon and Gonzales 3307 (GH); Soledad, Howard 5138 (GH), Gonzales 107 (GH,NY). ORIENTE: Sierra de Nipe, Cayo del Rey, Carabia 4033 (NY); Santiago de Cuba, Millspaugh 1121 (F), 1120 (F), Clement 126 (NY), Britton 1883 (NY), Palmer 377 (F,NY,MO), Blake 7263 (US), Britton, Britton and Cowell 12817 (NY), 12851 (US,NY); Lopez 231 (US); Holguin, Shafer 1325 (F,NY); Bayate, Ekman 8561 (F); Baracoa, Webster 4039 (US); Rio Mayari, Shafer 3692 (US,NY); Gran Piedra Mt., Lopez 863 (US). PINAR DEL RIO: Rio Mestanza, Britton, Britton and Cowell 10151 (NY);San Diego to Las Yeguas, León and Agathauge 4890 (NY); Guanajay, Hermann 212 (F,NY); Pinar del Río, Palmer and Riley 51 (US), 17 (NY); without precise locality, Shafer and León 13690 (F,NY). SANTA CLARA: Hoyo de Manicaragua, Britton, Britton and Wilson 4690 (NY); Mina Carlota near Cumanayagua, Senn 385 (NY); Siguanea, Britton and Wilson 4981 (NY); Soledad, Howard 5138 (NY); Lomas de Banaeo, León 320 (NY).. Without Precise Locality: Wright 22 (GH,MO), 21 (GH), Rugel 298 (US), Luna 30 (NY), Hioram 1783 (NY), Leon, Clement and Roca 10426 (NY).

DOMINICAN REPUBLIC: AZUA: Azua, Rose, Fitch and Russell 3989 (US,NY). BARAHONA: Polo, R.A. and E.S. Howard 8445 (NY,GH); without precise locality, Fuertes 161 (F,MO,NY). BENEFACTOR: San Juan, Miller 1234 (US). LA VEGA: Jarabacoa, Augusto 845 (NY); Piedra Blanca, Allard 13739 (US); Constanza, Jiménez 2135 (US). MONTE CRISTI: Moncion, Mera 2076 (US). PUERTO PLATA: Cordillera Septentrional, Bajabonica, Ekman 14484 (US). SAMANÁ: Samaná peninsula, Abbott 271 (US), 1148 (US), 2375 (US), Ekman 15229 (US). SANTIAGO: Santiago, Allard 14549 (US); without precise locality, Valeur 847 (US,MO,NY), 907 (US,NY,MO), 915 (US,MO,NY). SANTO DOMINGO: Colonia Ramfis, Allard 14977 (GH); Ciudad Trujillo, Allard 13846 (US), 19138 (US); without precise locality, Fuertes 571 (GH,NY), Eggers 2136 (US,NY), 1528 (US,NY,GH), Rose, Fitch and Russell 4106 (US,NY), Wright, Parry and Brummel 537 (US). SEIBO: Hiqüey, R.A. and E.S. Howard 9831 (GH,NY); Seiba, Abbott 2517 (US); Monte Redondo, Abbott 2783 (GH). Without Precise Locality: Augusto 739 (NY), 817 (NY), 860 (NY), 338 (NY).

GUADELOUPE: ST. MARTIN: without precise locality, Boldingh 3191 (NY). Without Precise Locality: Stehle 1545 (GH), Duss 2586 (F,MO, NY), Questel 4184 (US).

HAITI: ARTIBONITE: Ennery, Leonard 8891 (F). NORD: Pilate, Leonard 9660 (GH); St. Michael de l'Atalaye, Leonard 7213 (US,NY), 7613 (US,NY); Cap-Haitïen, Ekman 2761 (US), Nash 953 (NY); Marmelade, Leonard 8408 (US). NORD-OUEST: Môle-St. Nicolas, E. and G. Leonard 13318 (GH); Île de la Tortue, E. and G. Leonard 15496 (US); Bombardopolis, E. and G. Leonard 13247 (US); Bord do Mer, E. and G. Leonard 12900 (US); Jean-Rabel, E. and G. Leonard 13706 (US); Port-de-Paix, E. and G. Leonard 14715 (US). QUEST: Margot, Nash 363 (F,NY), 270 (NY), 181 (F,NY), 240 (F); Port-au-Prince, Holdridge 968 (F,NY); Pétionville, Leonard 5040 (GH,NY), 4949 (GH,NY), Nash 1000 (NY), 977 (NY); Fond Verrettes, Leonard 3796 (GH), 3961 (US); Île de la Gonâve, Eyerdam 107 (GH). SUD: Miragoâna, Eyerdam 557 (GH). Without Precise Locality: Leonard 4573 (US,NY), Miller 182 (US), Nash and Taylor 1055 (NY).

JAMAICA: CORNWALL: Lucea to Montego Bay, Britton 2907 (NY); Ramgoat Cave, Howard, Proctor and Stearn 14671 (GH). MIDDLESEX: Mandeville, Brown 11 (NY), 25 (NY), Crawford 750 (NY), Britton 3220 (NY), 982 (NY); Spanish Town, Britton 3089 (NY); Albiou Pen, Harris 11999 (US,NY); Grier Mount, Proctor 6485 (US); Mount Diablo, Maxon and Killip 532 (F); Pike, Proctor 18310 (GH). SURREY: Kingston, Britton 803 (NY); Hope Bay, Harris 6968 (F); Rockfort, Maxon and Killip 1390 (F,NY); Eleven Mile, Lewis s.n. (US); Hope Gardens, Maxon 1668 (US); Belleview near Constant Springs, Britton 950 (US,NY); Constant Springs, Philipson 548 (NY). Without Precise Locality: Yuncker 17093 (F), Hart 668 (F), Harris 8737 (F,NY), Howard and Proctor 14484 (GH), 13788 (GH), Killip 95 (US), Harris and Lawrence C15116 (US), Maxon 8778 (US), 2820 (US), Hunnewell 14161 (GH), Norman 54 (MO), 189 (MO), Crosby, Hespenheide and Anderson 340 (MO,NY), Britton 3363 (NY).

LEEWARD ISLANDS: ANTIGUA: Sugar Loaf Mt., Box 772 (GH,MO), 1008 (US). MONTSERRAT: Ganbaldi Hill, Shafer 315 (F,NY). VIRGIN ISLANDS: Tortola, Fishlock 306 (GH,NY).

MARTINIQUE: Without Precise Locality: Duss 1041 (NY), 1040 (NY), 1038 (NY), 1039 (NY).

NETHERLANDS ANTILLES: BONAIRE: without precise locality, Boldingh 7411 (NY). CURACAO: St. Christoffelberg, Arnoldo 1929 (GH).

PUERTO RICO: CAGUAS: Caguas, Underwood and Griggs 351 (F,NY), 305 (US,NY); Cayey to Guayama, Underwood and Griggs 329 (US,NY), 521 (NY); Cayey to Caguas, Underwood and Griggs 350 (US,NY), CAYEY: Cayey, Kuntze 419 (NY), 206 (NY), 230 (NY). CULEBRA: Culebra Island, Britton and Wheeler 126 (US,NY). FAJARDO: Fajardo, Urban 326 (NY). HUMACAO: Humacao, Sintenis 5186 (US). LUQUILLO: Luquillo, Wilson 282 (F,US,NY). MAYAGÜEZ: Las Mecas, near Mayagüez, Holm 204 (MO), Mayagüez, Britton and Marble 667 (US,NY). NAGUABO: Rio Blanco, Sintenis 5354 (US); Loma La Mina, Shafer 3255 (US,NY). SAN JUAN: Rio Piedras, Heller 1283 (NY), Stevenson 1971 (F), 259 (US), Johnston 259 (NY), Hioram s.n. (NY). TOA BAJA: Sabana Seca, Otero 564 (F,MO).

UTUADO: Mount Morales, near Utuado, Britton and Cowell 821 (NY). YAUCO: Yauco, Garber 47 (GH,NY), Sargent 223 (US). Without Precise Locality: Sintenis 326 (F,US,NY), Heller 332 (F), 1283 (F), Wydler 207 (F), Shevsholm 204 (F,MO,NY), Shafer 2482 (NY,US), Stevenson 4357 (US), Britton and Shafer 2143 (NY).

TRINIDAD AND TOBAGO: TOBAGO: Roseborough, Purseglove P6317 (NY); Logwood Park, Broadway 2959 (F,MO); Richmond, Fairchild s.n. (US); without precise locality, Eggers 5521 (NY), 5621 (NY). TRINIDAD: Moruga, Britton and Broadway 2422 (US,NY); San Juan, Johnston 38 (GH), 76 (GH,NY); Arena Government Forest, Broadway 9174 (GH,MO); without precise locality, Kuntze 618 (NY), 924 (NY), Fendler 206 (NY).

VIRGIN ISLANDS (U.S.): ST. CROIX ISLAND: Mt. Eagle, Thompson 426 (GH), 577 (GH); Signal Hill, Ricksecker 184 (F,NY,MO), 436 (F,MO); Frederiksted, Rose, Fitch and Russell 3514 (NY,US); Christiansted, Rose, Fitch and Russell 3593 (US). ST. JOHN ISLAND: Bordeaux Mt., Britton and Shafer 591 (US). ST. THOMAS ISLAND: Belgian Road, Britton, Britton and Shafer 57 (US,NY); without precise locality, Eggers 23 (GH).

BRITISH HONDURAS (BELIZE): BELIZE: Belize, Gentle 19 (F,NY). CAYO: Cayo, Bartlett 11563 (F); Mai Fire Lookout Station, Dwyer, Elias and Maxwell 198 (MO); Central Farm, Dwyer, Elias and Maxwell 285 (MO,US). NORTHERN: Corozal, Gentle 415 (F), 4859 (NY), 595 (F), 4919 (NY), Lundell 4919 (MO). Without Precise Locality: Peck 274 (GH).

COSTA RICA: ALAJUELA: Atenas, Smith P2488 (GH), P2461 (GH); San Ramón, Brenes 14319 (GH), 22323 (NY), 14318 (NY), 5757 (F), Smith 2817 (F). CARTAGO: Cartago, Stork 4700 (GH), 1068 (GH), 307 (US), Cooper 5703 (GH); Las Cóncavas, Cooper 49 (F); Corinto, Williams 16553 (F). GUANACASTE: Río San José, Dodge and Thomas 6436 (MO); Tilarán, Dodge 6199 (MO); Standley and Valerio 46551 (US), 44436 (US). SAN JOSÉ: Santa Ana, Jiménez 3529 (NY); El General, Skutch 2548 (GH,MO), 4283 (GH,MO,NY); San José, Tonduz 7287 (US), 781 (F,US), Skutch 2548 (NY), Valerio 197 (F). Without Precise Locality: Tonduz 13804 (F), 17872 (US)8068 (US), 8459 (US), 9618 (US), 11403 (US), Roever 5300 (F), León 420 (F), Valerio 1447 (F), 39 (US), Dodge 6199 (US), Echeverria 38 (F), Laukeke K103 (F), Pittier 12154 (US).

EL SALVADOR: AHUACHAPÁN: Ahuachapán, Standley 19718b (US). SAN SALVADOR: Finca San Nicolás, Calderón 1568 (NY), San Salvador, Velasco 8920 (GH,US), Standley 23118 (GH), Renson 225 (NY); Tonacatepeque, Standley 19491 (GH). SANTA ANA: Metapán, Carlson 747 (F), 796 (F). SAN VINCENTE: San Vincente, Standley and Padilla 3782 (F). SONSONATE: Izalco, Standley 21862 (US); Sonsonate, Standley 22322 (US). Without Precise Locality: Renson 337 (NY).

GUATEMALA: ALTA VERAPAZ: Pancajché, Standley 70631 (F); San José, Standley 69661 (F); Secanquim, Cook and Griggs 304 (US), Pittier 188 (US,NY), Maxon and Hay 3183 (US,NY); Tactic, Standley 90393 (F); Cobán, Tuerckheim 1137 (GH). BAJA VERAPAZ: Patal, Standley 90964 (F). CHIQUIMULA: Concepción, Pittier 1894 (US);

Quezaltepeque, Steyermark 31415 (F). EL PETÉN: La Libertad, Aquilar 392 (MO,NY), Lundell 3737 (NY); Yaloch, Bartlett 12853 (US), 12857 (US); without precise locality, Lundell 3432 (F). EL QUICHÉ: Sacapulas, Standley 62531 (F); San Siguan, Heyde and Lux 2905 (GH, MO,NY); without precise locality, Aquilar 1150 (F). ESCUINTLA: San José, Standley 64051 (F); Río Guacalate near Escuintla, Standley 89308 (F); without precise locality, Tonduz and Rojas 59 (US), Seler 2572 (GH,NY). GUATEMALA: Guatemala, Standley 62977 (F); Amatitlán, Smith 1880 (GH); without precise locality, Kellerman 4587 (US), Morales 621 (US), Smith 1881 (US). HUEHUETENANGO: Puente El Aquilar, Standley 81427 (F); between San Rafael Pétzal and Colotenango, Steyermark 50544 (F); without precise locality, Seler 2996 (GH,NY). IZABAL: Quebradas, Blake 7532 (US); Quiriguá, Standley 23814 (GH), Steyermark 38314 (F); Murcielago, Lake Izabal, Popenoe 6 (F); Puerto Barrios, Standley 73105 (F). JALAPA: Jalapa, Standley 76491 (F), Steyermark 32082 (F). QUEZALTENANGO: Aguas Amargas, Standley 65398 (F); Santa María de Jesús, Standley 84849 (F). RETALHULEU: San Andres, Smith 1482 (F,NY); Retalhuleu, Standley 88325 (F). SACATEPEQUEZ: Mazatenango, Kellerman 5141 (US). SAN MARCOS: Slope of Volcán Tajumulco near El Porvenir, Steyermark 37721 (GH); between Ocós and Ayutla, Steyermark 37897 (F). SOLOLÁ: Patalul, Kellerman 5807 (US). AZCAPA: Gualan, Deam 301 (GH,NY). Without Precise Locality: Hedge 52/262 (F,US), Tonduz 656 (US,NY), Ruano 318 (US), Deam 6058 (MO,NY).

HONDURAS: Atlántida: Tela, Mitchell 104 (F), Standley 53532 (F), Standley 55171 (F), Van Severén 74 (US); Isla Roatán, Gaumer 126 (F); La Ceiba, Yuncker, Koepper and Wagner 8307 (GH,MO,NY). COMAYAGUA: Siguatepeque, Yuncker, Dawson and Youse 5743 (F,MO); Lake Yojoa, Kamb 2152 (GH); Ajuterique, Rodriquez 2605 (F). CORTES: Potrerillos, Yuncker 4891 (F,MO). EL PARAISO: Quebrada del Ingenio de los Angeles, Williams and Molina 12040 (F), 11205 (F). FRANCISCO MORAZÁN: Tegucigalpa, Moldenke 19814 (NY); Morazán, Molina 316 (F,MO); San Antonio de Oriente, Standley 21075 (F); El Zamorano, Williams and Molina 10456 (F,MO), Standley 16032 (F), 284 (F), Rodriquez 607 (F); Río Capa Rosa, Williams and Molina 12700 (F,MO); Pedregal, Glassman 1691 (F,NY), Molina 112 (F); Río de la Orilla, Rodriquez 816 (F); without precise locality, Rodriquez 76 (F), 518 (F), 607 (F). OLANCHO: Juticalpa, Standley 18031 (F). SANTA BARBARA: San Pedro Sula, Thieme 5126 (GH, NY), 5128 (GH). SWAN ISLANDS: Nelson 92 (GH) 9 (F).

MEXICO: CHIAPAS: Siltepec, Matuda 15616 (F), 4357 (F,NY), 4420 (F), 1575 (GH,US,MO,NY); between Mazapa and Motozintla, Matuda 4817 (NY); Escuintla, Matuda 16076 (F), 1800 (NY); Tuxtla, Seler 1947 (GH); Palenque, Matuda 3809 (GH); Tonalá, Matuda 17150 (NY,F); Mazapa, Matuda 4817 (GH). COLIMA: Colima, Orcutt 4561 (F,MO), Palmer 1140 (GH,NY). GUERRERO: Atoyac, Matuda 1468 (GH,MO,NY); Chilapa, Ortega 6195 (GH); Iguala, Rose, Painter and Rose 9420 (US). HIDALGO: Tamazunchale, Clark 7018 (MO); Huejutla, Seler 897 (GH); Molango, Moore 2990 (GH); Jacala, Moore 2879 (GH). JALISCO: San Sebastian, Mexia 1443 (MO,NY); Zapotlan, Pringle 4376 (F,MO,NY), Tuxpan, Purpus 491 (US,MO); La Palma, Jones 49 (US,MO); Santa

Cruz, Jones 50 (US). MEXICO: Temascalapa, Hinton 5893 (GH,MO), 3180 (GH), 4332 (US). MICHOACÁN, Uruapan, King and Soderstrom 4899 (NY). NAYARIT: Aguacatlan, Gregg 926 (MO); Marie Madre Island, Malthy 151 (US,NY), Nelson 4262 (F), 4233 (GH), Mason 1776 (F), Solis 13 (US); Acaponeta, Rose 1471 (GH,NY); Tepic, Jones 22948 (GH), Mexia 582 (GH,MO). NUEVO LEON: Galeana, Hinton 14724 (GH,NY). OAXACA: Uberto, Williams 9373 (F); Fochutla, Conzatti 3206 (US); Choapam, Mexia 9207 (NY,F,MO); without precise locality, Galeotti 4624 (US). SAN LUIS POTOSI: Tamazunchall, Clark 7018 (NY); Tamasopo, Pringle 3516 (F). SINALOA: Colomas, Rose 1700 (US); Villa Unión, Rose, Standley and Russell 13899 (F,MO,NY); San Ignacio, Montes and Salazar 302 (US), 353 (US), 753 (US); San Blas, Rose, Standley and Russell 13379 (US,NY); Guadalupe, Rose, Standley and Russell 14761 (US,NY). SONORA: Alamos, Rose, Standley and Russell 13098 (US). Tabasco: San Juan Bautista, Rovirosa 23 (NY); Balancán, Matuda 3058 (F,NY); without precise locality, Rovirosa 297 (US). TAMAULIPAS: Gomez Farias, Palmer 316 (F,NY) 340 (US). VERA CRUZ: Orizaba, Muller 3011 (NY), 839 (NY), Botteri 232 (F), Botteri and Lumichrast 1580 (US), Bourgeau 2444 (GH); Tezonapa, Orcutt 3111 (F,MO); Jalapa, Pringle 7767 (F,MO), Smith 1443 (MO); Zacaulpan, Hedges 2958 (F), Purpus 12023 (US), 15301 (US), 2958 (US,MO,NY), 17129 (GH); Nogales, Matuda 1176 (GH,MO,NY); San Francisco near Veracruz, Smith 1443 (GH); Cordoba, Bourgeau 1952 (GH), 2528 (GH,F); without precise locality, Muller 4136 (NY); Papanula, Seler 3638 (GH,US); Teocelo, Goldman 683 (US). YUCATAN: Chichen Itzá, Steere 1324 (NY); Mérida, Schott 500 (F), 91 (F); Píste, Steggerda 41 (F); El Paso, Lundell 1525 (GH,NY); Izamal, Gaumer 484 (NY,F,MO); Kancaboonot, Gaumer and Sons 23591 (F); Suitun, Gaumer and Sons 23367 (F,MO,NY); Tuxpeña, Lundell 1179 (F); without precise locality, Gaumer 24102 (F,US,MO), 24010 (US,F). Without Precise Locality: Kerber 390 (US), Conzatti 3093 (US), 3542 (US), Mexia 1443 (GH), Coulter 659 (GH).

NICARAGUA: CARAZO: Jinotepe, Standley 8476 (F). CHINANDEGA: Chinandega, Baker 48 (GH,MO,NY), 816 (US). ESTELÍ: Estelí, Standley 20291 (F). JINOTEGA: Las Mercedes, Standley 10609 (F). LAKE NICARAGUA: Omotepe Island, Shimek and Smith 39 (F). MANAGUA: El Crucero, Standley 8144 (F); Managua, Garnier A1304 (F), Maxon, Harvey and Valentine 7490 (US); Casa Colorado, Maxon, Harvey and Valentine 7358 (GH), 7425 (US). MATAGALPA, Cordillera Central, L. and T. Williams 25042 (NY). ZELAYA: between El Recreo and El Pijibaye, Standley 19880 (F); Isabel, Molina 2489 (F); La Crúz, Molina 2360 (F), Grant 974 (F). Without Precise Locality: Chaves 316 (US).

PANAMA: BOCAS DEL TORO: Chiriquí Lagoon, Wedel 2691 (MO), 1309 (GH,MO). CANAL ZONE: Las Cruces Trail, Hunter and Allen 752 (MO); Miraflores, White 122 (MO), 120 (MO,NY); Curundu, Tyson 1055 (MO); Río Cocoli, Stearn, Chambers, Dwyer and Ebinger 304 (MO); Gatún, Lewis, MacBryde and Oliver 1814 (MO), Hayes 1035 (NY), 922 (NY); Fort Kobe Road, Woodson, Allen and Seibert 1426 (F,MO,NY), 1425 (MO,NY,F); Gamboa, Heriberto 88 (GH,NY), Standley 28348 (US); Barro Colorado Island, Ebinger 642 (MO), Shattuck 476 (MO), Aviles 888 (F),

921 (F), 57 (F), Wetmore and Abbe 178 (F), 177 (F), Bailey 575 (GH); Ancon Hill, Woodson, Allen and Seibert 1324 (GH,NY), Culebra, Pittier 2092 (US), 2218 (US); Summit, Woodson, Allen and Seibert 766 (GH,MO,NY), Standley 25672 (US); Mamei Hill, Pittier 3796 (US); Darién Station, Standley 31642 (US); Juan Mina, Piper 5688 (US); Obispo, Standley 31773 (US); Empire to Mandinga, Piper 5480 (US); Red Tank, Maxon and Harvey 6578 (US,NY); Balboa, Standley 25526 (US); without precise locality, Lindsay 248 (US), Ebinger 304 (MO). CHIRIQUÍ: Boquete, Davidson 611 (F,MO); Cerro Vaca, Pittier 5323 (F,GH,NY); Bajo Chorro, Woodson and Schery 682 (US). COCLÉ: El Valle de Antón, Allen 3705 (MO,NY); Club Campastre, Duke 13265 (NY); La Pintada, Hunter, and Allen 581 (US). DARIÉN: Cerro Campana, Duke 8638 (NY); El Real to Pinogana, Duke 5130 (MO); Tuira, Stearn, Chambers, Dwyer, Ebinger 143 (MO); Ilsa Boca Grande, Duke 8845 (MO); without precise locality, Macbride 2699 (F). LOS SANTOS: Loma Prieta, Duke 11796 (NY), Lewis, Baker, MacBryde and Oliver 2215 (MO); Macaracas, Lewis, MacBryde, Oliver and Ridgway 1609 (MO). PANAMÁ: Chepo, Hunter and Allen 91 (MO); El Llano, Tyson 1740 (MO); Rio Mamoni beyond Chepo, Duke 5581 (MO), 5579 (MO); Bejuco, Duke 4563a (MO); Chilibre, Dwyer 1016 (MO); Bella Vista, Piper 5370 (US), Heriberto 221 (US); near Tapía River, Juan Días region, Maxon and Harvey 6760 (US,NY); Panamá, Maxon, Harvey and Valentine 7085 (US, NY); Sabanas, Brother Paul 21 (US), 40 (US). VERAGUAS: Santiago, Duke 12362 (NY), 12370 (NY); Piria, Duke 14433 (NY); Las Palmas, Standley 33189 (US); La Hondura, Standley 37599 (US); La Verbena, Standley 32282 (US). Without Precise Locality: Woodson and Schery 545 (F), Williams 536 (NY).

ARGENTINA: CATAMARCA: La Merced, Lorenty and Hieronymas 1234 (F); Andalgalá, Jörgensen 1558 (GH,MO). CHACO: Fontana, Meyer 2016 (F). CORRIENTES: General Paz, Shwarz 252 (NY); Esquina, Rodrigo 955 (NY); Empedrado, Pederson 4575 (US), Ibarrola 3061 (NY); Mburucuyá, Pederson 1329 (US,MO,NY), Burkart 19410 (US); without precise locality, Ibarrola 898 (US). ENTRE RÍOS: Victoria, Burkart 8737 (F,NY). FORMOSA: Formosa, Jörgensen 2383 (GH,MO), Eyerdam and Beetle 22989 (GH). JUJUY: Jujuy, Moldenke 19752 (NY). MISIONES: Posadas, Ekman 1515 (MO), 1518 (NY). SALTA: Mostan, O'Donnel 2587 (NY); Guachipas, Meyer 3590 (NY); Alemania, Meyer 3590 (GH), Venturi 9907 (GH,NY); Coronel Moldes, Meyer 3589 (GH); without precise locality, Venturi 3768 (US), 9907 (US,MO), 9909 (US). SANTA FE: Orillas Parana Mini, Meyer 2764 (NY); Reconquista, Parodi 11127 (F). SANTIAGO DEL ESTERO: Without precise locality, Venturi 5840 (US). TUCUMÁN: Capital, Meyer 3916 (NY); Pueblo Viejo, Moldenke 19719 (NY); Burruyacú, Venturi 7467 (F); Rio Chico, Meyer 4405 (GH); without precise locality, Lorenty and Hieronymus 1126 (F), Venturi 9051 (GH,MO), 35b (GH), 6138 (GH,MO), 2185 (GH). Without Precise Locality: Meyer 827 (GH,NY).

BOLIVIA: BENI: Rio Chaparé to Rio Mamoré, Werdermann 2233 (MO); Trinidad, Werdermann 2322 (MO). LA PAZ: Mapiri, Buchtein 1260 (US). Bang 1553 (MO). SANTA CRUZ: Lagunillas, Cárdenas 2808 (F); Buena Vista, Steinbach 1468 (GH), 1602 (GH,NY), 1490 (NY); without precise locality, Steinbach 6308 (GH), 2095 (GH), Cárdenas 4704 (US).

Without Precise Locality: Buchtien 757 (F,MO,NY), 394 (US), Rusby 2422 (F), 1441 (NY), 1444 (NY), Brooke 5927 (NY), Bang 2422 (F,MO, NY).

BRAZIL: AMAZONAS: Bõa Vista, Black 51-12661 (NY); Tefé, Pires 1298 (US,NY). DISTRITO FEDERAL: Lagôa Paranoá, Irwin, Souza and Santos 8407 (NY), 9094 (NY); Universidade de Brasília, Irwin, Souza and Santos 8702 (NY); Córrego Landím, Irwin, Souza and Santos 11350 (NY). GOIÁS: Serra do Caiapó, France and Silva 59466 (NY); Corumba de Goias, Irwin, Souza and Santos 10797 (NY); without precise locality, Gardner 3002 (GH). MATTO GROSSO: Sao Luiz de Cáceres, Hoehne 4079 (NY), 4364 (NY); Jaraguary, Archer 181 (NY); without precise locality, Moore 475 (NY). MINAS GERAIS: Vicosa, Mexia 4174a (GH), Irwin 2679 (GH), 2050 (US); Uberaba, Regnell 259 (US); Belo Horizonte, Magalhaes (US); without precise locality, Regnell 260 (US), Claussen 69 (NY). PARÁ: Boa Vista on Tapajós River, Dahlgren and Sella 196 (F). PARANÁ: Ponta Grossa, Dusen 2491 (NY); Curitiba, Dusen 2266 (NY). RIO DE JANEIRO: near Rio de Janeiro, Glaziou 18131 (US). RIO GRANDE DO SUL: Santo Ângelo, Lindman 1149 (GH); Montenegro, Rambo 52190 (US). SANTA CATARINA: Canoinhas, Smith and Reitz 8602 (US); Mafra, Smith and Reitz 10671 (US), Reitz 5290 (US); Cacador, Smith and Reitz 11037 (US); Porto Uniao, Smith and Reitz 10831 (US). Without Precise Locality: Macedo 1178 (US), Rambo 51533 (US), Gardner 2475 (GH,NY).

BRITISH GUIANA: Kanuku Mts., Smith 3315a (F,NY,MO); Karenambo, Smith 2251 (F,NY).

COLOMBIA: ANTIOQUIA: Medellin, Toro 778 (NY); Fredonia, Archer 508 (US); San Cristóbal, Barkley, Klare and Antila 2 (US); Dabeiba, Metcalf and Custrecasas 30192 (GH,MO); San Geronimo, Daniel 2279 (NY); Bello, Tomas 581 (US); without precise locality, Tomas 610 (US). ATLÁNTICO: Barranquilla, Elias 1552 (F); Ponedera, Dugard 4706 (US). BOLÍVAR: Boca Verde, Pennell 4221 (NY); Cartagena, Dugand and Jaramillo 3387 (US). CAUCA: Popayán, Cuatrecasas 13853 (NY), Arbeláez and Cuatrecasas 5803 (F); Tambo, Sneidern 416 (F,NY), CUNDINAMARCA: Quetane, Pennell 1866 (GH,NY); Tequedama, Haught 6476 (US); Facatatíva, Arbeláez and Cuatrecasas 5294 (US). MAGDALENA: Santa Marta, Smith 1624 (MO); 2620 (NY), 1624 (NY); El Banco on road to Chimichagua, Haught 2224 (F); Jugua, Haught 3598 (US); Becerril, Haught 3665 (US); Valledupar, Angel 707 (US). META: Villavicencio, Schiefer 722 (GH), Pennell 1383 (US,NY), Haught 2481 (US); Macarena Mts., Idrobo and Schultes 901 (US). NARIÑO: Pasto, Fosberg 21258 (US,NY). NORTE DE SANTANDER: Charta, Killip and Smith 19114 (NY), 19248 (NY); Suratá, Killip and Smith 16839 (NY); Sarare, Cuatrecasas, Schultes and Smith 12177 (F); Cúcuta, Killip and Smith 20993 (GH); Pamplona, Killip and Smith 20553 (GH,NY); Santiago, Molina and Barkley 18NS096 (US), 18NS107 (US). PUTUMAYO: Mocoa, Cuatrecasas 11382A (US). SANTANDER: Bucaramanga, Killip and Smith 16237 (F,NY); El Roble, Killip and Smith 19348 (GH,NY); between Surata and California, Killip and Smith 16839 (GH); Málaga, Cuatrecasas and Barriga 9850 (US,F). TOLIMA: Líbano, Pennell 3324 (GH,NY); Chicoral, Haught 6362 (US); Aquadita, Javier 23 (US).

VALLE DEL CAUCA: Río Sanquininí, Naranjal, Cuatrecasas 15357 (NY); Río Sanquininí, La Laguna, Cuatrecasas 15478 (NY); Potredillo to Miraflores, Pennell and Killip 6066 (NY); Cuchilla, east of Zarzal, Pennell, Killip and Hazen 8527 (NY), Arbeláez and Cuatrecasas 6402 (US). Without Precise Locality: Cuatrecasas 4489 (F), 19474 (GH), Brother Apolinar-Maria 121 (F), Garcia 3046 (US), 4456 (US).

ECUADOR: GALÁPAGOS ISLANDS: Academy Bay, Schimpff 32 (MO); Albemare Island, Villamit, Stewart 1520 (F,MO,NY); Iquana Cove, Snodgrass and Heller 67 (GH), 871 (GH), 91 (GH), Stewart 1522 (GH), Tagus Cove, Snodgrass and Heller 221 (GH), 902 (GH), Howell 9555 (GH), Stewart 1521 (GH); Duncan Island, Stewart 1528 (GH); Indefatigable Island, Svenson 58 (F), 149 (GH), Stewart 1529 (GH), 1531 (GH), 1530 (GH), Howell 9039 (US); Chatham Island, Stewart 1527 (GH), Baur 1 (GH); Charles Island, Baur 2 (GH), Stewart 1525 (GH), 1526 (GH); James Island, Stewart 1532 (GH); Abingdon Island, Snodgrass and Heller 849 (GH). GUAYAS: Guayaquil, Mille 19 (NY); Manglaralto, Svenson 11464 (NY).

PARAGUAY: CAAGUAZÚ: Igatimí, Hassler 5477 (F,NY). CONCEPCIÓN: Concepción, Hassler 7176 (F,NY), 7610 (GH,NY); between Río Aquidabán and Apa, Fiebrig 4568 (GH). CORDILLERA: Altos, Fiebrig 60 (F), Hassler 12623 (GH,MO,NY). FEDERAL DISTRICT: Asunción, Malme 854 (US), Lindman 1069 (US), Burkart 18543 (US). SAN PEDRO. Alto Paraguay, Woolston 1653 (NY). Without Precise Locality: Jórgensen 4131 (F,GH,NY,MO), Morong 815 (F,MO,NY), 829 (F,MO,NY), 729 (GH,MO,NY), Lindman 1903 (NY), Hassler 11895 (GH,MO,NY), 7169 (NY), 4733 (NY), 6198 (NY), 1206 (NY).

PERU: AYACUCHO: Huanta, Killip and Smith 23195 (US,NY). CUZCO: Yanaoca, Macbride 3758 (GH); Quillabamba, Marin 7650 (US). HUÁNUCO: Monzón, Woytkowski 5315 (GH,MO); Pampayacu, Kanehira 83 (GH), Puna, Woytkowski 5193 (GH,MO), 5246 (GH,MO). JUNÍN, Yaupe, Woytkowski 6363 (MO). LAMBAYEQUE: Purculla to Olmos, Woytkowski 6754 (MO). PASCO: Quillasú, Soukup 3312 (US). SAN MARTÍN: San Roque, Williams 7256 (GH), 7375 (GH); Tarapoto, Williams 5546 (GH), Spruce 4409 (NY). Without Precise Locality: Diehl 2448 (GH), Vasgas 2145 (GH), Weberbauer 6702 (GH), 6710 (GH), Cook and Gilbert 1415 (US).

SURINAM: Without Precise Locality: Hostmann 19 (GH,NY), Sagot 18 (NY).

URUGUAY: RIO NEGRO: without precise locality, Herter 1028 (F, MO,NY).

VENEZUELA: ARAGUA: Colonia Tovar, Pittier 9374 (GH,NY). BARINAS: Santa Catalina, Rusby and Squires 138 (F,MO,NY). BOLÍVAR: Alto Caroni, Sta Elena, Lasser 1342 (NY), 1978 (NY); Upata, Steyermark 57696 (F), 57709 (F). CARABOBO: Valencia, d'Heguert 901 (NY); Puerto Cabello, Pittier 8978 (GH,NY), 9143 (GH,NY); Tocuyeto, Saer 901 (US). DISTRICTO FEDERAL: Naiguata, Williams 10139 (F); Caracas, Eggers 13140 (F), Fernández 193 (US); Sanchorquiz, Pittier 9183 (F,NY). FEDERAL DEPENDENCIES: Margarita Island, Miller and Johnston 151 (F), Bernardi 2656 (NY). FALCÓN: Santa Ana, Steyermark and Braun 94616 (NY). LARA: El Tocuyo, Tamayo 2633 (US); Carora, Lasser 1488 (US). MÉRIDA: Mérida, Breteler 3245 (NY); Tovar, Fendler 14 (GH), Pittier 12827 (US,NY); Timótes, Archer 3141 (US). MIRANDA:

Baruba, Williams 10849 (F); Los Teques, Pittier 6119 (US,NY); El Hatillo, Ginés 230 (US). MONAGAS: Barrancas, Tamayo 1577 (F). TACHIRA: Papacho, Archer 3180 (US), 3181 (US). Without Precise Locality: Fendler 13 (F,MO,NY), Broadway 427 (GH,NY), 682 (GH,NY).

BURMA: BURMA: Myitkynia, Belcher 795 (F), 705 (S); Hkamti Plain near Burma-Tibet border, Ward 9044 (F,BM); Mong Wa, Ward 8777 (F); Walkyi, Meebold 17091 (S); Tenasserim, Helfer 84 (S). SOUTHERN SHAN STATES: Valley of Nam-Live, Ward 8877 (NY); Kangtung, Durie s.n. (BM).

CEYLON: Without Precise Locality: Silva 147 (NY), Simpson 8825 (BM), 8455 (BM), Macras 113 (BM).

CHINA: YUNNAN: Manhoa on Red River, Henry 9532 (NY).

INDIA: ASSAM: without precise locality, Jenkens s.n. (NY); Khasi Hills, Hooker and Thomson s.n. (S). BOMBAY: Bassein Fort, Gupta Ua82 (MO); Poona, Roa 84464 (BM). HIMACHAL PRADESH: Chamba, Koelz 8777 (NY). JAMMU AND KASHMIR: Saidpur near Rawalpindi, Stewart 14742A (GH,NY). MADRAS: Cuddapat, Gamble 18236 (BM); Salem, Yeshoda 211 (GH); Kalhatti, Barnes 1015 (GH). PATIALA AND EAST PUNJAB STATES UNION: Dharameala, Ram 328 (NY), Stewart 2107 (GH); Kangra, Koelz 4374 (F,NY); Kulu, Koelz 3136 (NY). PUNJAB: Mandi, Koelz 8324 (GH,NY); Rampur, Parmanand 352 (NY). UTTAR PRADESH: Dehra Dun, Vaid s.n. (NY), Ravzada 90 (NY), Singh 331 (F,NY,S,MO), Choudbury 5 (US); Gorakhpur, Chandi s.n. (US); Almora, Strachey and Winterbottom 1 (GH), 2 (GH,BM); Gonda, Jain 16856 (S). WEST BENGAL: Bengalia near Calcutta, Helfer 38 (NY,B,S). Without Precise Locality: Stewart 951 (GH,MO,S), Choudbury 4 (GH), Biswas 4772 (US), Stewart 16804 (US), Dudgeon and Kenoyer 140 (MO), Stewart 11034 (MO), 21086 (NY), 1024 (S), Koelz 8807 (NY), Samnasena 5 (NY), Kuriakose s.n. (NY), Thomson 268 (BM), Drummond 1220A (S), Hooker and Thomson s.n. (S), 194 (S).

INDONESIA: BORNEO: NORTH BORNEO: Kota Belud, Darnton 95 (F); Mt. Kinabalu, J. and M.S. Clemens 26193 (BM). CELEBES: Kambaena, Elbert 3357 (GH); Manado, Eyma 3504 (GH); without precise locality, Warburg 1888 (NY). SUMBAWA: Sumbawa, Elbert 3960 (GH). WETAR: Elbert 4673 (GH), 4466 (GH), 4687 (GH).

LAOS: Without Precise Locality: Poilane 20540 (B).

NEPAL: Bhim Khola, Stainton, Sykes and Williams 282 (BM); Kali Gandak, Stainton, Sykes and Williams 89 (BM); Kahre, north of Dana, Stainton, Sykes and Williams 632 (BM); Ghanpoklara, Stainton, Sykes and Williams 5140 (BM); Dikhu Khola, Stainton 4544 (BM); Tamur Valley, Stainton 1286 (BM); Trisuli Valley, Lyon 59 (BM); Chillara, Polunin, Sykes and Williams 1957 (BM); Sitalpati, Polunin, Sykes and Williams 1232 (BM).

PAPUA: Wuroi, Brass 5840 (NY,BM,GH).

PHILLIPPINES: LEYTE: Without Precise Locality: Wenzel 1000 (F), 1303 (F,MO). LUZON: BATAAN: Mt. Mariveles, Lamao River, Borden 21736 (US,NY), 2015 (NY,US), Williams 114 (NY); without precise locality, Borden 2016 (F). BATANGAS: without precise locality: Ramos 1837 (BM,MO). BULACAN: Quingua, Vidal 2069 (GH). CAGAYAN: Dalupiri Island, Bartlett 15110 (F). ISABELA: San Mariano, Ramos and Edaño 47071 (S). LAGUNA: Los Blanos, Gates 7173 (F); without

precise locality, McGregor 23059 (US). MANILA: Loher 1980 (US), 1983 (US), Rogerson 1048 (US). MOUNTAIN: Bontoc, Vanoverbergh 3476 (F); Baguio, Williams 1005 (NY). NUEVA ECIJA: Mt. Umingan, Ramos and Edaño 26283 (US). NUEVA VIZCAYA: Dupax, McGregor 14185 (US). PANGASTINAN: Umingan, Merrill 9 (NY,F,MO,BM). RIZAL: Kay Unguian, Bartlett 15377 (GH), Ramos 21339 (US). SORSOGON: Mt. Bulusan, Elmer 15027 (F,US,S,BM,MO); Trosir, Elmer 15027 (NY). Without Precise Locality: Fénix 28076 (F,MO), Loher 1981 (NY). MINDORO: Mt. Yagaw, Conklin 19134 (GH); Abra de Ilog, Sulit 13801 (GH); Mt. Baco, Merrill 1248 (US), 1249 (US); Baco River, McGregor 196 (US,NY). MINDANAO: COTABATO: Quipatag, Añonuevo 13625 (BM). DAVAO: Mati, Ramos and Edaño 48985 (BM); Mt. Mayo, Edaño 11383 (GH); Davao, Copeland 474 (US,NY). LANAO: Lake Lanao, Clemens 36936-2 (US). SURIGAO: Surigao, Ramos and Pascasio 34427 (GH,BM), Wenzel 2818 (GH,MO); without precise locality, Ramos and Pascasio 34622 (US). ZAMBALES: Anuling, Ramos and Edaño 44571 (BM). ZAMBOANGA: Zamboanga, Robinson 11750 (F); Kabasalan, Ebalo 750 (GH); Dikus, Frake 962 (US). PALAWAN: Aborlan, Sulit 12318 (GH); without precise locality, Bermejos 39771 (US), Escritor 21546 (US). PANAY: CAPIZ: Capiz, Ramos and Edaño 31481 (GH). Without Precise Locality: Cuming 619 (BM,GH), 1613 (BM), 1440 (BM,MO,NY), Merrill 228 (NY).

THAILAND: PRACHULAP KHIRI KHAN: Prachuap Khiri Khan, Put 270 (BM). Without Precise Locality: Kerr 6164 (BM).

ANGOLA: LAUNDA: Dalatando, Gossweiler 4420 (BM). Without Precise Locality: Welwitsch 2311 (BM).

COMORO ISLANDS: Without Precise Locality: Humboldt 205 (BM).

ETHIOPIA: GALLA: Ego, Ellenbeck 361 (B).

KENYA: CENTRAL: Kibwezi, Scheffler 147 (BM). COAST: Changamwe near Mombasa, Mearns 2093 (US), 2223 (US), 2293 (US); Tana River, Polhill and Paulo 575 (S). NYANZA: Elgon, Anderson 45 (S).

MADAGASCAR: Amaborano, White s.n. (BM); Betafo, Viguier and Humbert 1403 (B); Moramanga, Afzelius s.n. (S); Majunga, Afzelius s.n. (S); without precise locality; Afzelius s.n. (S), Bojer s.n. (B), Baron 2393 (BM).

MAURITIUS: Without Precise Locality: Ayres s.n. (NY), Bojer s.n. (B).

MOZAMBIQUE: NIASSA: Cabo Delicado, Macondes, Correia 78 (MO). SUL DO SAVE: Massinga, Mondonca 34 (BM).

PORTUGUESE EAST AFRICA: Meringua, Chase 29405 (NY).

RUANDA-URUNDI: Usumbura, Peter 31402 (B), 18539 (B), 18478 (B), 16686 (B), 13226 (B), 39416 (B), 39352 (B), 22174 (B), 20621 (B), 18478 (B).

SOUTHERN RHODESIA: UMTALI: Maranka Reserve, Chase 4762 (MO). Without Precise Locality: Wild 5398 (MO).

TANZANIA: EASTERN: Pangani, Faulkner 675 (S); Morogoro, Schlieben 2888 (S,B); Tanga, Peter 24068 (B), 23800 (B); Lushoto, Drummond and Hensley 2115 (S). NORTHERN: Kilimanjaro, Volkens 1958 (BM). SOUTHERN: Lindi, Carnochan 191 (GH,BM); Hahenge, Schlieben 2271 (B). TANGA: Magogoni, Tanner 3327 (NY); Karoti, Tanner 2938 (NY); Mji Mkuu, Tanner 2070 (NY); Sawa, Faulkner 3631 (S), 3717 (S).

ZANZIBAR: Without Precise Locality: Taylor s.n. (BM).

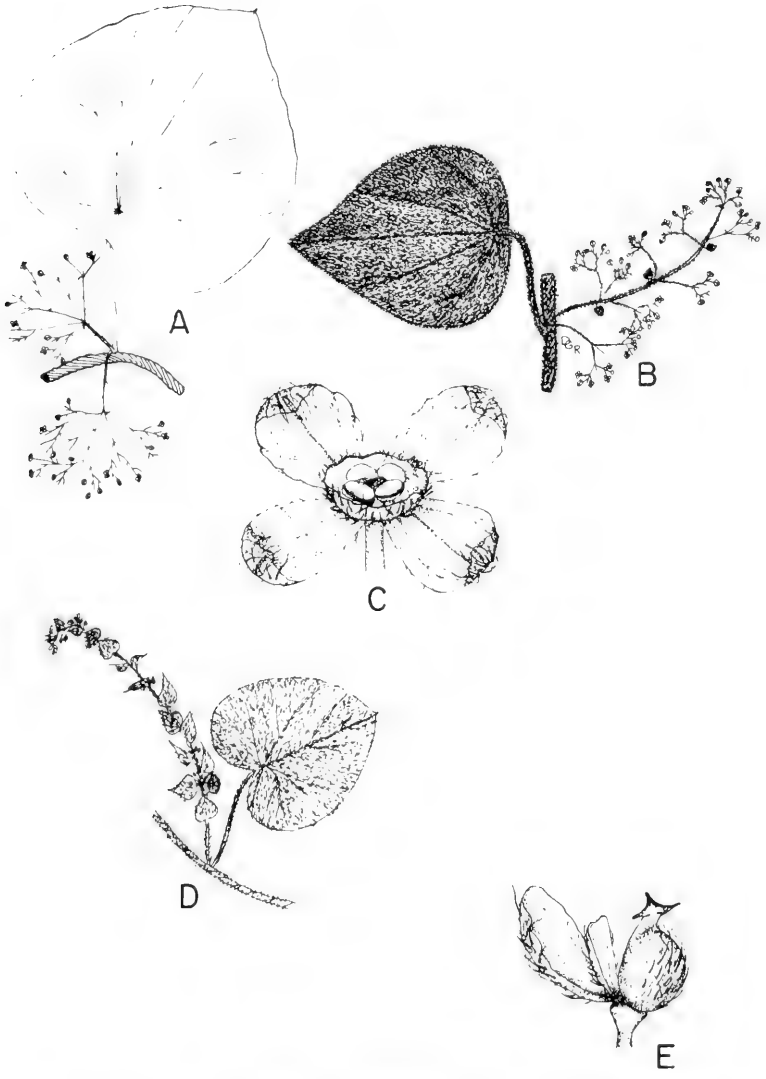

Figure 11. Cissampelos pareira L. A: Cymose staminate inflorescences and glabrous leaf, X 1/2; B: Racemiform staminate inflorescence and pubescent leaf, X 1/2; C: Staminate flower, X 15; D: Pistillate inflorescence and leaf, X 1/2; E: Pistillate flower, X 15.

Cissampelos pareira occurs as a suffrutescent twiner or scrambler and usually is found on hedges, at the forest edge, or in open thickets, although numerous other ecological niches are utilized. Flowering specimens have been collected each month of the year, but the peak period is between January and July.

Venacular names include "peteltum" from Mexico, "alcotan" from Central America, "puro del cura" and "velvet wiss" from the West Indies, and "calaad", "kelulut" or "gleknat" from Asia. Other more widespread venacular names include "false pareira brava", "ice-vine", "portuguese wild olive", "pareira brava", "velvet leaf", and "wild vine".

The heterogeneous nature of the species has led to numerous synonyms. Many of these delimitations were based on isolated collections or fragmentary specimens, but even with adequate material the species presents a difficult task for the taxonomist.

11. Cissampelos mucronata A. Rich. in Guill. and Perr. Fl. Seneg. 11. 1831 (Type: Perrottet 12!) (Figure 12).

Cissampelos aristolochiaefolius Fenzl, in Flora 27:312. 1844 (Type: Kotschy 504).

Cissampelos apiculata Hochst. in Flora 28:93. 1845, ex char. (Type: Krauss 232).

Cissampelos vogelii Miers, in Hook. Fl. Nig. 214. 1849 (Type: Vogel 97).

Cissampelos comata Miers, in Hook. Fl. Nig. 215. 1849, ex char.

Cissampelos macrostachya Klotzsch, in Peters' Reise to Mossamb. 1:174. 1862 (Type: Peters s.n.).

Cissampelos senensis Klotzsch, in Peters' Reise to Mossamb. 1:173. 1862.

Cissampelos zairensis Miers, in Ann. Nat. Hist. ser. 3. 27:180. 1866, nom. nud.; in Contrib. Bot. 3:180. 1871 (Type: Smith s.n.).

Cissampelos pareira L. var. reniformis Welw. ex Hiern. Cat. Afr. Pl. Welwitsch 1:19. 1896 (Type: Welwitsch 2314).

Cissampelos pareira L. var. deglabrescens Welw. ex Hiern. Cat. Afr. Pl. Welwitsch 1:19. 1896 (Type: Welwitsch 2312).

Cissampelos pareira L. var. mucronata Dur. and Schinz, in Consp. Fl. Afr. 1. 2:51. 1898.

Cissampelos pareira L. var. macrostachya Dur. and Schinz, in Consp. Fl. Afr. 1. 2:51. 1898.

Cissampelos pareira L. var. senensis Dur. and Schinz, in Consp. Fl. Afr. 1. 2:51. 1898.

Cissampelos pareira L. var. zairensis Dur. and Schinz, in Consp. Fl. Afr. 1. 2:52. 1898.

Cissampelos pareira L. var. pachyphylla Diels, in Engl. Pflanzen. 4(94):301. 1910.

Suffrutescent twiners to 2 m; stems striate, pilose to tomentose. Leaves petiolate, basifixed or obscurely peltate, broadly ovate to cordate, rarely suborbicular or reniform, entire, the apex acute to obtuse, rarely rounded or emarginate, mucronate, the base cordate to truncate, (2.0-)5.8(-10.0) cm long, (2.5-)5.4 (-8.5) cm wide, membranous to subcoriaceous, palmately 5- to 7-nerved, puberulent to pilose above, rarely glabrous, paler below and densely pilose to tomentose; petioles (1.0-)2.5(-5.5) cm long, tomentose or rarely pilose. Staminate inflorescence multi-flowered fasciculate dichasia arranged in an ebracteate racemiform manner to 30 cm in length or as cymose clusters axillary from normal leaves or rarely cymose clusters within the axils of reduced leaves or bracts of secondary axillary branches; 1-4 dichasia per fascicle; peduncle of cymes at length 1 cm long, tomentose; bracts of secondary branches basifixed, petiolate to 3 mm, broadly ovate to cordate, entire, 6-12 mm long, 4-12 mm wide, membranous, pilose above, densely pilose below; bracteoles linear, about 0.5 mm long, pilose. Staminate flowers pale yellow or whitish: sepals 4, rarely 5, obovate or rarely elliptic, (0.9-)1.3(-1.5) mm long, (0.5-)0.7 (-1.0) mm wide, exteriorly pilose; corolla cupuliform, 0.5 mm high, 1.0 mm in diameter, or patelliform, (0.6-)0.9(-1.2) mm in diameter, rarely 2-lobed, glabrous or the exterior sometimes puberulent; synandrium sessile to 0.1 mm high, anthers (6-)8(-9), glabrous. Pistillate inflorescence composed of individual flowers fasciculate in the axils of bracts upon racemiform secondary axillary branches to 18 cm; 5-12 flowers per fascicle; bracts basifixed, sessile or petiolate to 3 mm, ovate to reniform, entire, mucronate, (3-)10.3 (-18) mm long, (3-)10.9(-21) mm wide, membranous, pilose above, densely pilose below. Pistillate flowers: sepal 1, obovate, (1.1-) 1.4(-1.7) mm long, (0.7-)0.9(-1.0) mm wide, exteriorly pilose; petal 1, broadly ovate, suborbicular, reniform or deltoid, (0.5-)0.6(-0.7) mm long, (0.6-)0.8(-1.0) mm wide, glabrous or the exterior puberulent to pilose; carpel 1, slightly gibbose, (0.5-)0.9(-1.2) mm long, sessile, pilose, rarely glabrous; stigma 5-lobed or the lobes quite reduced. Drupe obovoid, (4-)4.3(-6) mm long, (3-)3.5(-5) mm wide, puberulent to pilose; fruiting stalk (1-)1.5(-3) mm long.

Africa.

ANGOLA: BENGUELA: Benguela, Anchieta 81 (BM). Without Precise Locality: Gossweiler 2330 (MO).

BELGIAN CONGO: KATANGA: Baudouinville, Robyns 2257 (MO). KIVU: Kabare, Troupin 5552 (NY); without precise locality, Humbert 8187 (B). Without Precise Locality: Michel and Reed 423 (MO), Germain 3288 (MO), Louis 4886 (BM).

FRENCH WEST AFRICA: SENEGAL: Dakar, Baldwin 5747 (US); without precise locality, Sieber 39 (S). SOUDAN: Koutiala, Roberty 13342 (MO).

KENYA: Nairobi, Dummer 1789 (BM).

NIGERIA: NORTHERN: Abinsi, Dalziel s.n. (MO,BM).

MOZAMBIQUE: MANICA E SOFALA: Chimoio, Mendonca 265 (BM); without precise locality, Torre and Paiva 9070 (MO). ZAMBEZIA: Mocuba, Faulkner 300 (S). Without Precise Locality: Thompson 5 (MO), Chase 2781 (MO).

RHODESIA AND NYASALAND: NORTHERN RHODESIA: Namwala, White 2980 (MO); Mwinilunga, Milne-Redhead 2826 (BM); Ndola, Angus 916 (MO,BM); Barotse, Codd 7449 (BM); Kalomo, Rogers 26011 (S). NYASALAND: Bandawe, Jackson 998 (BM); Zomba, Whyte s.n. (GH,NY); Mwanza River, Brass 17997 (US,MO,NY), 18011 (US,MO,NY); Karonga, Whyte 325 (US); Kyimbila, Stolz 382 (US,BM,S,MO); without precise locality, Stolz 1871 (MO,B,S), Buchanan 115 (US,BM), 153 (BM). SOUTHERN RHODESIA: Shangani, Goldsmith 81/56 (S); Victoria, Monro 1344 (BM), 1352 (BM); Umtali, Fries, Norlindh and Weimarck 2921 (BM,S), Chase 123 (BM); Nakomi, Fries, Norlindh and Weimarck 3338 (S), 3389 (BM,S), 3279 (BM,S); Matopos, Gibbs 243 (BM), Wall s.n. (S); Salisbury, Godman 161 (BM), Lyles 1878 (MO); Sinoia, Rand 310 (BM); Nyamandhlovu, Plowes 1750 (S); Ndanga, Goodier 31 (MO); Que Que, Biegel 502 (MO); Chipinga, Soane 271 (MO); Zimbabwe, Leach and Chase 10568 (MO,BM); Kondoa Irangi, Burtt 703 (MO).

RUANDA-URUNDI: Usumbura, Peter 3885d (B); Biumba, Troupin II.731 (GH,MO), II.763 (GH,MO), 8012 (NY), 8063 (NY).

SOUTHWEST AFRICA: Lisikili, Codd 7105 (BM); without precise locality, Dinter 5257 (GH).

TANZANIA: Tanga, Peter 24870 (B); Ujiji, Peter 36879 (B); Pare, Peter 10777 (B), 14252 (B); Mahenge, Schlieben 2271 (S,BM); Lindi, Carnochan 191 (GH); Mpanda, Jefford and Juniper 21 (MO); Kigoma, Newbould and Harley 4332 (MO), 4330 (MO); Bwiru, Tanner 671 (NY); Ulugurus, Bruce 1053 (BM).

TOGO: Without Precise Locality: Warneke 263 (B,BM), 338 (BM).

UGANDA: Entebbe, Mearns 2579 (US); Tororo, Bagshawe 1246 (US); Kibwezi, Scheffler 147 (S); Bunvoro, Taylor 3346 (S); Kampala, Wall s.n. (S); Ruwenzari Mt., Elliot 8399 (BM), 7321 (BM); without precise locality, Dummer 282 (US,MO).

UNION OF SOUTH AFRICA: TRANSVAAL: Pietersburg, Rogers and Moss 59 (US); Barberton, Stolz 1841 (MO,BM), Rogers 18224 (S). CAPE OR GOOD HOPE: Capetown, Bolus 7634 (MO). NATAL: Hlabisa, Wells 2114 (MO); Port Natal, Krauss 232 (MO). Without Precise Locality; Schlechter 3071 (BM,S), Wood 632 (BM).

ZANZIBAR: Kisimbani, Faulkner 3123 (S).

Cissampelos mucronata is collected often in open areas, sometimes in association with termite mounds.

The species is known as "chipomba-folia" in Mozambique, "umuhanda" in Ruanda-Urundi, and "chilambe" in Nyasaland.

The most distinguishing characters include the extensive amount of pubescence on the foliage, the eight anthers present in the staminate flower, and the five lobed stigma of the pistillate flower.

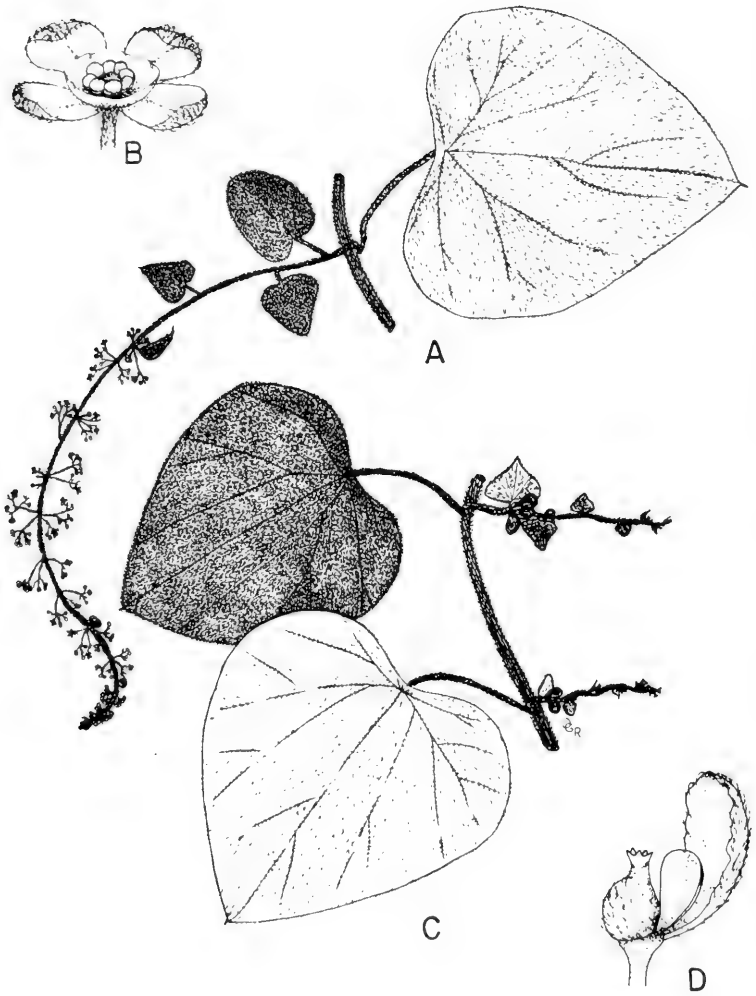

Figure 12. Cissampelos mucronata A. Rich. A: Staminate inflorescence and leaf, X ½; B: Staminate flower, X 15; C: Pistillate inflorescences and leaves, X ½; D: Pistillate flower, X 15.

12. Cissampelos tenuipes Engl. in Bot. Jahrb. 26:399. 1899 (Type: Pogge 618!) (Figure 13).

Twiners, sometimes rooting at the nodes; stems striate, glabrous. Leaves petiolate, peltate to 14 mm, suborbicular, the apex rounded, frequently emarginate, mucronate, the base truncate to slightly rounded, 2.5-7.5 cm long, 4.0-10.5 cm wide, membranous, palmately 10- to 12-nerved, prominent below, glabrous, paler below and sometimes glaucous; petioles 4-8 cm long, glabrous. Staminate inflorescence not seen. Pistillate inflorescence a racemiform secondary branch; bracts basifixed, sessile, suborbicular, entire, mucronate, at length 1.8 cm long, 2.0 cm wide, membranous, glabrous. Pistillate flowers not seen. Drupe red, obovoid, conspicuously ridged, 5 mm long, 4 mm wide, glabrous.

Africa.

BELGIAN CONGO: KATANGA: Lulua River, Pogge 618 (B). Without Precise Locality: Callens 3477 (BM).

A species which is distinguished by the glabrous and conspicuously peltate leaves.

13. Cissampelos owariensis P. Beauv. ex DC. Prodr. 1:100. 1824 (Type: Beauvois s.n.!) (Figure 14).

Cissampelos insolita Miers, in Ann. Nat. Hist. ser. 3. 27:136. 1866, nom. nud.; in Contrib. Bot. 3:179. 1871 (Type: Mann 1870).

Cissampelos hirta Miers, in Ann. Nat. Hist. ser. 3. 27:136. 1866, nom. nud.; in Contrib. Bot. 3:179. 1871 (Type: Smith s.n.).

Cissampelos pareira L. var. owariensis (Beauv.) Oliv. in Fl. Trop. Afr. 1:46. 1868.

Cissampelos owariensis Beauv. var. asperifolia Welw. msc. ex Hiern, Cat. Afr. Pl. Welw. 1:19. 1896 (Type: Welwitsch 2313).

Cissampelos macrosepala Diels, in Bot. Jahrb. 43:326. 1909 (Types: Mildbraed 2952, 2990).

Cissampelos insignis Alston, in Kew Bull. 362. 1925 (Type: Stolz 1600!).

Cissampelos robertsonii Exell, in Journ. Bot. 64:192-193. 1926. (Type: Robertson 27).

Suffrutescent twiners; stems striate, glabrous to pilose or sometimes sericeous. Leaves petiolate, conspicuously peltate to 17 mm, ovate to suborbicular, frequently obscurely 3-lobed, entire to undulate, the apex acuminate to obtuse, rarely emarginate or

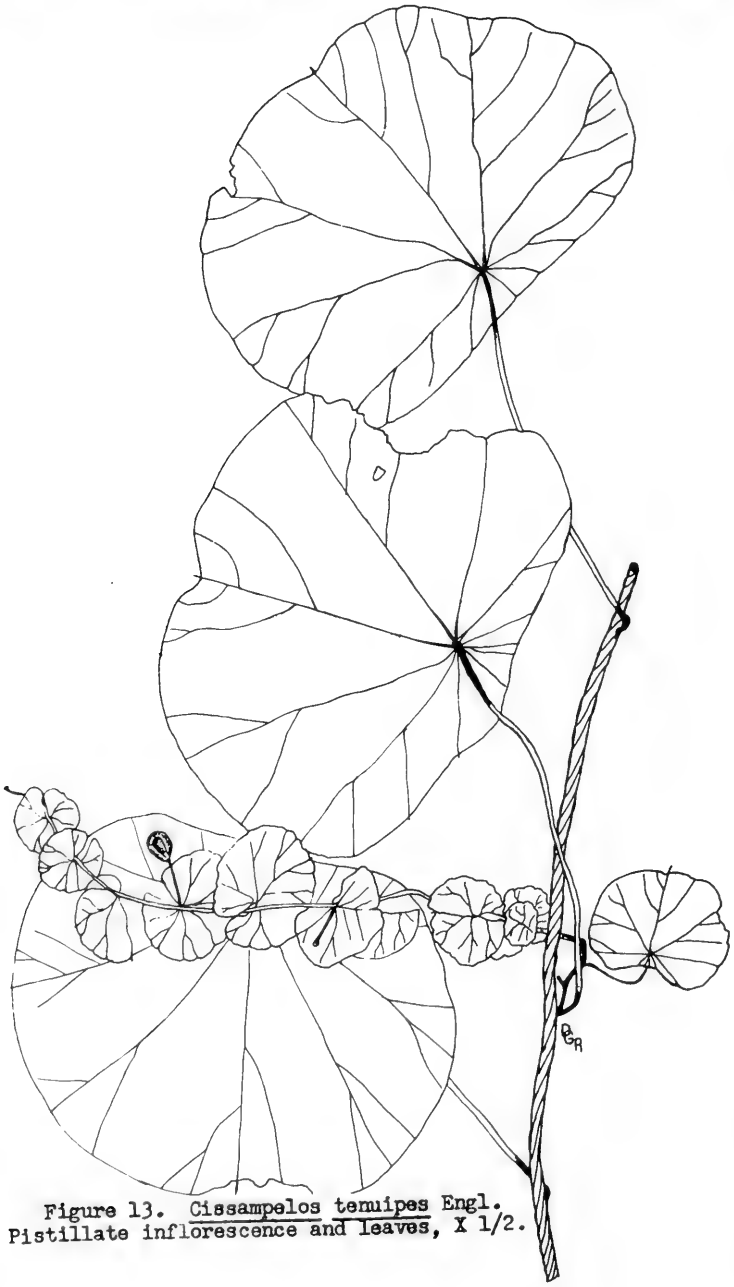

Figure 13. Cissampelos temuipes Engl. Pistillate inflorescence and leaves, X 1/2.

rounded, the base truncate to rounded, rarely retuse, (4.0-)8.0(-14.5) cm long, (3.3-)8.2(-17.0) cm wide, palmately 10- to 12-nerved, prominent below, glabrous to pilose above, pilose below; petioles (2.5-)7.7(-11.0) cm long, puberulent or tomentose distally and proximally. Staminate inflorescence multi-flowered fasciculate dichasia arranged in ebracteate racemiform manner to 15 cm in length or as cymose clusters axillary from normal leaves or rarely as cymose clusters within the axils of reduced leaves of secondary axillary branches; 1-4 dichasia per fascicle; peduncle or cymes at length 1 cm long, pilose. Staminate flowers whitish; sepals 4, elliptic to obovate, (1.1-)1.7(-2.8) mm long, (0.7-)0.9(-1.1) mm wide, puberulent to pilose exteriorly; corolla cupuliform and frequently dentate, (0.9-)1.0(-1.2)mm high, (0.7-)1.0(-1.2) mm in diameter, or patelliform, (0.9-)1.0(-1.1) mm in diameter, glabrous or rarely puberulent exteriorly; synandrium sessile to 1.2 mm in height, anthers 4, glabrous. Pistillate inflorescence composed of individual flowers fasciculate in the axils of bracts upon racemiform or paniculiform secondary axillary branches to 30 cm; about 6 flowers per fascicle; bracts basifixed, minute to large and foliaceous, at length 22 mm long and wide, sessile or petiolate to 4 mm long, reniform, rarely broadly ovate, entire to undulate, mucronate, membranous, puberulent to pilose with the margin frequently ciliate. Pistillate flowers: sepal 1, lanceolate to obovate, (1.6-)1.8(-2.8)mm long, (0.7-)0.8(-1.0) mm wide, the exterior puberulent to pilose; petal 1, reniform to quadrangular, (0.7-)0.8(-0.9) mm long, (0.6-)0.9(-1.1) mm wide, glabrous or exteriorly puberulent; carpel 1, gibbose, (0.7-)1.0(-1.2) mm long, sessile, puberulent to pilose; stigma 3-lobed. Drupe obovoid, 4 mm long, 3 mm wide, puberulent to pilose; fruiting stalk 3 mm long.

Africa.

ANGOLA: Without Preicse Locality: Gossweiler 4436 (BM), 9273 (BM), 4437 (BM), 5427 (BM), 4440 (BM), 4429 (BM), 5603 (BM), Nolde 361 (BM), Welwitsch 2318 (B).

BELGIAN CONGO: EQUATEUR: Bikoro, Leonard 617 (US,MO); Eala, Louis 2190 (S), Lebrun 1236 (S). KATANGA: Elisabethville, Luarre 4440 (S); Luapula River, Kassner 2435 (BM). KIVU: Kabambare, Troupin 5571 (NY). LEOPOLDVILLE: Matadi, Dacremont 223 (MO). ORIENTALE: Lubutu, Linder 1786 (GH); Euplu, Putman 209 (GH); Yangambi, Louis 2357 (BM), 4108 (F), 1337 (F), 1858 (F), 12451 (US,MO), 14591 (US,MO), Troupin 2083 (BM,S), 7952 (S), Gilbert 205 (MO); Bambesa, Louis 1701 (US,MO); Buta, Lebrun 2533 (MO). Without Precise Locality: Robyns 1153 (MO), Louis 1345 (MO), Michel and Reed 866 (MO), Lebrun 1056 (MO).

CAMEROUN: Without Precise Locality, Gocker 87 (GH), Zenker 119 (GH,B), 1243 (S), 2357 (BM,S), 3137 (BM,S), 3015a (NY,BM,S), Staudt 17 (S), Jungner 24 (S), Dusen 82 (S).

FRENCH WEST AFRICA: DAHOMEY: Without precise locality, Poisson B.2-78 (GH). GABON: Without precise locality, Loyaux 368 (B).

NIGERIA: Eket District, Talbot s.n. (BM); Oban, Talbot 1257 (BM).

RHODESIA AND NYASALAND: NORTHERN RHODESIA: South Down, Linley 71 (MO); Mwinilunga, Milne-Redhead 3678 (BM). NYASALAND: Kyimbila,

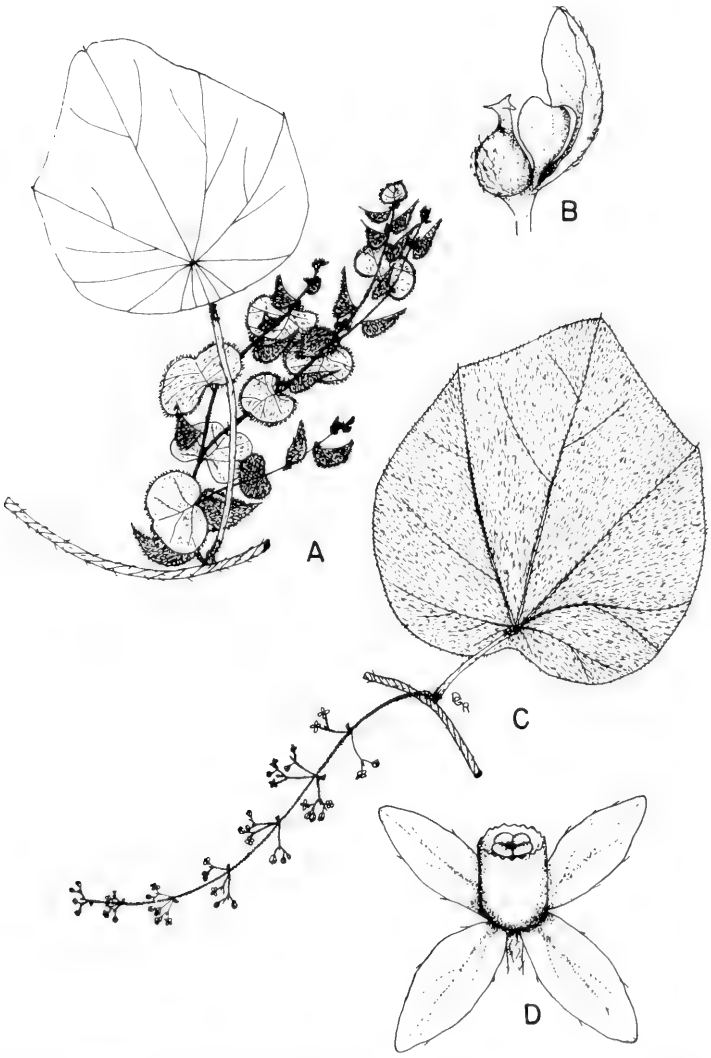

Figure 14. Cissampelos owariensis Beauv. A: Pistillate inflorescence and leaf, X 1/2; B: Pistillate flower, X 15; C: Staminate inflorescence and leaf, X 1/2; D: Staminate flower, X 15.

Stolz 737 (B,S).

RUANDA-URUNDI: without precise locality, Peter 36565 (B), 38859 (B), Busse 1099 (B).

TANZANIA: Masagati, Schlieben 1096 (BM,B,S): north of Lake Nyasa, Stolz 1600 (GH,MO,BM); Lindi, Schlieben 5913 (S,B); Morogorao, Verschueren 666 (US).

Cissampelos owariensis is distinguished by the large suborbicular leaves which are obscurely three-lobed, the large pistillate and staminate flowers compared to other species of Cissampelos, and the dentate, cupuliform corolla of the staminate flower.

14. Cissampelos rigidifolia (Engl.) Diels, in Engl. Pflanzen. 4(94):303. 1910 (Type: Schweinfurth 3688♂!) (Figure 15).

Cissampelos pareira L. var. transitoria Engl. subvar. rigidifolia Engl. in Engl. Bot. Jahrb. 26:395. 1899.

Cissampelos owariensis sensu Troupin, in Fl. Congo Belge et Ruanda-Urundi. 2:249. 1951.

Cissampelos rigidifolia (Engl.) Diels var. lanuginosa Troupin, in Bull. Jard. Bot. Brux. 25:141. 1955 (Type: Schieben 5913b).

Twiners; stem striate, young stems puberulent to pilose. Leaves petiolate, peltate to 4 mm, cordate, entire, the apex acute to obtuse, mucronate, the base retuse to cordate, 5.0-7.5 cm long, 5.5-7.5 cm wide, subcoriaceous, palmately 9- to 12-nerved, usually prominent below, glabrous to puberulent above, paler below and densely pilose; petioles 1.2-3.5 cm long, pilose to tomentose. Staminate inflorescence multi-flowered fasciculate dichasia arranged on bracteate paniculiform axillary branches to 28 cm; 3-5 dichasia per fascicle; peduncle of cymes at length 2 cm long, rigid, tomentose; bracts of secondary branches scattered, basifixed, sessile or petiolate to 2 mm, cordate, mucronate, entire, at length 5 mm long and wide, membranous, pilose; bracteoles linear, about 1 mm long, pilose. Staminate flowers; sepals 4, elliptic to obovate, 1.2-1.5 mm long, 0.5-0.7 mm wide, exteriorly pilose; corolla patelliform, 0.8 mm in diameter, pilose exteriorly; synandrium 0.5 mm long, anthers 4, glabrous. Pistillate inflorescence composed of 5-7 individual flowers fasciculate on bracteate, paniculiform secondary branches; bracts basifixed, sessile or petiolate to 2 mm, reniform, entire, mucronate, at length 1.5 cm long, 1.6 cm wide, membranous, pilose, the margins densely ciliate with yellowish hairs. Pistillate flowers: sepal 1, elliptic to obovate, 1.3-1.5 mm long, 0.5-0.8 mm wide, exteriorly pilose, petal 1, rarely 2, sometimes bilobed, obovate to deltoid, 0.4-0.6 mm long, 0.4-0.7 mm wide, exteriorly pilose; carpel 1, gibbose, 0.4-0.6 mm long, pilose. Drupe obovoid, 4-5 mm long, 3-4 mm wide, pilose; fruiting stalk 3-4 mm long.

Figure 15. Cissampelos rigidifolia (Engl.) Diels. A: Staminate inflorescence and leaf, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescence and leaf, X 1/2; D: Pistillate flower, X 15.

Central Africa.

SUDAN: EQUATORIA: Nambambisso, Schweinfurth 3688 (B); Niamniam, Schweinfurth ser. III, 78 (B); Tambura, Wyld 145 (B).

A species which is distinguished by the paniculiform pistillate and staminate inflorescences.

The type for Cissampelos rigidifolia is the staminate collection of Schweinfurth 3688 (B). A pistillate collection from the type locale also numbered Schweinfurth 3688 and labeled in the Berlin collection as an isotype is a specimen of C. owariensis.

15. Cissampelos torulosa E. Mey. ex Harv. Fl. Capens. 1:11. 1859. (Type: Drege 3392) (Figure 16).

Menispermum capense Thunb. Fl. Cap. ed. Schultes. 402. 1823, ex char.

Cissampelos wildemaniana Bossche, in Pl. Nov. Herb. Hort. Then. 1:5. 1904 (Type: Luja 473).

Cissampelos truncata Engl. in Engl. Bot. Jahrb. 26:398. 1899 (Type: Stuhlmann 8831!).

Twiners, stems striate, young stems glabrous to pilose. Leaves petiolate, basifixed, reniform to deltoid, entire to undulate, the apex obtuse to rounded, rarely emarginate, mucronate, the base cordate to truncate, 1.8-6.0 cm long, 2.7-6.5 cm wide, subcoriaceous, palmately 3- to 5-nerved, glabrous to rarely pilose with tuft of hairs at petiole attachment; petioles 1.5-4.0 cm long, glabrous to pilose. Staminate inflorescence multi-flowered fasciculate dichasia as cymose clusters axillary from the leaves or rarely from reduced leaves or secondary axillary branches to 8 cm; 1-2 dichasia per fascicle; peduncle or cymes at length 3 cm long, glabrous or puberulent; bracteoles about 1 mm long. Staminate flowers greenish-yellow: sepals 4, elliptic to obovate, 0.7-1.1 mm long, 0.5-1.0 mm wide, glabrous; corolla cupuliform, rarely patelliform or lobed, 0.4-0.5 mm in height, glabrous; synandrium 0.3-1.0 mm in height, anthers 4, rarely 5, glabrous. Pistillate inflorescence composed of 3-4 individual flowers fasciculate on bracteate racemiform secondary branches to 10 cm in length or from reduced leaves of secondary branches; bracts sessile, reniform, entire, mucronate, 4 mm long and wide, membranous, puberulent. Pistillate flowers: sepal 1, rhomboidal, 1.1 mm long, 1.0 mm wide, glabrous; petal 1, suborbicular, 0.5 mm long, 0.7 mm wide, glabrous; carpel 1, gibbose, 0.7 mm long, glabrous; pedicellate to 3 mm. Drupe obovoid, 4 mm long and wide, glabrous; fruiting stalk 6-8 mm long.

Africa.

MOZAMBIQUE: LOURENCO MARQUES: Lourenco Marques, Howard 23 (US). SUL DO SAVE: between Morrumbene and Massinga, Exell, Mendonca and Wild 656 (BM).

RHODESIA AND NYASALAND: NORTHERN RHODESIA: Nyika Plateau, Robson 414 (BM). NYASALAND: without precise locality, Robson 1367 (BM).

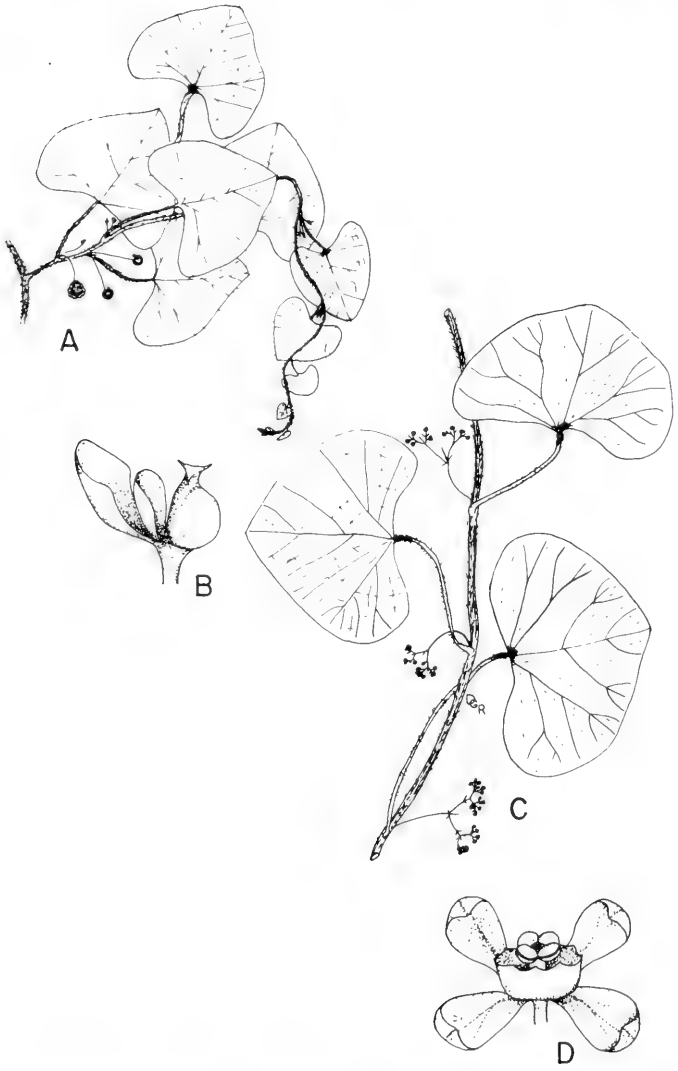

Figure 16. Cissampelos torulosa E. Mey. A: Pistillate inflorescence, X 1/2; B: Pistillate flower, X 15; C: Staminate inflorescence and leaves, X 1/2; D: Staminate flower, X 15.

SOUTHERN RHODESIA: Inyanga, Plowes 2100 (MO), Fries, Norlindh and Weimarck 3873 (S); Chirinda, Chaje 444 (MO); Umtali, Exell, Mendonca and Wild 154 (BM); Gwanda, Wild 2230 (S).

TANZANIA: Uluguru Mts., Stuhlmann 8831 (B), Bruce 74 (BM), Schlieben 2699 (S); Usambara Mts., Peter 18232 (B), 17530 (B), 17454 (B), O.I. 101 (B), 16125 (B), 3256 (B), 10022 (B); Amani, Peter 23646 (B), 16914 (B); Monga, Peter 19045 (B); Lushoto, Drummond and Hemsley 2157 (S).

UNION OF SOUTH AFRICA: CAPE OF GOOD HOPE: Montagu-Pass, Rehmann 275 (BM); Uitenhage, Burchell 4659 (GH); between Keiskamma and Buffelrivier, Drege s.n. (S). NATAL: Durban, Wood 5962 (F,BM,MO) Alexandra District, Rudatis 1234 (US); Zululand, Gerrard 355 (BM); Claremont, Schlechter 2841 (S); without precise locality, Schlechter 2841 (GH,BM). TRANSVAAL: Louis Trichardt, Schlieben 7598 (F,NY); Houtbosh, Rehmann 5956 (BM). Without Precise Locality: Cooper 120 (BM).

Cissampelos torulosa is characterized by the usually deltoid leaves which possess a tuft of hairs at the junction of the petiole and lamina as well as the staminate flower which often has the corolla lobed or parted.

Diels (1910) separates Cissampelos truncata as a distinct species on the basis of a five to eight locular synandrium and a truncate leaf base, but these characters are not stable enough to warrant species delimitation.

16. Cissampelos nepalensis Rhodes, sp. nov. (Type: Nicolson 3121!) (Figure 17).

Plantae volubiles; caules striati, puberuli, Folia petiolata, basifixa, late ovata usque obscure cordata, undulata, apex obtusus mucronatus, basis truncata vel retusa, 4.5-5.5 cm longa, 4.0-4.9 cm lata, membranacea, palmatim 5-7 nervata, puberula, venae totae cristis phelloideis; petioli 3.0 cm longi, pilosi sed tomentosi distaliter et proximaliter. Inflorescentia staminata dichasia multi-flora fasciculata disposita atque fascicali corymbosi intra axillas in foliorum reductorum vel bractearum in ramis racemiformibus secundariis usque 14 cm, dichasia 2-3 per fasciculum; pedunculi in cymarum demum 3 cm longi, pilosi; bracteolae circa 1 mm longae, pilosae. Flores staminati virelli; sepala 4, obovata, 0.6-0.8 mm longa, 0.4-0.5 mm lata, extus puberula, intus glabra cristis phelloideis secus venas; corolla plus minusve cupulata, 0.5 mm in diametro, 0.2 mm in alt, glabra; synandrium pedicellatum usque 0.5 mm longum, antherae 4, glabrae. Flos pistillatus ignotus.

Central Asia.

NEPAL: ILAM: Mechi, Nicolson 3121 (US). KAILALI AND KANCHANPUR: Seti, Nicolson 2786 (US). POKHARA: Gandaki, Nicolson 2893 (US).

Cissampelos nepalensis is distinguished by the essentially glabrous staminate flowers and the phelloid ridges which occur along the veins of the leaves and sepals.

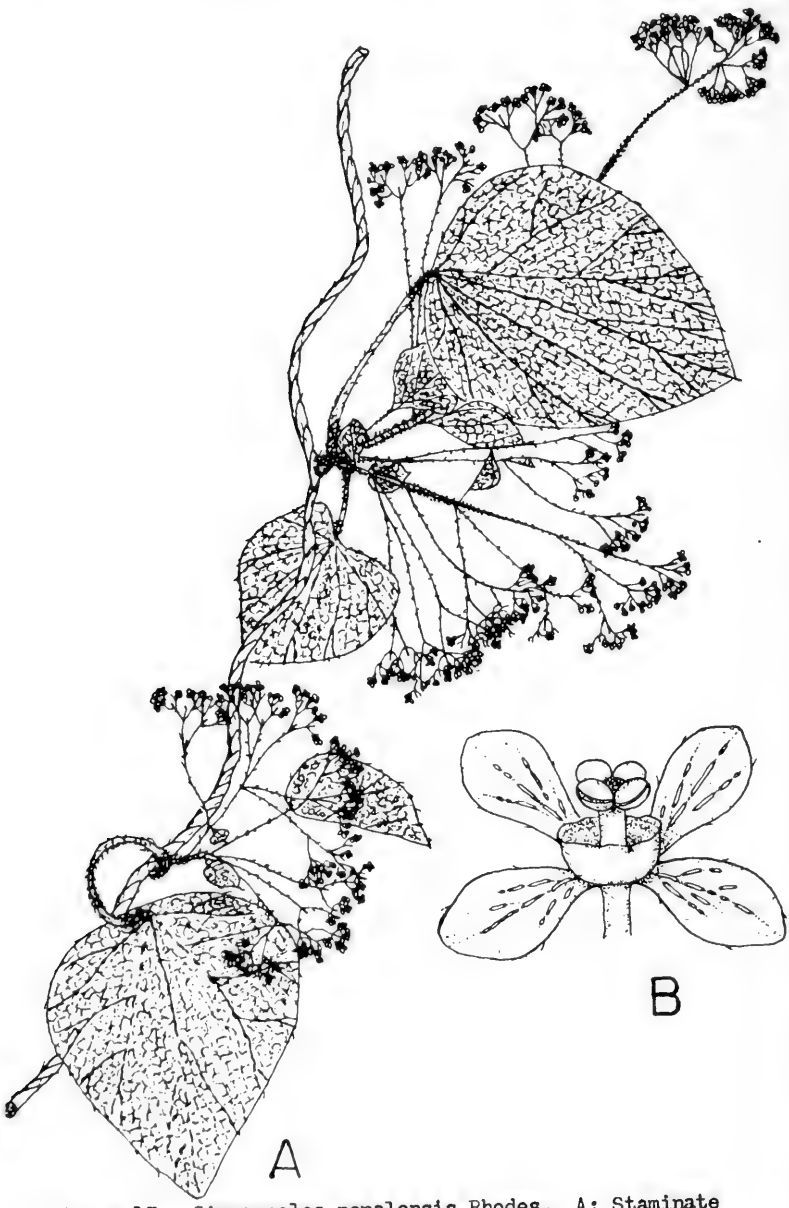

Figure 17. Cissampelos nepalensis Rhodes. A: Staminate inflorescences and leaves, X 1; B: Staminate flower, X 30.

17. Cissampelos friesiorum Diels, in Bot. Gar. Mus. Berlin Not. 8:477. 1923 (Type: Fries 1625!) (Figure 18).

Twiners; stems striate, young stems sericeous. Leaves petiolate, peltate to 3 mm, ovate, undulate, the apex acuminate to acute, mucronate, the base rounded, 5.5-7.0 cm long, 3.5-5.0 cm wide, membranous, palmately 5- to 7-nerved, slightly sericeous above, paler below and densely sericeous; petioles 2-3 cm long, sericeous. Staminate inflorescence multi-flowered fasciculate dichasia arranged as cymose clusters axillary from normal leaves; 2-3 dichasia per fascicle; peduncle of cymes at length 1 cm, pilose. Staminate flowers: sepals 4, elliptic to obovate, 1.1-1.4 mm long, 0.8-1.0 mm wide, exteriorly pilose; corolla cupulate, 0.5-0.8 mm in height, 0.8-1.0 mm in diameter, exteriorly pilose; synandrium 0.5-0.8 mm long, anthers 4, glabrous. Pistillate inflorescence not seen.

East Africa.

KENYA: Meru, Fries 1625 (S).

A specimen from the Berlin Museum is labeled as an isotype, but apparently there was an error in the label preparation as it is numbered Fries 1635.

Cissampelos friesiorum is distinguished by the densely sericeous character of the vegetation.

18. Cissampelos hirta Klotzsch, in Peters' Reise Nach Mossamb. 1:174. 1862 (Type: Peters s.n.!) (Figure 19).

Cissampelos tamnifolia Miers, in Ann. Nat. Hist. ser. 3. 27:137. 1866, nom. nud.; in Contrib. Bot. 3:185. 1871. (Type: Forbes 11).

Cissampelos pareira L. var. hirta Dur. and Schinz, in Consp. Fl. Afr. 1(2):51. 1898.

Cissampelos pareira L. var. klotzschii Dur. and Schinz, in Consp. Fl. Afr. 1(2):51. 1898.

Cissampelos pareira L. var. mucronata (A. Rich.) Engl. subvar. hirta (Klotzsch) Engl. in Bot. Jahrb. 26:395. 1899.

Twiners; stem striate, young stems glabrous to pilose. Leaves petiolate, basifixed or rarely peltate to 2 mm, reniform to deltoid, entire to crenate, the apex acute to rounded, sometimes emarginate, mucronate, the base retuse to cordate, rarely truncate, 2.5-7.5 cm long, 3.5-7.5 cm wide, subcoriaceous, palmately 5- to 7-nerved, usually prominent below, glabrous to puberulent, paler below; petioles 1.3-4.5 cm long, glabrous to pilose. Staminate inflorescence multi-flowered fasciculate dichasia arranged as cymose clusters axillary from normal leaves or upon secondary ebracteate racemiform axillary branches to 6 cm; 1-4 dichasia per fascicle; peduncle of cymes at length 3.5 cm long, glabrous. Staminate flowers: sepals 4,

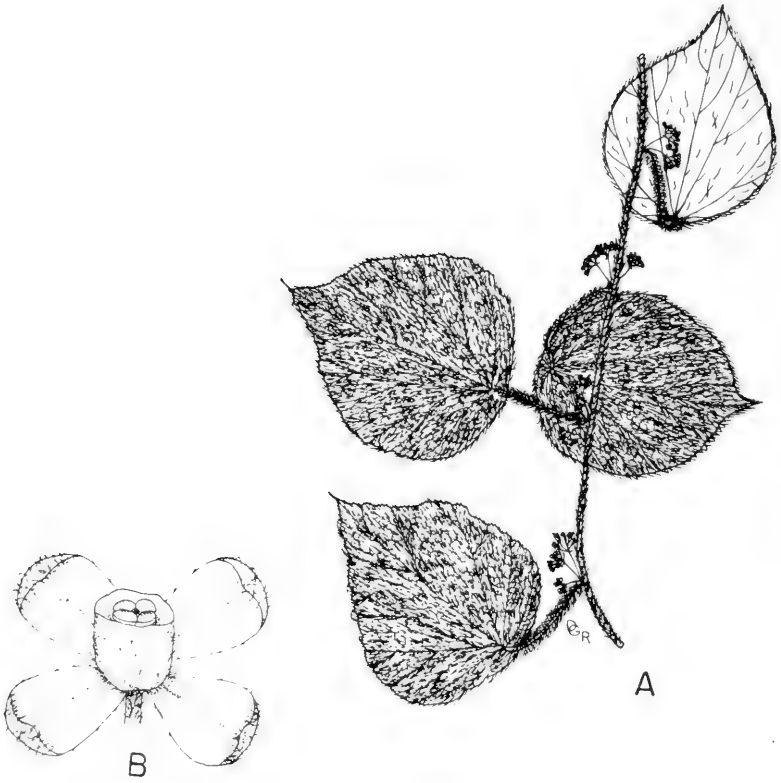

Figure 18. Cissampelos pariesiorum Diels. A: Staminate inflorescence with leaves, X ⅔; B: Staminate flower, X 15.

elliptic, 0.8-1.0 mm long, 0.5-0.7 mm wide, glabrous; corolla patelliform, 0.6-0.8 mm in diameter, essentially glabrous; synandrium sessile to 0.2 mm in height, anthers 4, glabrous. Pistillate inflorescence composed of 3-7 individual flowers fasciculate on bracteate racemiform secondary branches; bracts basifixed, sessile or petiolate to 1 mm, broadly ovate, cordate or reniform, frequently large and foliaceous, entire, mucronate, at length 1.6 cm long, 2.3 cm wide, frequently grading to minute, membranous, glabrous to pilose. Pistillate flowers: sepal 1, elliptic to obovate, 0.6-0.8 mm long, 0.4-0.5 mm wide, glabrous, involute and somewhat carnose; petal 1, obovate to deltoid, 0.3-0.5 mm long, 0.3-0.6 mm wide, glabrous, somewhat involute; carpel 1, gibbose, 0.5-0.8 mm long, glabrous. Drupe red, obovoid, 4-5 mm long, 4-5 mm wide, glabrous; fruiting stalk 1-3 mm long.

South Africa.

MOZAMBIQUE: LOURENCO MARQUES: Lourenco Marques, Moss 7005 (BM), Schlecter 11548 (BM); Maputo, Mendonca 2921 (BM); Barbosa, Mendonca 691 (BM). SUL DO SAVE: Inhambane, Peters s.n. (B).

A species distinguished by the reniform to deltoid, subcoriaceous leaves which are shiny above. The glabrous flowers are also worthy of note.

19. Cissampelos nigrescens Diels, in Engl. Pflanzen. 4(94):296. 1910. (Type: Warnecke 446!) (Figure 20).

Cissampelos nigrescens Diels var. cardiophylla Troupin, in Bull. Jard. Bot. Brux. 25:141. 1955 (Type: Schlieben 59136).

Twiners, stems striate, young stems glabrous to pilose. Leaves petiolate, peltate to 8 mm, reniform to broadly ovate or suborbicular, entire to undulate, the apex obtuse to rounded, rarely emarginate, mucronate, the base cordate to truncate, 2.5-6.5 cm long, 3.0-7.8 cm wide, membranous, palmately 5- to 12-nerved, puberulent to glabrous above, dark and shiny upon drying, paler below and pilose; petioles 1.8-6.0 cm long, pilose to tomentose. Staminate inflorescence multi-flowered fasciculate dichasia as cymose clusters from the leaf axils, diffuse; 1-3 dichasia per fascicle; peduncle of cymes at length 3 cm long, pilose; bracteoles linear to ovate, about 1 mm long. Staminate flowers yellowish-green; sepals 4, elliptic, 1.2 mm long, 1.0 mm wide, exteriorly puberulent; corolla patelliform, 1.0 mm in diameter, the exterior puberulent; synandrium about 0.5 mm high, anthers 4, glabrous. Pistillate inflorescence composed of 3-6 individual flowers fasciculate on bracteate racemiform secondary branches to 8 cm; bracts sessile or petiolate to 3 mm, suborbicular or reniform, entire, mucronate, 0.3-1.5 cm long, 0.3-1.8 cm wide, membranous, pilose. Pistillate flowers: sepal 1, obovate, 1.0 mm long and wide, exteriorly pilose; petal 1, reniform to suborbicular, 0.5-0.6 mm long, 0.5-1.0 mm wide, exteriorly pilose; carpel 1, gibbose, 0.5 mm long, tomentose. Drupe obovoid, 4 mm long, 3 mm wide, pilose; fruiting stalk 3 mm long.

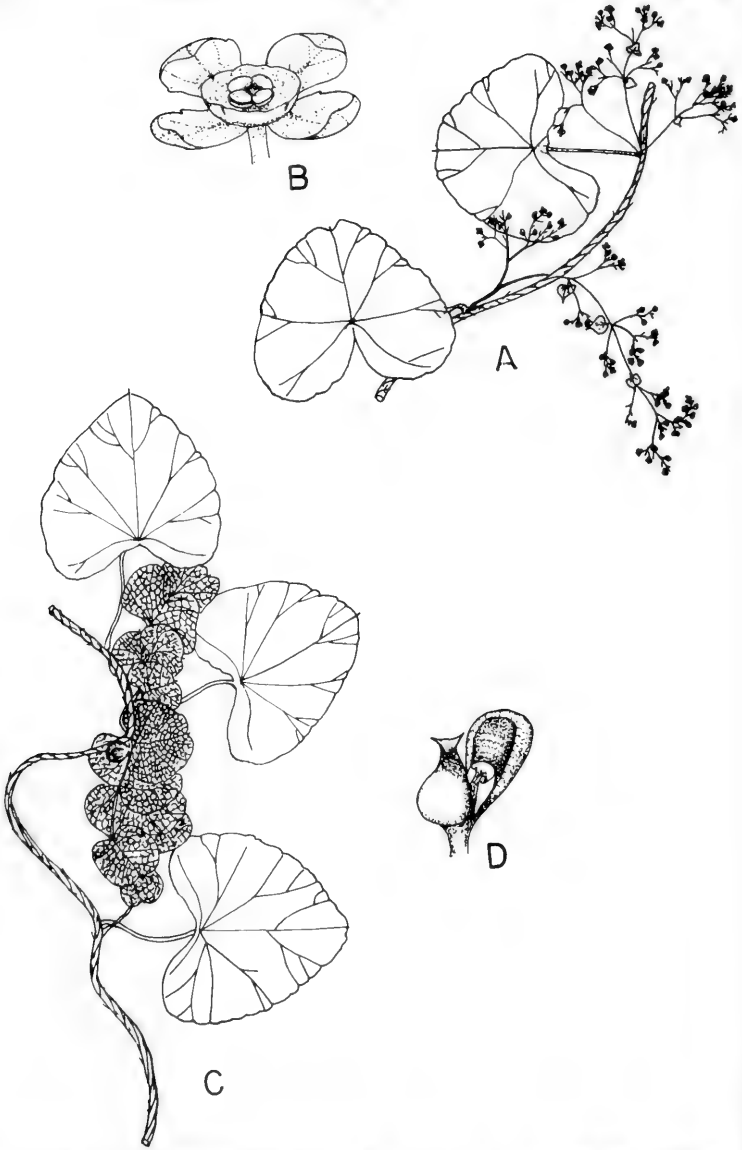

Figure 19. Cissampelos hirta Klotzsch. A: Staminate inflorescences and leaves, X 1/2; B: Staminate flower, X 15; C: Pistillate inflorescence and leaves, X 1/2; D: Pistillate flower, X 15.

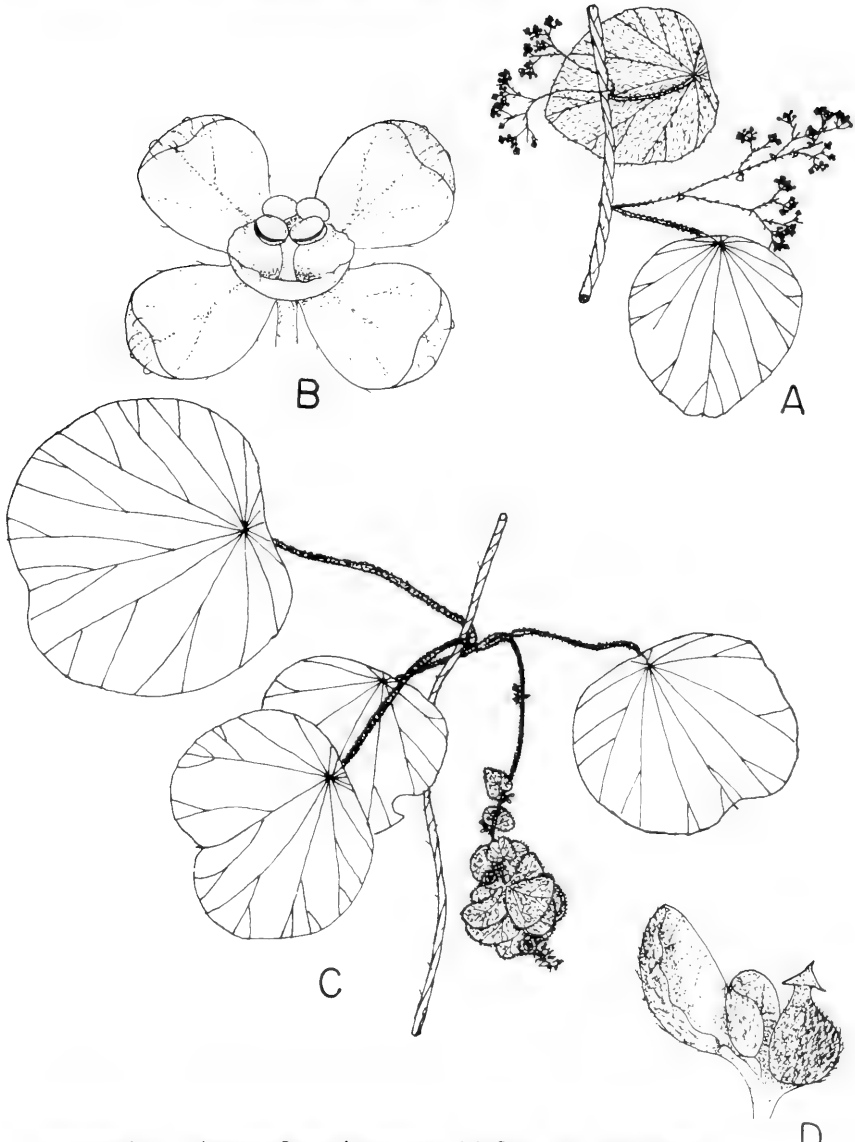

Figure 20. Cissampelos nigrescens Diels. A: Staminate inflorescences and leaves, X 1; B: Staminate flower, X 30; C: Pistillate inflorescence and leaves, X 1; D: Pistillate flower, X 30.

East Africa.

KENYA: RIFT VALLEY: Eastern Mau Forest Reserve, Geesteranus 6179 (GH,MO). CENTRAL: Muguga near Nairobi, Verdcourt 636 (MO).

MADAGASCAR: TULEAR: without precise locality, Humbert and Swingle 5641 (GH).

TANZANIA: Amani, Warnecke 446 (B); Mahenge, Schlieben 2060 (BM,S); Usambara Mts., Peter 17847 (B); Lindi, Busse 2438 (B).

A species which is close to Cissampelos pareira but differing in the darker and more shiny leaves, shorter pubescence, and smaller flowers.

Dubious Species

Diels (1910) based his description of Cissampelos pilgeri upon a single specimen (Pilger 255!) from Brazil. This collection is very similar to C. pareira from which Diels isolates primarily on the basis of an ebracteate staminate inflorescence. This character, however, is weak and not sufficient for species delimitation. Vegetatively the leaves are much like C. pareira but the staminate flowers of Pilger 255 are more pubescent than in the typical C. pareira. More material is required for an adequate judgment on this species.

Insufficient material was available for the study of Cissampelos madagascariensis (Baill.) Diels and C. perrierii Diels. The description of C. madagascariensis in the literature (Diels, 1910) reads as if the species should perhaps belong to the genus Cyclea while the C. perrierii description (Diels, 1920) has close affinity with C. pareira. The true nature of these species cannot be resolved until more material is collected.

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BOOK REVIEW

Alma L. Moldenke

"ELECTRON MICROSCOPY OF ENZYMES: Principles and Methods" Volume 3 edited by M. A. Hayat, xvi & 175 pp., illus., Van Nostrand Reinhold Company, Melbourne, London, Toronto, Cincinnati & New York, N. Y. 10001. 1975. $17.50.

The ten scientist-authors of the seven similarly organized papers sustain the scientific excellence of the earlier volumes and have provided a documented treatment of newer problems and viewpoints. All techniques have been critically pretested. Consequently and realistically the careful instructions for preparation and use of the various solutions, media and strains should enable electronmicroscopists and other kindred workers to prepare specimens satisfactorily.

This book covers the following topics: 1) the widely distributed non-specific esterases detectible by four ultracytochemical procedures, 2) purine nucleoside phosphorylase found in microbes, spores and many mammalian tissues, 3) cellulase which is a multienzyme complex whose components degrade cellulose to monosaccharides, 4) carbonic anhydrase which catalizes the hydration of CO_2 and the dehydration of bicarbonate ions, 5) a second preparatory method for detecting this same carbonic anhydrase so important in acid-base homeostasis, 6) creatine phosphokinase found in tissues with high energy requirement, and 7) acetyl CoA carboxylase which is involved as a coenzyme in many biosynthetic pathways utilizing ATP.

This editor and this publishing house have recently put forth an excellent series of E M books of which this one is an integral part. It is well illustrated and indexed.

A STUDY OF LICHENS FROM ABACO ISLAND, THE BAHAMAS

Paul A. Volz and Joseph H. McCulloch
Department of Biology, Eastern Michigan University
Ypsilanti, Michigan 48197

Collections of lichens were made over a three year period to identify species found on Abaco Island, The Bahamas. The species identified were then compared with listings of species previously collected on other Bahamian islands.

The specimens were collected and identified according to the literature (Fink, 1935; Hale, 1961, 1971; Hale and Culberson, 1970; Nearing, 1947; Smith, 1921; Thomson, 1967). Thallus forms and substrates were noted while spore examinations were frequently made for species determination. Identified species were then compared with lichen species previously listed in the literature that were isolated in The Bahamas. Current collections were made in all areas of Abaco south of Marsh Harbor.

Cladonia species were present but not in abundance. Species identified in reforested pine areas included Cladonia capitata (Michx.) Spreng., C. chlorophaea (Flörke ex Somm.) Spreng., C. cristatella Tuck., C. floerkeana (Fr.) Flörke, C. gracilis (L.) Willd., C. phyllophora Hoffm., C. ravenelii Tuck., C. squamosa (Scop.) Hoffm., and C. verticillata (Hoffm.) Schaer. Two species of Ramalina were found including R. peruviana Ach. and R. usnea (L.) Howe. Graphis was present on many substrates. The Graphis species included G. afzelii Ach., G. botryosa Tuck., G. elegans (Borr. ex Sm.) Ach., G. pavoniana Fée and G. scripta (L.) Ach. Arthothelium spectabile (Flot. ex Fr.) Mass., Buellia disciformis (Fr.) Mudd, Graphina adscribens (Nyl.) Müll. Arg., Menegazzia terebrata (Hoffm.) Mass., Opegrapha pulicaris (Hoffm.) Schrad., Parmelia perforata (Jacq.) Ach., P. reticulata Tayl., Phaeographina plurifera (Nyl.) Fink, and Phaeographis dendritica (Ach.) Müll. Arg. were also found. The habitat of Graphis, Graphina and Phaeographina was primarily mangrove. Specimens were collected that appeared to be Parmelia cirrhata Fr. but according to Hale and Culberson (1970), records in North America are misidentifications.

All island areas surveyed were previously logged or burned during the past 60 years. Mature trees were few while a dense ground cover existed. In many island areas tree seedlings had an opportunity to grow for only a few years before deliberate fires were set in various regions to assist in the hunt of wild pigs. Virgin timber stands have been absent several years, and the few mature tree stumps remaining were almost completely decomposed. Mycological studies also have been recently made on the island (Volz and Beneke, 1972; Volz and Jerger, 1972; Volz, et al., 1975).

In the summer of 1903 the Geographical Society of Baltimore undertook a study in The Bahamas (Shattuck, 1905). At the time of the expedition, the islands were considered terra incognita to the rest of the world with comparatively insignificant trade relations to other countries. Scattered observations were made by expedition members W. C. Coker, C. A. Shore and F. M. Hanes. Islands included in the botanical expedition were George Island, Cat Island, Nassau, Andros, Eleuthera, Spanish Wells, New Providence, and Watlings Island while Abaco Island was not surveyed. Species identified included Arthonia cinnabaria (DC.) Wallr., A. spectabilis Flo. = Arthothelium spectabile (Flot. ex Fr.) Mass., Buellia disciformis (Fr.) Mudd, Chiodecton sphaerale Ach., Coenogonium disjunctum Nyl., Glyphis achariana Tuck., Graphis afzelii Ach., G. cicatricosa Fr. = Glyphis cicatricosa Ach., Graphis dumastii (Fée) Nyl., G. elegans (Borr. ex Sm.) Ach., G. lutea (Dicks.) Tuck. = Dimerella lutea (Dicks.) Trev., G. nitida Nyl. = Graphina nitida (Eschw. ex Mart.) Müll. Arg., Graphis poitaeoides Nyl., G. radiata Montague, Heterothecium domingense (Pers.) Flotow = Lopadium domingense (Pers.) Fink, H. tuberculosum (Fée) Flotow = Bombyliospora tuberculosa (Fée) Mass., Lecanora pallida (Schreb.) Rabenh., L. varia (Ehrh.) Ach., Leptogium marginellum (Sw.) S. Gray, Opegrapha varia Ach. = O. pulicaris (Hoffm.) Schrad., Pannaria molybdoea (Pers.) Tuck. = Coccocarpia pellita (Ach.) Müll. Arg., Parmelia cetrata Ach., P. latissima Fée, Pertusaria leioplaca (Ach.) DC., P. velata (Turn.) Nyl., Pyrenula aurantiaca Fée = P. cerina Eschw., P. fallaciosa Tuck. = Polyblastiopsis fallaciosa (Stizenb.) Zahlbr., Pyrenula leucoplaca (Wallr.) Körb., P. mamillana (Ach.) Trev., Pyxine cocoes (Sw.) Nyl., Ramalina calicaris (L.) Fr., R. gracilis (Pers.) Nyl., Thelotrema interpositum (Nyl.) Müll. Arg., T. microporum Montague = Ocellularia micropora (Mont.) Müll. Arg., Trypethelium creuentum Montague = Melanotheca cruenta (Mont.) Müll. Arg., T. madreporiforme Eschw. = Laurera madreporiformis (Eschw.) Ridd., T. ocholeucum var. pallescens Mull. = T. pallescens Fée, T. sprenglii Ach. = T. eluteriae Spreng., and Verrucaria virens Nyl. Northrop (1910) further added to the listing of Bahamian lichens with Cladonia floerkeana (Fr.) Flörke, C. gracilis (L.) Willd., Leptogium pulchellum (Ach.) Nyl. = L. corticola (Tayl.) Tuck., L. tremelloides Fr., and Ramalina pusilla Duby = R. minuscula (Nyl.) Nyl. Leptogium tremelloides and Parmelia latissima are possible misidentifications (Hale and Culberson, 1970) while Graphis dumastii, G. radiata, and Ramalina gracilis are also species in question or not currently recognized as species.

An attempt was made to survey the lichen flora of Abaco Island, The Bahamas and review the Bahamian lichen species identified during previous studies. The Abaco collection included species of Arthothelium, Buellia, Cladonia, Graphina, Graphis, Menegazzia, Opegrapha, Parmelia, Phaeographina, Phaeographis,

and Ramalina. According to current nomenclature, previous collections also included specimens of Arthonia, Bombyliospora, Chiodecton, Coccocarpia, Coenogonium, Dimerella, Glyphis, Laurera, Lecanora, Leptogium, Lopadium, Melanotheca, Ocellularia, Pertusaria, Polyblastiopsis, Pyrenula, Pyxine, Thelotrema, Trypethelium, and Verrucaria.

Acknowledgments. Appreciation is extended to N. Roberts, E. Prescott, H. Prescott, and R. Giles for support and assistance during the Abaco studies in lichenology as well as in mycology.

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BOOK REVIEWS

George M. Hocking
School of Pharmacy, Auburn University
Auburn, Alabama

"THE CUTICLES OF PLANTS" by J. T. Martin and B. E. Juniper, xx + 347 pp., 78 figs., many tabs., 1 col. pl. St. Martin's Press, 175 Fifth Ave., New York 10010. 1970. $27.00.

From the standpoint of the health and security of the plant, the cuticle as the first line of defence is of utmost importance. This structure is here examined from every angle--the morphological, microscopic (anatomical), analytical, chemical, biosynthetical, developmental, physiological, paleobotanical, commercial, and historical, possibly others. In the eleven chapters, considerable emphasis is put on modern information and concepts of chemistry, optical instrumentation (transmission electron microscopy, scanning electron microscopy, interference microscopy, X-ray diffraction), and other technics (absorption spectroscopy, chromatography). The cuticle and cork layers are considered to have chemical and functional similarities. The pollen grain surfaces are also considered. The arrangement of the text is quite logical--from general explanatory, methods of study, history of investigation, anatomy and morphology, chemistry, biosynthesis, functions of cuticle, processes of decay (including fossil forms), and the practical utilization. This is followed by a glossary, a combination author index and bibliography, index to biological names, and a subject index. The chapter on commercial and industrial uses includes carnauba wax, candelilla and ouricury waxes, etc., also wax-like substances (such as bayberry "wax", actually a fatty oil and not a wax at all); oak cork and other barks having applications in modern life, including medicine. In the early part of the book, following the table of contents, there is a useful reference list of plant binomial scientific names with vernacular names, also a reference list of systematic and trivial names of normal-aliphatic constituents of plant waxes C_{12}-C_{35}, showing the alkane base which is used in forming the systematic name of the alkanoic acid, then (when there is one) the trivial name of the fatty acid and that for the corresponding fatty alcohol. (Thus, the C_{12} fatty acid, from dodecane, dodecanoic acid, or lauric acid, with lauryl alcohol.) The figures, both photographs and line sketches, are excellent and the entire printing operation allows no complaint.

GMH

"WILDLAND SHRUBS - THEIR BIOLOGY AND UTILIZATION" by C. M. McKell, J. P. Blaisdell, and J. R. Goodin (editors). USDA Forest Service, Gen. Techn. Rept. INT-1:vi, 494, 47 figs. 1972. (Gratis).

The many reports in the 8 sections were presented at an International Symposium, held at Utah State University, Logan, Utah, in July, 1971. Section 9 consists of references for the entire volume arranged in a single alphabetic sequence. Section 2, present and possible uses of shrubs, includes several economic applications, including medicinal values (A. Krochmal) and industrial raw materials (Q. Jones and A. S. Barclay). Section 3, genetic potential, has chapters on evolution and diversity of arid-land shrubs, cytology and cytogenetics of shrubs, genetic improvement, origins and variation in ornamental shrubs. Section 6, Nutritive value, has six chapters on the nutrient use of shrubs by foraging animals, including a survey of chemical constituents.

GMH

"THE SAVORY WILD MUSHROOM" Edition 2, by Margaret McKenny,† revised and enlarged by Daniel E. Stuntz, xxi, 242 pp., 32 col. pls., 156 figs. (photos). Univ. of Washington Press, Seattle, Washington. 1971. $4.95 card; $8.95 cloth.

This present edition is larger in all three dimensions from the edition of 1962. The page size is slightly larger, there are almost twice as many pages, more black and white figures (but fewer colored plates*) with more than twice as many illustrations. Instead of c. 81 species, there are 156 species in this edition, each with its illustration. The chapter on mushroom poisons by V. E. Tyler has been revised and there is an additional chapter on "The hunt, the quarry, and the skillet" by A. M. Pellegrini, dealing with mushroom cookery. The area of coverage is the Pacific Northwest from s. British Columbia to n. Idaho to n. Oregon; however 89% of the species occur in many other areas and the book should be of service in a large part of North America. The organisms are arranged according to their body shape instead of as previously under such headings as "poisonous", "nonpoisonous", etc. The gilled mushrooms have been sub-divided into groups according to spore color. Bibliography; index. This book should be of much value to those interested in safely utilizing the mycological treasures of the natural world.

GMH

*Although the preface states that there are one-third more illustrations in color this is incorrect since there are 32 (new) and 48 (old).

"ANTITUMOUR AND ANTIVIRAL SUBSTANCES OF NATURAL ORIGIN" by Edward S. Meek. Recent Results in Cancer Research (RRCR 28) Vol. 28: viii + 78 pp. Spring-Verlag New York, Inc. 175 Fifth Ave., New York 10010. Title #103643. 1970. Cloth. $4.40.

It seems to be a common opinion among pharmacologists and pharmacognosists (but not among chemists) that the answer or answers to cancer control will be attained through products from the natural kingdoms of the plants or animals. In the past, most attention has been given to synthesized compounds in treating or preventing cancer, with mostly all negative results. It seems likely that this book will be of special interest now in this area, particularly since it also discusses antiviral agents (or reputed such) and since it is now apparent that many types of cancer are viral in origin. The author of this rather thorough coverage is a clinical lecturer at the University of Bristol in west England. There are chapters on the design of screening programs, microbial sources, plant sources, marine sources, and animal and other sources, followed by a truly formidable reference section, constituting nearly 38% of the text pages. Index.

GMH

"TREE FLORA OF KENTUCKY" by W. Meijer, xxv, 144 pp., 1 fig. University Kentucky Bookshop, Lexington, Ky. 1972. $2.50.

By the use of the several keys in this book, one is enabled to identify trees and shrubs of this state during summer and fall by their leaf, flower, and fruit characters. This is said to be the first text to fill this particular purpose. (A single herb, Cannabis sativa, is included, because of the great interest in this plant at present.) The families are arranged in the Engler order. There are family, generic, and species descriptions, which include much information on the local distribution, importance, uses, etc. The range information is very useful. An Appendix lists "Big tree champions" in the State of Kentucky, including eight national champions occurring in the state. Circumference of trunk at breast height, and height and spread of tree are shown. This is a useful field manual.

GMH

"FLOWERING TREES OF THE WORLD FOR TROPICS AND WARM CLIMATES" by Edwin A. Menninger, XV + 336 pp., 425 col. figs., also many black and white line drawings. Hearthside Press, Inc., 118 E. 28th St., New York 10016. 1962. Clothbound. $18.95.

This impressive and attractive clothbound volume is provided with carefully worded descriptions of 1000 species

(representing ca. 500 genera) of ornamental trees from the warmer areas of the globe. Supplementing the descriptive texts are many brilliant colored pictures, mostly of inflorescences or of individual flowers, together with 40 line sketches (by Eva Melady), which greatly increase the value of the book for purposes of identification or recognition. For each species are given the botanical name or names and common name or names, the geographical place or places of origin, the habitat, places where cultivated, the appearance of the tree from season to season (i.e., its phenology), directions for propagating and growing the plant in the garden, and appropriate quotations from the botanical and horticultural literature. Here is a brief summary of the book's chapters: (I) definitions of "flowering" and "tree"; (II) adaptability of tropical or subtropical trees to temperate regions; (III) various sources of information; (IV) obtaining tree seeds; (V) interesting facts about trees; (VI) flowering failure in non-native areas--methods of inducing bloom; (VII) introduction to the main body of text, viz., Part II, which, coming next, takes up the various tree species by family (pp. 31-291); (VIII) flowering tree species omitted from the main text, with listing of 200 species (in 200 genera) which might well be cultivated. The balance of the volume includes reference lists of trees arranged by flower color, hardiness, utility, original home, etc., a long bibliography, a list of individuals who collaborated in preparing the present book by forwarding suggestions, photographs, etc., and a subject index. This is a volume which is easily read and put aside to be picked up again, but it is one which must be kept as a constant reference by persons who are interested in ornamental trees. The author is a well known horticulturist of southeastern Florida and comes from a family well known in the fields of medicine and psychiatry.

GMH

"A NEW DICTIONARY OF CHEMISTRY." Edition 4 by L. Mackenzie Miall and D. W. A. Sharp, IX, 638 pp., many unnumbered tabs. and figs. Longmans, Green & Co. Limited, Burnt Mill, Harlow, Essex (England). 1968. 84s. = $14.00.

While labeled a "dictionary" this work it seems to me comes closer to being a kind of cyclopedia. One thinks of a dictionary as possessing brief definitions, sometimes almost in the order of equivalent or synonymous words. In this work in actuality there are many more words defined than would appear from considering the bold-face type entries alone; an index would have been helpful by multiplying the actual access words available and would have made the book more useful as a "ready" reference. The definitions and statements are very well written, being lucid and nicely balanced. Many technical terms are hidden in the text and available as to meaning

by their use in context. Thus, in the definition of glycoside, "glucoside" and "methyl glucoside" occur. Types of information available include: biographical (ex. Birkeland, D.), classes of compounds (ex. bismuthates), special compounds (ex. aldosterone), descriptive chemical terms (ex. alicyclic), processes (ex. amylo process), reactions (ex. Friedel-Crafts reaction), chemical laws (ex. mass action law), elements (ex. zinc), crude materials (ex. Cinchona), trade names (ex. Birlane), and so on. The English spelling is of course used as one would expect (ex. sulphur). The book is somewhat more useful for general information than for multitudinous special or specific names. No entries were found for the following: spectrophotometry, photometry, (ultra-violet) spectroscopy, glucides, polyosides, polyose, saccharose, exthoxose, tensides, surfactants, colloids, aggregation, spiroketal, molecularity, glucosinolate, phytoene, tetraside, rotenoids, apoprotein, flavonoids, isoflavones, Enslin no., sulfhydryl, glucopeptide, arsonium, resinols, oses (much used for sugars in USA), ammoniac (aq. soln. of NH_3), electropherogram, corrin, glucides (carbohydrates), glucokinase, flavanone, catecholamines, Tris, units (ex. lambda), terpinol, polyols, sugar alcohols, chlorins (chlorophyllin bases), leucoanthocyanins, ergoline, tarkonin indoline alkaloids, picropolin, thiaminase, abbreviations (ex. R_f, R_m), thiolans, Witepsol, oxazolones, palmitoleic acid, holozyme, apoenzyme, carbolines, bufenolides, cardenolides, steran(e)s, saccharides, sutilans, paolins, and others.

GMH

"SOURCES OF FREE AND INEXPENSIVE TEACHING AIDS" by Bruce Miller. Pamphlet: 28 pp. Bruce Miller Publications, Box 369, Riverside, California. 1962. $.50.

Brief statement of methods of requesting and utilizing teaching aids is followed by an alphabetic listing of 115 science topics (Adult Education to Weather), each with one to several items (over 200 items are listed). Most sources are private concerns, a few are governmental.

GMH

"A BIBLIOGRAPHY OF BOOKS, PAMPHLETS AND ARTICLES RELATING TO IRISH LICHENOLOGY, 1727-1970" by M. E. Mitchell, viii + 76 pp. Published by author, Dept. of Botany, University College, Galway, Ireland. 1971. £ 2-50.

A listing of references alphabetically by author, with complete citations (numbers 1-422) is followed by an index of subject coverage (anatomy, chemistry, etc.) and an index of geographical locations (counties of Ireland). The book is bound in hard cloth covers.

GMH

"THE FLORIDA HANDBOOK, 1967-1968" by Allen Morris (compiler), viii + 536 pp., many figs., maps, tabs. The Peninsular Publishing Company, Tallahassee, Florida. 1967. $6.50.

In this attractive volume, with the tower of the Florida State Capitol printed on the front cloth cover, the Florida State Seal on the back cover, and the Florida State Flag on the spine, one can obtain a great deal of information about this attractive state and its prosperous and generally happy natives. On turning to the inside of the front cover ("flyleaf") a map of the State and a list of counties and county seats appears together with important data in tabular form on Florida. The back flyleaf bears reproductions of State currency issued during the Confederacy. The contents within are of undoubted interest to many classes of people both inside and outside of the State--the businessman, the visitor, the politician, the retiree, the ordinary resident. Although there is an excellent terminal index, no table of contents appears in the first part of the book, so that the general contents of the book are unknown until one has taken the time to leaf through it. Such a table would be a very useful addition to this fine book, without question.

GMH

"THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE" edited by William Morris, L + 1553 pp.; ca. 4,000 figs. (unnumbered), ca. 200 maps (unnumbered). American Heritage Publishing Co., Inc. and Houghton Mifflin Co., Boston/New York/Atlanta/Geneva, Ill./Dallas/Palo Alto. (American Heritage Publ. Co., 551 Fifth Ave., New York 10017). 1969. $12.50 (deluxe).

On opening this new dictionary, one is surprised to find illustrating each page not line drawings as conventionally used but for the first time in a dictionary photographs. These are used along with line drawings, reproductions of paintings,etc., with much effectiveness. Thus, turning at random to page 1143, we find to this page as to others three colums--two of words, the third of illustrations. On this page occurs a diagram to show the make up of Sagittarius (constellation), a line drawing of the sailfish, and three photos showing (respectively) saguaro (the cactus), the Saint Bernard dog, and the saiga (Saiga tatarica, antelope). There are many attractions in this dictionary with its definitions of 155,000 words--the clarity of its typeface, its up-to-dateness, its inclusion of many slang and less proper terms, its etymological derivations, and so on. Samplings on many pages indicate a high degree of accuracy in scientific and other terms included. Comparison with other dictionaries showed instances where the AH dictionary was superior. For instance, the treatment of primary colors (not found in the most popular "comprehensive unabridged" dictionary).

Several consultants were noted in the fields of biology (5), botany (4), zoology (6), bacteriology (1), etc. but none for pharmacy, pharmacology, pharmacognosy, medicine (per se), as far as could be told from the listing. Suggestions for improvement: (1) leave a few blank pages at the end to encourage annotations by the user. Submission of the same for use in later revisions might also be encouraged. (1) Add a listing of other dictionaries in specialized fields--ex. chemistry, botany, psychology, medicine, etc. Terms suggested for inclusion: spoiler (as applied to automobile); bossa nova (Brazilian music); Crotaline (referring to the Crotalidae, rattlesnakes); shafted (US slang), failed in course or examination; welterweight (US slang): wife; piffed (US slang): drunk (insane ?); guesstimate (US slang): a calculated conjecture; gimmick ("origin unknown"; does it not derive from "gimme" (give me)?); goofballs (US slang): amphetamines; bookcerpt (US slang): quotations from a book (cf. excerpt); hoke (US slang): exaggeration; saddleleaf (leaf of yellow poplar or tulip tree); Gus: short for Augustus; Lum: short for Columbus; Meg: short for Margaret; Sissy: short for Elizabeth; blend (US negro slang): marry; karyology (caryology): the science of nuts; solanberry. Error: page 239: Christmas rose: properly called Black Hellebore not Hellebore.

GMH

"HANDBOOK OF ROCKY MOUNTAIN PLANTS" by Ruth Ashton Nelson, ii + 336 pp., 1 portr., 433 line figs., 9 pls. (halftones), 1 map, 1 diagram, 75 col. pls. Dale Stuart King, 2002 N. Tucson Blvd., Tucson, Arizona 85716. 1969. Cloth $6.95/ card cover $4.95.

This is a useful guide for identifying and studying 975 taxa of plants which are found in the mountains from northern New Mexico and Arizona to southern British Columbia, Canada. The elevations inhabited by the plants of this volume range from ca. 5,000 feet to over 14,000 feet, running from the montane zone to the timberline and elfin timber areas. To aid the beginner, there is a glossary of terms, as well as a list of reference books and pamphlets; an introductory section also discusses various plant structures and the technical terms used. There is useful information on using a diagnostic key such as the one included here. Part I informs the reader on the environment of the Rocky Mountains, including climate, soils, geological processes, plant succession, recognized vegetational zones, etc. In the detailed portion covering individual taxa there are miscellaneous data of interest, including mode of use of the plant. This represents a very useful work.

GMH

"SMOKE SCREEN: TOBACCO AND THE PUBLIC WELFARE" by U. S. Senator (Mrs.) Maurine B. Neuberger, xiv + 151 pp. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1963. Cloth $3.95.

Senator Neuberger of Oregon has performed a very useful service here in unmasking the great conspiracy to conceal the truth of the great dangers to health of cigarette smoking. The reason for the difficulty of so many persons and concerns in accepting the demonstrated and demonstrable hazards in this common habit of modern humanity lies of course to a very large degree in the fact that this "weed" is the mainspring of one of our biggest industries and the chief crop of hundreds of thousands of farm families. There is also of course the personal viewpoint here, with the individual's long standing usage; he fails to understand that the "smoking stick" is so dangerous because he has smoked it for years, still survives, and is skeptical of any harm to his own health. It is also difficult for many to comprehend that there is anything inherently wrong in anything which is performed so often by so many people as smoking. The attitude of some seems to be--"If I can't smoke and enjoy living, why then, I might just as well die and be done with it." All of these factors and many others are brought out in this most interesting and--we hope--widely read volume. Index.

GMH

"PHYTOPATHOLOGISCHES PRAKTIKUM: VERSUCHSANLEITUNGEN UND LABORATORIUMSMETHODEN FÜR STUDIUM UND PRAXIS" by F. Nienhaus, 167 pp., 61 figs. Paul Parey in Berlin und Hamburg, Lindenstrasse 44-47, 1 Berlin 61. 1969. DM. 26.

In this most practical and lucid laboratory manual, Professor Franz Nienhaus, of the Institut für Pflanzenkrankheiten of Bonn, has succeeded in making of phytopathology an interesting and attractive field. An abundance of drawings and diagrams with succinct yet adequate instructions for performing the various experiments has importantly contributed to this handy manual. Among the several useful features of the book is the section following the end of the 114th exercise (the last one): A glossary ("explanation of technical expressions") is followed by an elaborate bibliography, and this by an appendix with many formulas and pragmatic suggestions for improving laboratory procedures. There is apparently no explanation for some of the abbreviations used in several figures (ex., Nos. 18-19, 22, 23, 25, 28-30, 32-33). This book should be successful in an English translation.

GMH

"PLANT STRUCTURE AND DEVELOPMENT: A PICTORIAL AND PHYSIOLOGICAL APPROACH" by T. P. O'Brien and Margaret E. McCully, x + 114 pp., 155 figs. The Macmillan Company, New York; Collier-Macmillan Ltd., London. 1969.

In this book with its almost letter-size (8.5 in. x 11 in.) pages, strong hard-back cloth binding, fine reproductions of photographs and microphotographs, and sharp typeface, we have an attractive introduction to an important and fascinating subject--the architecture and the story of growth of plants. In a Foreword by K. V. Thimann, the book is described as furnishing a genuine "physiological anatomy" of the type envisioned many years ago by O. Haberlandt, whose name however will not be found in any of the reference lists of bibliography which appear at the end of each chapter. The main body of the text is followed by an appendix (methods of specimen preparation) and a brief subject index. There are chapters successively on the cell, mitosis, root, shoot apex, leaf, bud, stem, reproductive tissues, and seed. To illustrate the treatment, the chapter on the leaf may be taken as an example (p. 49): the chloroplast is first discussed, followed by the epidermal cells, cuticular wax, stomata, glands and mechanical trichomes, and leaf abscission. There are many photographs (including numerous electron microphotographs) of such structures as trichomes, guard-cells, glands, petiole abscission zone, etc.

GMH

"COMMON WILD FLOWERS OF MINNESOTA" by G. B. Ownbey (text) and Wilma Monserud (illustrations), xiii + 331 pp., 314 figs., 1 map. Univ. Minnesota Press, Minneapolis, Minn. 1971. $9.75.

In this illustrated manual there are included 306 plant entities of the Angiospermae, the Monocotyledonae occupying the first 64 pages, the Dicotyledonae the pages running from 65 to 316. In the last part of the book, there is a glossary followed by the index of plant names (scientific and vernacular). The illustrations made from pen and ink drawings are excellent, showing up to 8 numbered parts to each figure. Thus, for instance, the very first figure of Alisma plantago-aquatica shows habit of entire plant, one basal leaf, the (apical) inflorescence, one flower, a fruit cluster from below and from above, a face-on view of a fruit (achene) and a lateral view. Aside from the introductory notes, all of the text is that adjacent to the figure, consisting of the family name , vernacular and binomial names, legend for the figures, and a brief description with habitat and geographic range information. Dr. Ownbey is Professor of Botany at the prestigious University of Minnesota and Miss Monserud is a former botanical artist there. The book is a most excellent one and is recommended for the layman as well as for the more informed student of botany.

GMH

"A CHRONOLOGY OF PLANT PATHOLOGY" by G. K. Parris, vi + 167 pp. Johnson and Sons, 111 N. Lafayette St., Starkville, Mississippi. 1968. $2.00.

Presented here is a novel history, novel in that it is not like most chronologies, simply a list of dates with brief notations of individuals, events, etc., following. Instead, the author has inserted after each date carefully prepared sentences (one or usually more) giving in good literary style the discoveries, publications, authors, etc. Apparently, the author got the nucleus of his idea from a booklet of Prof. H. H. Whetzel (Cornell University) entitled "An Outline of the History of Phytopathology"; Saunders, 1918), elaborating, correcting, and of course updating this compilation. Following the chronology is a bibliography, mostly of books, and the detailed index.

GMH

"FREE AND INEXPENSIVE EDUCATIONAL AIDS" Edition 3 by Thomas J. Pepe, XIII + 175 pp. Dover Publications, Inc., 180 Varick St., New York 10014. 1966. $1.75.

Unlike many of the Dover books, this is not a reprint but an original edition of the Company. Included are audio-visual and other teaching aids, including pamphlets, bulletins, booklets, folders, leaflets, posters, portfolios, charts, notebooks, listings, serial publications, films, film-strips, slides, workbooks, instruction notes, loose-leaf note sheets, catalogs, magazines, kits, maps, picture sets, etc. The following subjects are covered: agriculture, arts and crafts, business and labor, communications, conservation, energy and fuels, government, guidance and career, health and hygiene, homes and homemaking, languages, manufacturing, music, nutrition and diet, pets, safety, science and weather, social studies, and transportation. Following the listings there is a list of the companies and their addresses, an index of audio-visual aids, and a general index. This will be of much interest to teachers at various levels of instruction.

GMH

"A MANUAL OF PLANT NAMES" Second (revised) Edition, by C. Chicheley Plowden, 260 pp., 10 figs. Philosophical Library, 15 East 40 St., New York 10016. 1970. $10.00.

The author is the keeper of an inn (The Royal Oak) in Lancastershire, England, and at the same time a keen student of plants who (fide the writer of the Foreword, Mr. F. W. Loads) can identify numerous plants by examination of a mere scrap. He demonstrates in this volume through presenting a wealth of information his ability and knowledge in the botanical field. The book would have been more useful because more accessible content-wise if a table or index to contents had been inserted

in the front part of the text. The contents are made up of eight parts all but parts 5 to 8 inclusive being in alphabetic order: (I) Generic names, with equivalent common names and derivation of the name. (pp. 21-82) (II) Specific epithets (with meanings and occasionally derivations). (pp. 83-116). (III) Common names, equated to the botanical names. These names are arranged by the principal part of the name (ex. Balm, Bee), and are those mostly used in England (for instance, "monkey grass" used in the USA is not given). (Derivations would have been interesting.) (pp. 117-174). (IV) Technical botanical terms, with definitions; ex. manicate. (pp. 175-191). (V) The flower and inflorescence: discussion of size and other characters, with diagrams. (pp. 193-9). (VI) The leaf: form, size, etc. (pp. 201-210). (VII) The plant system with classification into groups. Families given in the Englerian order under four phyla; general remarks are given on size of family, economic importance, etc., followed by a list of representative genera included in the family. (VIII). The index of plant families, both the Latin and English names. (pp. 255-260). (Errata: Lavandula p. 247, and Hieracium p. 136, are misspelled.) The origin of the generic name Mentha is not given; piperitus is omitted under specific epithets. In the bibliography on page 217, the second edition of Lawrence's Taxonomy and the seventh (1966) edition of Willis' Dictionary could have been cited as those currently available. In the tabulation of plant groups, the thallophytes and bryophytes received bare mention, none of the genera being named. In view of the frequency of plant diseases, mention of a few fungal genera of particular importance in a negative way might have been useful. To sum up, this is a very useful book especially for the horticulturist; however it would be of service to any plant student and should be considered a useful reference work for the science as well as for the botany library.

GMH

"MICROBIOLOGY: AN INTRODUCTION TO PROTISTS" Edition 1, by J. S. Poindexter, viii + 582 pp., many figs. and tabs., 1 col. fig. The Macmillan Company, New York. c. 1970. Price ?

Protistology is the term sometimes now used as equivalent to microbiology, the study of the protists or Protista, otherwise known to the layman as the microbes and to many scientists as microorganisms or microscopic protists. The group runs parallel with the organisms studied in botany and zoology, in other words the protists represent a kingdom of organisms. Even though this concept was proposed by Haecke in 1866, it has not yet been officially accepted although it is expected to be adopted at a future time. The Protists include the "unicellular" (better "acellular") organisms and those multicellular organisms where the body is made up of undifferentiated tissues, hence

representing both microscopic and macroscopic organisms. (The term Protista is preferred to microorganisms because the latter denotes only microscopic-sized organisms). The Protista are understood as including the Bacteria (in 10 orders, such as the Hyphomicrobiales) (pp. 149-99), the Fungi (Lower 4 classes, as Phycomycetes; higher, including the Acomycetes, Basidiomycetes, Deuteromycetes) (pp. 201-60), the Protozoa (in 4 phyla, including the Sporozoa) (pp. 261-310), the Slime Protists in 4 groups, intermediate between the fungi and the protozoa, including the net slime molds (Labyrinthulæ), endoparasitic (Plasmodiophoromycetes), plasmodial (Myxomycetes to botanist, Mycetozoa to zoologist), and cellular slime molds (Acrasiae) (pp. 311-8), and the Algae in 10 divisions (pp. 319-88). The Algae are classed into the eucaryotic (with cells having nuclei bounded by a membranous envelope during at least part of the life-cycle) and the procaryotic (those in which the nucleus is not bounded by a membrane), the latter being regarded as the more primitive state. In this work, the viruses are not considered as true organisms, but rather as "infective cell products", non-living masses of protein with RNA or DNA which are capable of extensive reproduction; three groups are recognized: the bacteriophages, plant viruses, and animal viruses . Chapter 7 is devoted entirely to the viruses. There are two indexes--one of various organisms, the other a combination index and glossary. Two terms not found: Schizophyta; Schizomycetes.

GMH

"MANUAL OF WAYSIDE PLANTS OF HAWAII; INCLUDING ILLUSTRATIONS, DESCRIPTIONS, HABITS, USES, AND METHODS OF CONTROL OF SUCH PLANTS AS HAVE A WILD NATURE OF GROWTH, EXCLUSIVE OF FERNS" by W. T. Pope, iv + 289 pp., 160 pls. Charles E. Tuttle Co., Rutland, Vt. 1968. $6.00.

This is a semi-popular book, reprinted from an original edition of 1929 (Advertisers Publishing Co., Honolulu, Hawaii). It contains descriptions and other pertinent information on about 160 species of wayside plants (herbaceous plants found along roadsides, in fields, and in waste places). Most of the plants are not native to Hawaii but represent naturalized taxa, common in other parts of the world with similar climate. A flower color key at the front is of some service in identifying the plants and is based on the predominating color of the flowering parts. There are also lists of medicinal, toxic, and weed species. At the end of the book there is a bibliography and index.

GMH

"INFRASPECIFIC CHEMICAL TAXA OF MEDICINAL PLANTS" by Péter Tétényi, 225 pp., 14 figs., 2 tabs., Chemical Publishing Co. Inc., 200 Park Ave. So., New York. 1970. $15.00

This attractive volume was written by an internationally famous phytochemist, the Hungarian Dr. Tetenyi, Director of the Research Institute for Medicinal Plants, at Budapest. In it is contained a great deal of information on the chemistry of plants as this relates to their classification, especially within the species. This phase of plant classification is not new but the active application is only now being pursued to an important extent. The current importance is demonstrated by the large number of plant taxa included in this book: ca. 780 species in 106 families.

While the author has drawn on publications in every language for his work, it incorporates much of his own work as well. There are 21 reference in which he is the senior author and of course many more where his name does not appear in alphabetic sequence since not the senior author. Some of the references from eastern Europe appear in the Cyrilliac alphabet, but these are translated into English as a rule. Many abbreviations are used throughout, but fortunately a key is given to facilitate our understanding of their meaning and there is also an added convenience in the form of a book marker card with the chief abbreviations used.

GMH

"THE ALGAE OF ILLINOIS" by Lewis Hanford Tiffany and Max Edwin Britton, xiv + 407 pp., 108 pls. with 1186 figs., Hafner Publishing Company, Inc., 866 Third Ave., New York, 100 22. 1971(1952). $14.95.

This volume is an unaltered facsimile reprint of the 1952 edition, unaltered that is except for pages iii and iv, representing the altered title page and copyright notation. The volume was published nearly 20 years ago as the second of a series intended to record data on Illinois Algae, the first number being Britton's "A Catalog of Illinois Algae". The introduction discusses the physical features of the State of Illinois, and gives information of a general nature on the distribution of the various phyla of Algae in the state. Following this is a brief key to the nine classes of Algae recognized. These are then taken up in systematic fashion, in the order of phyla: Chlorophyta (with Chlorophyceae); Chrysophyta (with Xanthophyceae, Bacillariophyceae, and Chrysophyceae); Pyrrophyta (with Dinophyceae); Euglenophyta (with Euglenophyceae); Myxophyta (with Myxophyceae); Rhodophyta (with Rhodophyceae). This is followed by a catalog of doubtful species (5), a Glossary, a Bibliography, and the Index. Within the individual treatments of classes, along with a general description there is a key to genera, and within the generic treatments usually a key to the species. Descriptions of the species follow, accompanied

by clean well drawn line figures, There can be no fault found with the reproduction of either text or figures. The authors were well established in their field. Tiffany, who died a few years ago, was a native of Illinois, born 1894, and for most of his career was an outstanding Professor at Northwestern University's Department of Botany. Britton (born 1926) was also a professor at Northwestern, presumably one of Tiffany's graduate students, since he got his Ph.D. at Northwestern in botany. Without question this volume should be in every library dealing with biology, botany, the water sciences, and ecology.

GMH

"TOPICAL TIME (...topical stamp journal)", pp. 1-72, vol. 16, No. 5 (Sept.-Oct., 1965), American Topical Association, 3306 N. 50th St., Milwaukee, Wisc. 53216. Subscription price $3.00 per yr.

Topical philately is an increasingly popular field, where the collector instead of arranging his stamps of all kinds in a strictly chronological or stamp album order, collects stamps from all countries which are devoted to a certain theme. Thus, in the issue noted, there are articles on pharmacy on stamps, flowers, missles and space, Grecian costumes, chemistry, jet planes, religion, President and Mrs. Franklin D. Roosevelt, the history of Andorra, etc., each with its listing and descriptions of stamps pertaining to this particular subject. This is a dynamic and highly interesting field for collectors.

GMH

"PLANT FORM AND FUNCTION. AN INTRODUCTION TO PLANT SCIENCE" (Reprinted with corrections.) by Gerard J. Tortora, Donald R. Cicero, and Howard I. Parish, X plus 566 pp., many figs. and tabs., Macmillan Co., New York (Collier-Macmillan Ltd. London). May, 1970.

This large and impressive volume is a beginning textbook in botany which should supply the interested and serious student with an excellent overlook of the field. It is interesting to read, as far as noted accurate, and covers nearly every important area in the field. At the head of each chapter (also on the first page) there is a blown-up figure without title and in all but one or two cases made from another figure in the book, which page may be distant from the photo blow-up. Since these illustrated structures may not always be familiar and since they are not indexed anywhere in the volume, the following tabulation may be of use to the person perusing the work:

Chapter	page of text	Subject	Page of original smaller Photo
Heading	i	Volvox (?)	4 (?)
1	1	Marchantia	6; 447
2	23	Anthoceros	448
3	59	chloroplast	78
4	95	elder stem x.s.	118
5	131	Sarracenia	126
6	161	leaf abscission layer	125
7	171	guttation	192
8	201	pepsin crystals	208
9	217	nodules in soy root	176
10	241	Rhizopus	5
11	263	Mimosa pudica leaf center	290
12	293	stem section	125 (second use of same fig.)
13	325	lichen	5
14	333	Carboniferous swamp forest	354
15	363	Bacillus cereus	(p. iv: text)
16	381	diatoms	392
17	413	Physarum plasmodium	416
18	439	Marchantia capsule	447
19	457	Equisetum	7; 472
20	483	Pinus cone, female, sectioned	492
21	503	Morchella pileus (detail)	430

There are chapters on taxonomy, physiology, biochemistry, morphology, histology, phylogeny, genetics, evolution, etc., with individual chapters on the Algae, Fungi, Bryophyta, Pteridophyta, and Spermatophyta. - The book should be considered for purchase by every library with scientific content. We can never have too many books treating of this most important subject.

GMH

"PLANT MATERIALS OF DECORATIVE GARDENING: THE WOODY PLANTS" by W. Trelease, xliii, 188 pp., Dover Publications, Inc., New York. 1968 (Ed. 5) $2.00

This is a facsimile reproduction of the edition published in 1940 by Constable & Co., London. Many diagnostic keys are provided, along with sufficient description to allow a person to determine almost any tree, shrub, or woody climber used in landscaping, gardens, or on city streets. 1,150 different plants are covered, belonging to 127 genera. Information on using the keys, an elaborate glossary of terms, and an index make the volume

handy to use. The plants are those which would be encountered in east and central USA and in northern Europe.

GMH

"HELECHOS. VOLUMEN I, TOMO I" by V. Vareschi, 468 pp., 81 pls., 7 photos; Vol. I, Tomo II pp. 469-1041; 126 pls., 1969. Represents part of "Flora de Venezuela dirigida por Tobias Lasser." (Ed. Especial del Instituto Botánico, Ministerio de Agr. y Cria, Caracas, Venezuela.

In this work on the ferns of Venezuela, there are many diagnostic keys, descriptions, synonymies, data on distribution, bibliographies, etc. Tome 1 covers classes Lycopodiinae, Psilotinae, Isoetinae, Equisetinae, and Filicinae (in part). The families in the latter class covered in tome 2 are: Aspleniaceae, Blechnaceae, Pteridiaceae, Vittariaceae, Acrostichaceae, Polypodiaceae, Marsiliaceae, and Salviniaceae. Terminal index in tome 2. There are many comb. nov. and var. nov. described. 110 families are represented in Venezuela and included in this volume. This work seems to represent an important addition to our literature on the Pteridophyta.

GMH

"IMAGINATION IN SCIENCE." by J. H. van't Hoff. Translation and introduction by G. F. Springer. (Vol. I of Molecular Biology, Biochemistry, and Biophysics.) II + 20 pp., 1 portr., Springer-Verlag, New York, Inc., 175 Fifth Ave., New York 10010. 1967. $1.65.

In this brochure is given in English the text of an address made early in his career by the great savant, at the time of his installation as full Professor of Chemistry at the State University of Amsterdam. His age was 36 years, the date Oct. 11, 1878. In this inspiring speech van't Hoff pointed out the great importance in science of the powers of the imagination and showed how the great minds of the scientific world have so often been men with this characteristic in abundant quantity. He shows that many of the workers in science have had broad interests in other fields and in particular in such unrelated subjects as poetry, painting, music, and theology. Part of the lecture is devoted to a defence of Van't Hoff's ideas as they were bitterly attacked by the chemist Kolbe, a long quotation of the latter being included in the early part of the lecture. Kolbe had criticized van't Hoff's ideas on stereochemistry in what must be considered a rather insulting and violent matter. Van't Hoff makes an appropriate reasonable and unexcited response, which leaves him the victor in the dispute. The text was previously published only in Dutch, German, and French.

GMH

"PROCEEDINGS OF THE FOURTH INTERNATIONAL TOBACCO SCIENTIFIC CONGRESS," Athens, 1966. LIII + 1128 pp., many figs. and tabs. (Organized by CORESTA and the National Board of Greece.) 1971 (ca.) (S.D.). S.P.

This large bound volume represents both the contents of the scientific papers presented and the record of the meetings of the congress in Athens sponsored by CORESTA (Centre de Cooperation pour les Recherches Scientifiques relative au Tabac (France)) and the National Tobacco Board of Greece. The latter part covers only 53 pages, while the great bulk of the volume is taken up with the many scientific papers. 47 countries were represented at the Congress, including many countries on both sides of the iron curtain, from Algeria to Zambia. Part I is bilingual, English and French, whereas the scientific papers are published in the language of the author with a summary in the other language (English-French). Many of the papers include terminally a "debate" or discussion by members of the audience, often with participation by the author. Besides the brief summary of contents at the beginning of the volume, there is a detailed table of contents and an alphabetized index of authors at the end. In Theme I, "The tobacco plant," Section 1 deals with the nutrition of tobacco (water relationships, manuring, and fertilizers), section 2 with cultural practices and mechanization of agricultural procedures, section 3 with harvesting and cure, section 4 with plant protection--pathogens (fungi and bacteria) and root parasites (nematodes), section 5 with the general genetics of varieties and hybrids of Nicotiana species and specifically genetic resistance to Peronospora. Theme II, "Tobacco products and smoke," includes section 1, physical and chemical analyses of raw and manufactured tobacco, section 2 technological characteristics of the manufactured products, section 3, the physics and chemistry of tobacco smoke and of the processes involved in its formation, including both the physical and chemical analysis of tobacco smoke. No mention could be found of the potential dangers and injury from smoking of cigarettes, etc., and this may well have been a taboo subject at this congress meeting. An interesting feature of this meeting is the discussion on control of fungal infections by development of resistant strains of tobacco instead of combatting the fungus with fungicides, as previously done. Such means of biological control are much to be applauded and hopefully all of our pests will one day be taken care of in this way, thereby avoiding the atmospheric, soil, and water pollution which has been so hazardous in the past.

GMH

Index to authors in Volume Thirty

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Index to supra-specific scientific names in Volume Thirty

Revised publication dates & publication dates for Volume Thirty

Vol. 29, no. 5 — December 24, 1974
Vol. 29, no. 6 — December 24, 1974
Vol. 30, no. 1 — January 10, 1975
Vol. 30, no. 2 -- January 25, 1975
Vol. 30, no. 4 -- February 21, 1975

Because of the uncertainties of publication schedules and unpredictable delays in postal service, we shall henceforth give at the close of volumes only the dates when numbers actually are definitely known to have been officially and validly published.