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INDUCED LESIONS IN MICE CAUSED BY SACCHAROMYCES CEREVISIAE
WILD-TYPE AND SELECTED PHENOTYPES OF THE APOLLO 16
MICROBIAL ECOLOGY EVALUATION DEVICE

M. J. Kennedy and P. A. Volz

Mycology Laboratory
Eastern Michigan University
Ypsilanti, Michigan 48197

Abstract: Saccharomyces cerevisiae Hansen was exposed to spaceflight parameters during the deployment of the Microbial Ecology Evaluation Device on Apollo 16, then returned to earth for post-flight analysis. Space parameters included ultraviolet light at known wavelengths and intensities in addition to weightlessness. Induced lesions caused by inoculations of the spaceflight cells were systematically monitored in mice. Variations occurred among the recovered phenotypes as compared to the wild-type ground control. Results were similar to data collected immediately after yeast cell recovery from space, after a seven year period of colony growth and transfer.

Materials and Methods: Vegetative yeast cells of Saccharomyces cerevisiae Hansen y2439 were housed in distilled water or dry in 0.05 ml volume square cuvettes within the Microbial Ecology Evaluation Device (MEED) spaceflight hardware of Apollo 16. Each cuvette contained a quartz window and a series of filters to regulate the ultraviolet light (UV) wavelength and intensity at exposure in space (Taylor, 1970). The MEED was deployed at a 90° angle to the sun for 10 min + 7 sec during the transearth Extra Vehicular Activity (EVA) of Apollo 16 (Volz, 1975). Fungi in the flight hardware were exposed to 254, 280, and 300 nanometers (nm) UV light at various energy levels during deployment and attachment of the MEED flight hardware on the television campole extension and Command Module hatch (Volz et al., 1974). After exposure, the flight hardware was stowed and returned to the laboratory at splashdown (Volz, 1974). Fungal cells housed in the flight hardware were placed on Sabouraud maltose agar and initially studied for survival capabilities according to exposure levels in space (Volz and Dublin, 1973).

Phenotypes for the present study were obtained from viable cells collected in postflight analysis. The phenotypes were selected by alterations in colony morphology and growth rate (Volz, 1973). Six phenotypes and the wild-type ground control were used in the current study. The seven isolates were maintained for seven years in continual growth and colony transfer on Sabouraud maltose agar.

Swiss Flow DUB/KR mice were pretreated with 20 mg/ml inoculations of hydrocortisone succinate, two inoculations at one week intervals, for two weeks prior to the introduction of the yeast test organisms to repress the defense system of the animals.

Mice then received 0.2 ml cell suspensions in 0.9% saline intraperitoneally, at a cell concentration of 1×10^9 cells per ml, with three inoculations at one week intervals. Autopsy was performed

when changes in the normal behavioral activity in the animals were noted, two weeks after inoculation. Approximately 0.25 g material from isolated lesions were inoculated on Sabouraud maltose agar for yeast cell recovery. Replicates of three animals were used for each test phenotype and control.

Results: The spaceflight exposures received by the phenotypes are presented in Table 1. Morphological diversification in phenotypes compared to the parent strain, survival rates and exposure parameters were the principal method in selection of the test organisms for the present study.

Viable cells were recovered from mouse tissue streaked on agar plates as shown in Table 2. Subcutaneous mouse lesions of S. cerevisiae wild-type and phenotypes were large and quite well circumscribed. Yeast cells were recovered from the subcutaneous region, however, the cells did not involve the overlying skin. Budding yeast cells were very abundant. Liver lesions initiated by phenotype 7012-4 were large, while lesions caused by phenotype 7027-2 were small and fairly walled off. These results are similar to those of Hiebel and Volz (1977) who found that the lesions were necrotic and infiltrated with a mixture of polymorphonuclear cells surrounded by monocytes, including many lymphocytes and macrophages.

Discussion: Varying degrees of inflammatory responses were noted with the wild-type and phenotypes. Order of reactivity observed in mice from the most severe to the least was phenotype 1420-1, 7027-2, 7024-2, 1435-2, 1440-1, the parent strain, and phenotype 7012-4. Most of the phenotypes gave very diffuse and very intense reactions sometimes to the point of being a true abscess, and many of the cells would often proliferate in the host.

Variations in host reactions were noted between the yeast phenotypes that were initially exposed to specific wavelengths and intensities of UV light in space. In all cases but one, more viable cells were recovered from the dermal lesions induced by the phenotypes than from the lesions initiated by the wild-type ground control.

Of the four fungal species included in the Apollo MEED experiments, S. cerevisiae phenotypes produced the most severe inflammatory responses at yeast phenotype recovery immediately after exposure to the space environment (Volz and Hiebel, 1977). After seven years of continual growth in the laboratory, the S. cerevisiae isolates in the current study demonstrated similar severity in producing induced lesions in Swiss Flow DUB/KR mice.

Summary: The cellular response to Saccharomyces cerevisiae Hansen and spaceflight phenotypes was a foreign reaction and induced lesions. Response variation was a result of the exposure parameters to UV light. Phenotypes, with the exception of one, retained a higher recovery rate in lesions compared with cells isolated from lesions induced by the wild-type.

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Table 1. UV light exposure parameters for the yeast strains selected for induced lesion studies.

Phenotype	Wavelength (nm)	Intensity (ergs/cuvette/ 10 min)	Cuvette Moisture
Parent [@]	---	---	---
1420-1	280	2.4×10^4	wet
1435-2	300	7.0×10^4	wet
1440-2	254	3.5×10^4	wet
7012-4	280	9.4×10^3	dry
7024-2	300	4.2×10^4	dry
7027-2	254	9.6×10^3	dry

[@]Parent wild-type control culture housed on ground at 25 C with no light exposure.

Table 2. Average number of colony forming units per plate obtained from wild-type and phenotypes recovered from mouse tissue.

Strain	Skin	Liver	Kidney	Spleen
Parent	9	6	2	9
1420-1	490	0	0	0
1435-2	111	0	0	0
1440-2	51	0	0	0
7012-4	6	5	0	0
7024-2	170	0	1	0
7027-2	303	1	0	0

NEW NAMES IN AMERICAN ACACIAS

R. Mitchel Beauchamp
Pacific Southwest Biological Services, Inc.
6474 University Avenue
San Diego, Ca. 92115

Abstract. The new combination, Acacia minuta, is proposed with an expanded description for Arizonan and Californian populations. A. minuta ssp. densiflora is proposed for eastern United States populations.

For many decades, several populations of acacia in California and Baja California have been assigned to A. farnesiana (Linnaeus) Willdenow (McMinn, 1939; Benson & Darrow, 1944; Munz, 1959). However, Isely (1969, 1973) has noted the distinctiveness of these as well as other United States populations from A. farnesiana, for which he proposed the name A. smallii.

The acacia populations from the coastal regions of the Californias are immediately separable from A. farnesiana in that the Californian populations have a single row of seeds within the legume, while A. farnesiana has two rows. This double row is used to characterize the genus Vachellia Wight & Arnott and, therefore, A. farnesiana (Vachellia f. (L.) Wight & Arn.) (Wight & Arnott, 1834).

The eastern United States populations of this distinctive acacia differ from the Californian populations chiefly by the glabrate leaflets and shorter (3-8 cm) legumes. Populations of this acacia from the Baboquivari Mountains of Arizona are aligned taxonomically with the California material (Isely, 1973) based on foliar pubescence; however they are intermediate by virtue of shorter legume length.

The type specimen of Pithecollobium minutum Jones (1933) was found among the herbarium specimens examined to determine the extent of geographic range and morphological diversity of A. smallii. This specimen is well within the morphological range of the material ascribed to A. smallii by Isely. P. minutum appears to have priority over A. smallii Isely and is still available within Acacia for the taxon. The other available name, Vachellia densiflora Alexander ex Small, is preoccupied in Acacia by A. densiflora Morrison (1912).

Acacia minuta (M.E. Jones) Beauchamp comb. nov., based upon Pithecollobium minutum M.E. Jones, Contr. Western Bot.

18:38, August 1933. Cacachilla Mountains, 20 miles south of La Paz (Morton, 1945) Baja California Sur, Mexico, M.E. Jones 27265 (POM, holotype).

Additional specimens examined: Mexico: Baja California Norte: San Telmo, Harbison & Higgins, 1953 (POM); $\frac{1}{2}$ mi W of San Telmo, 500 ft. alt., Benson 14329 (POM); Santa Gertrudis, Harbison, 1953 (POM); by stream between Santo Tomas Valley and San Vicente, Ferris 8508 (POM, NY); Las Juncas Rancho, Harbison, 1940 (POM, SD); Calmalli, Epling & Robison, 1935 (POM); spring above the village Bahia de Los Angeles, Moran 12414 (RSA, SD). Baja California Sur: San Jose del Cabo, Jones 24012 (POM, SD); 3 mi. upstream Arroyo San Lazero, Cape Region, Thomas 7769 (SD). UNITED STATES: California: San Diego County: San Dieguito Valley, $4\frac{1}{2}$ mi. E of Del Mar, Gander 675 (SD); Federal Boulevard, near Emerald Hills Club House, Gander 113.2 (SD); near Radio Station (Chollas Heights), Higgins, 1952 (POM); on the road to Tijuana, Wolf 2094 (POM); S. of Otay. Roos 2560 (POM).

Because of the minimal description given by Jones (1933), an expanded description as well as an illustration of the San Diego County material (Figure 1) are given.

A usually inconspicuous shrub to 6 m tall; branches weakly zig-zag, well-armed with a pair of white stipular spines 4-55 mm long at each node; leaves alternate or clustered from multistipulate spurs, bipinnate, rachis 18-36 mm long, winged, ending in a weak mucro, puberulent; pinnae 3-5 pairs, 4-24 mm long; leaflets 11-17 pairs, elliptic-oblong, 2-5.5 mm long, asymmetrically attached to the rachis, puberulent, becoming glabrous with age; inflorescence spherically capitulate, 40-70 flowers, golden-yellow to dull orange in age, fragrant, 6-9 mm in diameter (pressed), 1-6 per node; peduncles 13-18 mm, maturing to 24-30 mm long and 10-15 mm in diameter, ebracteate, hirsutulous and becoming glabrous at maturity; corolla 5-lobed, 2 mm long, each lobe green and pubescent; filaments yellow, about 36 in number; legume with 10 mm long stipe, turgid, linear-acuminate curved to sickle-shaped, 7-15 (18.5) cm long, 13 mm in diameter, up to 14 per infructescence, tardily dehiscent by a conspicuous white, double-ridged suture; valves weakly constricted between the single row of 13-15 seeds, pithy, becoming dark brown to black at maturity. Seeds 7 mm long, depressed-ovate, brown with encircling black ridges on the depressed surfaces. Flowering generally from October to April but largely dependent on rainfall.

The apparent priority of Pithecollobium minutum and segregation of western populations within A. minuta also necessi-

tates a change in the nomenclature of the eastern United States populations which most recently had been designated as Acacia smallii Isely (1969, 1973).

Acacia minuta (Jones) Beauchamp ssp. densiflora (Alexander ex Small) Beauchamp, stat. et comb. nov. based upon Vachellia densiflora Alexander ex Small, Man. Se. Flora 655 & 1505. 1933. Synonyms: Acacia densiflora (Alexander) Corey, Rhodora 38-406. 1946 non A. densiflora Morrison (1912); A. smallii Isely, Sida 3(6): 384. 1969.

A. minuta ssp. minuta is now found only as relictual populations (Isley 1973), possibly as remnants of a former arid subtropic scrub plant community (Axelrod, 1958). The San Diego County, as well as several Baja Californian populations, are widely separated and occur in low-lying coastal areas which are generally frost-free.

The roots of this Californian subspecies in cultivation emit a pungent, onion-like odor when disturbed. This same odor is found in the germinating seeds and seedlings. The plants are self-fertile as evidenced by fertile seeds produced by isolated shrubs.

The fruits of all populations observed in San Diego County are infested with a Bruchid beetle and seed predation appears to be heavy, about 80% on dispersed seeds. The surface of the legumes and seeds are often covered with eggs of the beetles, giving a slightly speckled appearance.

Because of their occurrence on the coastal plain about San Diego, the three known California populations of Acacia minuta are seriously threatened with eradication by urbanization.

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Acknowledgements

Much of the initial research on this acacia was carried on by Mr. Charles F. Harbison, regional naturalist and Curator Emeritus of Entomology, San Diego Natural History Museum, who pointed out the distinctiveness of these native Californian acacia populations from cultivated specimens of A. farnesiana. Conversations with Dr. Duane Isely, while on his sabbatical leave at the New York Botanical Garden in 1974 also encouraged further investigation into the regional extent of the populations, especially into Baja California. Dr. Reid V. Moran aided with his critical review of initial drafts of this paper as well as information on the status of populations of the acacia in Baja California.

Nomenclature adjustments made here are necessarily local in scope. Much research remains to resolve the complex of variations in the acacias associated with A. farnesiana.

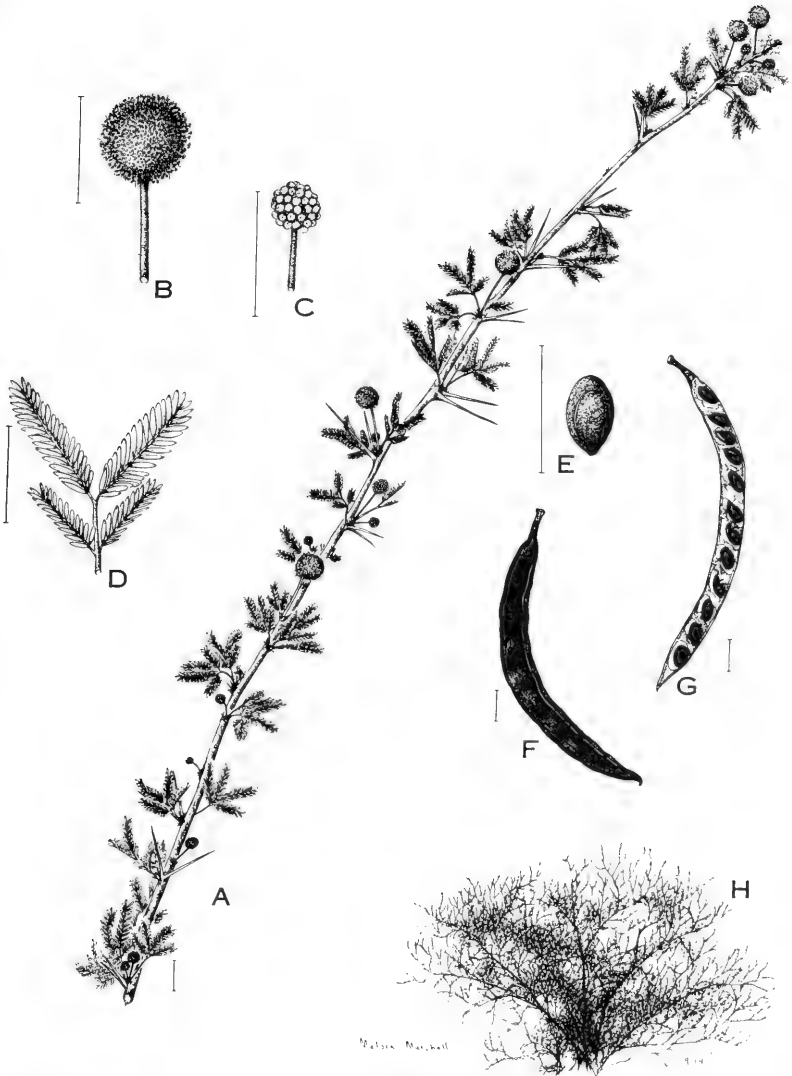


Figure 1. *Acacia minuta* ssp. *minuta*. A-flowering branch; B-inflorescence at anthesis; C-inflorescence in bud; D-single leaf; E-single seed (bar equals 1 cm); F-single legume (bar equals 1 cm); G-longitudinal cross-section of legume showing single row of seeds; H-habit of plant, 3 meters high.

ADDITIONAL NOTES ON THE GENUS *VITEX*. XVII

Harold N. Moldenke

VITEX Tourn.

Additional bibliography: Mold., *Phytologia* 45: 478--495 & 512. 1980.

The *White & Alveston 748*, distributed as *Vitex* sp., actually is a species of *Salvia* in the *Lamiaceae*.

VITEX KRUKOVII Mold.

Additional bibliography: Mold., *Phytologia* 15: 251. 1967; Mold., *Fifth Summ.* 1: 179 (1971) and 2: 926. 1971.

Recent collectors refer to this species as a tree, 5 m. tall, and have found it growing in varzea forest, flowering in June. The corollas on *Prance & al. 13446* are said to have been "white, lower lobe blue".

Additional citations: BRAZIL: Amazônas: *Prance, Maas, Atchley, Steward, Woolcott, Coêlho, Monteiro, Pinheiro, & Ramos 13446* (N, Z).

VITEX KUYLENII Standl.

Additional bibliography: Pittier, *Contrib. U. S. Nat. Herb.* 20: 484. 1972; Fedde & Schust., *Justs Bot. Jahresber.* 53 (1): 1076 (1932) and 56 (2): 286. 1937; Metcalfe & Chalk, *Anat. Dicot.* 2: 1037--1038. 1950; Kribs, *Comm. For. Woods*, ed. 2, 161--162 (1959) and ed. 3, 161--162, fig. 474. 1968; Mold., *Phytologia* 17: 8. 1968; Mold., *Biol. Abstr.* 50: 418 & 942. 1969; Gibson, *Fieldiana Bot.* 24 (9): 234 & 236. 1970; Hocking, *Excerpt. Bot. A.* 15: 421. 1970; Mold., *Fifth Summ.* 1: 77, 81, 82, & 84 (1971) and 2: 720, 721, 728, & 926. 1971; Mold., *Phytologia* 23: 415 & 416. 1972; Molina R., *Ceiba* 19: 96. 1975; Mold., *Phytologia* 44: 409 (1979) and 45: 491. 1980.

Illustrations: Kribs, *Comm. For. Woods*, ed. 2, fig. 474. 1968.

Recent collectors describe this species as a large tree, 24--80 feet tall, the trunk to 35 inches in diameter at breast height, the wood hard, close-grained, and the immature fruit green. They have encountered it in forests, high forests, and cleared swampy forests, on lakeshores and creekbanks, in corozal, and on broken cohune ridges, from sealevel to 200 feet altitude, in flower in February, April, June, and August, and in fruit in May, August, and October. Schipp refers to it as "rare". The corollas are described as "blue" on *Contreras 7597, Dwyer 12842, & Gentle 5551*, "light violet-blue" on *Jones & al. 3031*, "whitish-blue" on *Gentle 6769*, and "light-blue and white" on *Schipp 994*.

Vernacular names recorded for the species include "blue blossom", "flor azul", and "yaxnic". Kribs (1968) gives a detailed description of the wood anatomy, presumably of this species, although he refers also to *V. cooperi* Standl. and lists vernacular

names and geographic distributions which cannot possibly apply to *V. kuylenii*.

Material of *V. kuylenii* has been misidentified and distributed in some herbaria as *V. hemsleyi* Briq.

Additional citations: MEXICO: Guerrero: Webster, Rowell, & Barkley 17M858 (Au). GUATEMALA: Izabal: Contreras 7597 (Ld, Ld, W--2558709), 9886 (Ld, Ld), 10714 (Ld, Ld); Harmon 2481 (W--2705604); Jones & Facey 3500 (Ld, Mi, N); Jones, Proctor, & Facey 3031 (Ld, Mi, N). BELIZE: Dwyer 12842 (Au, W--2787797); Gentle 4610 (Au--188727), 5551 (Ld, Ld, N), 6769 (Ld), 7774 (Au--239604, Ld); Peck 920 (N); Schipp 994 (Ba).

VITEX KWANGSIENSIS P'ei

Additional bibliography: Mold., Phytologia 15: 251. 1967; Mold., Fifth Summ. 1: 290 (1971) and 2: 926. 1971.

VITEX KWEICHOWENSIS P'ei

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 59 (2): 417 (1939) and 60 (2): 576. 1941; Wangerin & Krause, Justs Bot. Jahresber. 60 (1): 753 & 825. 1941; Mold., Phytologia 17: 8. 1968; Mold., Fifth Summ. 1: 290 (1971) and 2: 926. 1971.

VITEX LAMIANA Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Dale & Greenway, Kenya Trees Shrubs 592 & 597. 1961; Mold., Phytologia 15: 252. 1967; Gillett, Numb. Check-list Trees Kenya 47. 1970; Mold., Fifth Summ. 1: 238 & 242 (1971) and 2: 926. 1971; Mold., Phytologia 44: 389. 1979.

Dale & Greenway (1961) comment that this taxon is "Doubtfully distinct from *V. strickeri* Vatke & Hildebrandt", but keys out the two taxa as follows: Leaflets glandular, puberulous on the veins beneath -- *V. lamiana*. Leaflets usually scabrid and more or less rugose above and densely to sparsely pubescent beneath -- *V. strickeri*. For the former he cites Fries 1988, Hildebrandt 2524, and Scott-Elliott 6417 from Kenya, describing the plant as a "Shrub with leaves of 3 ovate leaflets 1--2 1/2 in. long and 3/4 -- 1 1/2 in. wide, apex acuminate, margins entire or crenate-serrate, blade glabrous except for the nerves beneath. Flowers in terminal spike-like panicles; upper lip of corolla entire or slightly lobed. Fruit glossy-brown."

VITEX LANIGERA Schau.

Additional synonymy: *Vitex lanuginosus* Mohl, Beitr. Anat. Physiol. Gew. 85. 1834. *Vitex lanuginosa* Bojer, in herb. *Vitex lanuginosa* H. & B., in herb.

Additional bibliography: Mohl, Beitr. Anat. Physiol. Gew. 85. 1834; Mohl, Ann. Sci. Nat., ser. 2, 3: 319. 1835; Buek, Gen. Spec. Syn. Candoll. 3: 504. 1858; E. D. Merr., Trans. Am. Phil. Soc., ser. 2, 24 (2): 334 & 444. 1935; Mold., Phytologia 15: 252 (1967) and 17: 8. 1968; Mold., Resumé Suppl. 16: 13 & 29. 1968; Mold., Fifth Summ. 1: 263 & 426 (1971) and 2: 720, 926, & 970. 1971.

The Missouri Botanical Garden photograph A.862, cited below, is of an isotype of Bojer's *Chrysomallum lanuginosum*, re-determined at the British Museum as *Vitex lanigera* "Schaner". It seems most probable that the *V. lanuginosa* Mohr, referred to by me in Phytologia 17: 8 (1968), also belongs here in the synonymy of *V. lanigera*. The "H. & B." in the synonymy (above) doubtless refers to Hilsenberg & Bojer [not Humboldt & Bonpland!].

Additional citations: MADAGASCAR: Bojer s.n. (Mu--647--isotype); Hilsenberg & Bojer s.n. [Mo. Bot. Gard. photo A.862] (N--photo, W--photo).

VITEX LASIANTHA H. Hallier, Meded. Rijks Herb. Leid. 37: 50--51. 1918.

Additional & emended bibliography: H. Hallier, Meded. Rijks Herb. Leid. 37: 50--51. 1918; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 49. 1921; Mold., Phytologia 15: 252. 1967; Mold., Fifth Summ. 1: 338 (1971) and 2: 926. 1971.

VITEX LASTELLEI Mold.

Additional bibliography: Mold., Phytologia 15: 252. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 926. 1971.

VITEX LEANDRII Mold.

Additional bibliography: Mold., Phytologia 15: 252. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 926. 1971.

VITEX LEBRUNI Mold.

Additional bibliography: Mold., Phytologia 15: 252. 1967; Mold., Fifth Summ. 1: 232 (1971) and 2: 926. 1971.

VITEX LEHMBACHII Gürke

Additional bibliography: Mold., Phytologia 15: 252--253. 1967; Mold., Fifth Summ. 1: 224 (1971) and 2: 926. 1971.

The *Schlieben 1681* & 3255, distributed as *V. lehmbachii*, actually are *V. lokundjensis* Pieper.

Additional citations: CAMEROONS: *Lehmbach 11* (Mu--isotype, Z--isotype).

VITEX LEUCOXYLON L. f.

Additional & emended synonymy: *Wallrothia leucoxydon* (L. f.) Roth, Nov. Pl. Sp., imp. 1, 319--320. 1821. *Vitex leucoxydon* L. apud Sweet, Hort. Brit., ed. 1, 1: 323, in syn. sphalm. 1826; Ghosh, Indian Forest. 94: 778. 1968 [not *V. leucoxydon* Blanco, 1895, nor Naves, 1918, nor Roth, 1956, nor Roxb., 1814, nor Span., 1856, nor Schau., 1893]. *Vitex tomentosa* Wall., Numer. List 86, no. 1747H. 1831 [not *V. tomentosa* Pav., 1940, nor Rich., 1941, nor Sessé & Moc., 1940]. *Wallrothia leucoxydon* Roth apud D. Dietr., Syn. Pl. 3: 610. 1843. *Vitex n. 18* Hook. f. & Thoms. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 587, in syn. 1885; Mold., Phytologia 23: 438, in syn. 1972. *Wallrothia tomentosa* Wight ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 588, in syn.

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Leid. 37: 44 & 46. 1918; Kirtikar & Basu, *Indian Med. Pl.*, ed. 1,
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Bihar Orissa, ed. 1, 4: 711--713. 1922; Janssonius, *Mikrogr.*
Holz. 812. 1926; Alston in Trimen, *Handb. Fl. Ceyl.* 6: *Suppl.* 232.
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334, & 444. 1935; L. f., *Suppl. Pl.*, imp. 2, 293. 1936; Kadambi,
Indian Forest. 76: 18--30, 69--82, & 121--132. 1950; Cooke, *Fl.*
Presid. Bombay, ed. 2, imp. 1, 2: 508 & 510. 1958; Abeywickrama,
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346. 1959; Puri, *Indian For. Ecol.* 152. 1960; Haines, *Bot. Bihar*
Orissa, ed. 2, 2: 745 & 747. 1961; Hansford, *Sydowia*, ser. 2,
Beih. 2: 695. 1961; Thwaites & Hook. f., *Enum. Pl. Zeyl.*, imp. 2,
244. 1964; Cooke, *Fl. Presid. Bombay*, ed. 2, imp. 2, 508 & 510.
1967; J. L. Ellis, *Bull. Bot. Surv. India* 10: 157. 1968; Ghosh,
Indian Forest. 94: 778. 1968; Gunawardena, *Gen. Sp. Pl. Zeyl.* 148.

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Recent collectors describe this species in its typical form as a treelet or as a small, medium-sized, or large tree, to 20 m. tall, evergreen, water-loving, branching profusely at the top, with a dense or full rounded crown, forming a canopy, the bole to 30 feet long, the trunk very much fluted in cross-section, with twisted wavy ridges, to 1.3 m. in diameter at breast height, girth often 2--4 feet, the bark white or gray-white to dark-gray, brownish, or pale-brown, roughish, cracked to merely striate, the outer bark often smooth and white; leaves compound, the leaflets usually 3 or 5, very coriaceous and bicolored, 10--12 cm. long; flowers scented; calyx green; the corolla-throat pubescent, the anthers dark to purple or even dark-purple; fruiting-calyx persistent, covering 2/3 of the fruit; fruit green when immature, turning purple, purple-brown, or black when ripe, ovoid or elliptic to olive- or pear-shaped, smooth, 1-seeded, the pericarp fleshy. They have found it growing in swamps or swampy areas, along the edge of the water of rivers, streamlets, or lakes, as well as surrounding used or abandoned tanks, on savannas or in the riparian forests bordering savannas, in primary and secondary forests, at the margins of granitic outcrops and in large rock-outcrop areas, in the vegetation ring around villus, along mountain streams, on forested sandy riverbanks, in the sandy soil of beaches and dunes, and in the loose, sandy soil or loam of semidry streams, from sea-level to 850 m. altitude. They have found it in flower from March to July, as well as in October and November, and in fruit from April to June and in October and November. Worthington tells us that in the dry zone of Sri Lanka it always grows near water. He collected it in an area of annual rainfall of 70 inches. Cramer

asserts that it is "common along banks" in Sri Lanka, but he also reports it "isolated" in some areas. Saldanha reports it "common" in Mysore. Nicolson and his associates refer to it as "frequent" in Mysore; Townsend found it "scattered" in Sri Lanka. Thwaites (1861) says that it is "Not uncommon" in the hotter parts of Sri Lanka.

Khosla & Sareen (1978) report the chromosome number of this species as $4x = 32$. The corollas are described as "white" on Alston 1050, Cramer 3006, Meijer & Balakrishnan 119, Townsend 73/253, and Wirawan & al. 914a, "bluish" on Waas 606, "purplish" on Hladik 817 & 824, "whitish" on Jayasuriya 2118, "faintly blue" on Waas 573, "white with purple pubescence in the throat" on Nowicke & al. 364 & 365, "white with purple hairs above" on Jayasuriya 1937, "white with purple hairs at the tip" on Alston 2478, "white with mauvish hairs" on Amaratunga 1037, "white, the lower lip with purplish or purplish-bluish hairs inside" on Sumithraarachchi DBS. 352, "lip purple, bearded" on Ramamoorthy & Ganshi HFP.2764, "white with purple hairs on the lower lip" on Saldanha 13009 & 13348, "white, the throat pubescent" on Nowicke & al. 280, and "with purple hairs on the lower lip and throat" on Saldanha 16745.

The leaflets are quite hairy on Cramer 3006 and Wirawan & al. 914a, while they are almost glabrous on Hladik 817. They are uniformly 3 in number on Herb. Hort. Bot. Calcut. s.n., Saldanha 13318, and Worthington 4237, 4257, & 4649; 3 or 4 in number on Worthington 2046; 3--5 on Worthington 6964; and uniformly 5 on Hohenacker 451, Meijer & Balakrishnan 119, and Talbot 97. They are exceptionally broad on Collector undetermined s.n. and on Saldanha 13175 & 16745, while exceptionally narrow on Ramamoorthy HFP.1597. Worthington 4649 represents material taken from a sapling. Wight 2326, the type collection of *Wallrothia tomentosa*, has hairs along the midrib beneath and has the veins prominent above -- characters exhibited also by Alston 2478, Herb. Hort. Bot. Calcut. s.n. and Talbot 97.

Mueller-Dombois & Comanor tell us that the species is "an important tree" in Sri Lanka. Loudon (1832) asserts that it was introduced into cultivation in England from Sri Lanka in 1793. The fruit is used as a fish poison in Sri Lanka according to Nowicke and his associates, while Davidse reports the fruit is eaten by parrots there. Wirawan & al. 914a serves as voucher for ecologic observations.

Ghosh (1968) reports that *V. leucoxydon* serves as host for the loranthaceous parasite, *Dendrophthoe falcata* (L. f.) Ettingsh., while Hansford (1961) reports it as host for the fungus, *Meliola cookeana* Speg. in Bombay, the latter record being based on Sedge-wick s.n.

Vernacular names reported for *Vitex leucoxydon* include "hole-lakki", "kaddunochchi", "kaddu-nochchi", "kardu-nochi", "kyet-yoh", "lokki", "narda", "nebedda", "nēbedda", "nē-bedda", "nir", "nir-nochchi", "nochi", "samalu", "senkani", "sheras", "sherus", "sonagarbi", "songarbi", and "white-wooded wallrothia". The initial letter of the specific epithet was almost uniformly uppercased

by authors until very recently.

The Haines (1922) reference in the bibliography of this species is sometimes cited as "6: 711--713. 1924", but pages 419 to 754 of edition 1 are actually in part 4 of the work and were issued in 1922. The Willis (1911) reference is sometimes cited as "3: 358", but I have thus far been unable to verify this reference.

The younger Linnaeus' original (1781) description of this taxon is "*VITEX* foliis digitatis quinatis: foliolis petiolatis oblongis integerrimis, paniculis dichotomis, bacca monosperma. Habitat in vastis sylvis Zeylonae. König. Simillima *V. trifoliae*, sed differt foliis utrinque glaberrimis, panicula dichotoma a prima divisione." Kurz (1870) describe the species as "A large forest tree along the western coast of South Andaman, around Port Mouat, but also occurring around Port Blair". Troup (1921) calls it "A small or large deciduous tree with a short thick trunk and spreading crown. Bark smooth, light-grey. Wood light greyish brown or pinkish, durable. Indian Peninsula from the Chanda district southwards, chiefly along banks of streams, Kanara and the Konkan. Flowers, February--March, fruits, June."

Clarke (1885) cites "Roxburgh, Rottler, &c." and gives the species' distribution as "S. Deccan Peninsula and Ceylon, up to 3000 ft.", noting that "In the typical form the leaflets are coriaceous, shining, yellowish beneath, nervation obscure: in *V. saligna*, Roxb., they are more membranous, the reticulate nervation distinct on both surfaces. A very handsome form with broader leaflets is marked *Wallrothia tomentosa* by Wight; but the extreme membranous narrow-leaved *V. saligna* (Roxburgh's specimen) shows similar hair on each side the midrib beneath". Naire (1894) describes the species as "A small tree, leaflets 3 to 5 entire smooth, flowers whitish in dichotomous panicles, lower lip of corolla large and bearded with violet hairs, fruit oval or obovate, smooth, black." In western India he records it from "S. Konkan, Ghats, and S. M. country". Worthington (1959) reports that in Sri Lanka it flowers in July and August and that its timber weighs 48 pounds per cubic foot, is purple-brown to dark-gray, hard, fine-grained, and durable, and is used there to make cart frames.

Puri (1960) tells us that in India *Vitex leucoxydon* is found in the undergrowth of windward valleys where drainage is good, growing in association with *Eugenia*, *Musa*, and *Alpinia* in the southern wet tropical evergreen forests of the western Ghats. Agarwal (1970) reports it from four low-lying districts of Madras and asserts that the wood is whitish-gray when fresh, light, even-textured, warping on seasoning, moderately hard, and can withstand diseases "for a limited period", weighing 17.40 kgm. per cubic foot; "Used for cartwheels in Madras, in general construction at other places & can be tried for boards". Patel (1968) describes it as "A large deciduous tree with white bark; young parts pubescent" and found it "scarce" along riverbanks in Melfhat [Bombay], flowering in March and April and "Perhaps all the year round". He further says that there are 4 seeds per fruit

and that the wood is grayish-brown, moderately hard, weighing 610 kg, per cubic meter. Cooke (1905) reports it flowering in Bombay from February to April and cites unnumbered collections by Cooke, Graham, Law, Talbot, and Woodrow from the banks of rivers and nalas in moist forests in the Bombay area. Trimen (1895) reports it in Sri Lanka from the "Dry country: common, especially near tanks", flowering there in July and August, the flowers being "white with purplish hairs", and the wood dark-gray, hard, fine-grained, durable, shining.

The name, *Vitex tomentosa* Wall., referred to in the synonymy of *V. leucoxydon*, is based on *Wallich 1747H* from the Madras herbarium of the East India Company at Kew and is most probably the same as *V. tomentosa* Wight. Wallich (1831) cites as *V. leucoxydon* his 1749D from Silhet, 1748E from the Roxburgh herbarium, and 1749F from Gualpara.

Ellis (1968) cites his no. 23727 from Andhra Pradesh; Saxena & Khotole (1976) cite *Khotole 6057 & 9396* and *Saxena 1491, 1596, & 5484*. Sharma and his associates (1978) refer to the species as a "common tree with white flowers" in Tamil Nadu, citing *Rathakrishnan 37983* and *Vivekananthan 40742*.

The *Mueller-Dombois & Balakrishnan 68091211*, distributed as typical *V. leucoxydon*, actually is the type collection of *f. zeylanica* (Mold.) Mold., and *Bernardi 15282*, *Comanor 595*, *Davidse & Sumithraarachchi 8234*, *Fosberg & al. 51081 & 57012*, *Jayasuriya 316*, *Nowicke & Jayasuriya 280*, *Saldanha 13175*, *Simpson 8508*, *Sohmer 8953*, *Van Beusekom & Van Beusekom 1643*, *Waas 367*, and *Wirawan, Cooray, & Balakrishnan 914* also represent that form, while *Koelz 22383*, *Stocks, Law, & c. s.n.* [Malabar, Concan, &c.] are *f. saligna* (Roxb.) Mold., of which *Wallich 1748 & 1748/2* are cotypes; *Falconer 509* is *V. peduncularis* Wall.

Additional citations: INDIA: Karnataka: *Collector undetermined s.n.* [Mysore] (Pd); *Nicolson, Saldanha, & Ramamoorthy HFP.217* (W--2653617); *Ramamoorthy HFP.1597* (W--2794867); *Ramamoorthy & Gandhi HFP.2764* (N, W--2794860); *Saldanha 13009* (W--2794861), *13318* (W--2794866), *13348* (W--2653616), *16639* (W--2794864), *16745* (W--2794863); *Saldanha & Ramamoorthy HFP.1644* (W--2794865). Kerala: *Hohenacker 451* (Mu--649, Mu); *Stocks, Law, & c. s.n.* [Malabar, Concan, &c.] (Mu--648, Pd); *Talbot 97* (Pd). Tamil Nadu: *Wight 2326* (Mu--1347, Pd). SRI LANKA: *Alston 1050* (Pd); *Amaratunga 1037* (Pd); *L. H. Cramer 3006* (Pd, W--2718259), *4649* (W--2833956); *Davidse 7439* (Ld, W--2806278); *Gardner s.n.* [Thwaites C.P.1957] (Pd); *Hancock s.n.* [Worthington 6964] (K); *Hladik 817* (Pd, W--2761097), *824* (W--2761099); *Jayasuriya 305* (Pd, W--2721045), *1937* (Ac, W--2807768), *1961* (Ld, W--2807847), *2118* (Ld, W--2807747); *Meijer & Balakrishnan 119* (Pd, W--2716064); *Moldenke, Moldenke, & Jayasuriya 28224* (Ac, Gz, Kh, Ld, Pd, Tu, W--2764479, Z); *Mueller-Dombois & Comanor 67083110* (W--2512112); *Nowicke, Fosberg, & Jayasuriya 364* (N, Pd, W--2707473), *365* (N, Pd, W--2707474); *Reitz 30021* (W--2762781); *Sohmer 8144* (N, W--2807755); *Sumithraarachchi DBS.352* (Ac, Gz, Lc, Ld); *C. C. Townsend 73/253* (W--2765889); *Vincent 13* (Pd); *Waas 573* (Ld, W--2803404), *606* (N, W--2803435); *Walker 180* (Pd); *Wirawan, Cooray, & Balakrishnan 914a* (Ld, N, Pd, W--2656635);

Worthington 2046 (K), 4237 (K), 4257 (K), 4649 (K). BURMA: Upper Burma: Griffith 6062 (Mu--673). CULTIVATED: India: Herb. Hort. Bot. Calcut. s.n. (Pd). Sri Lanka: Alston 2578 (Pd). LOCALITY OF COLLECTION UNDETERMINED: Bureau & Schumann s.n. (Mu).

VITEX LEUCOXYLON f. SALIGNA (Roxb.) Mold., Phytologia 38: 178. 1978.

Synonymy: *Vitex saligna* Roxb., Hort. Beng. 46. 1814; Fl. Ind., ed. 2, 3: 75. 1832.

Bibliography: Roxb., Hort. Beng. 46. 1814; Sweet, Hort. Brit., ed. 1, 1: 323. 1826; Wall., Numer. List [48], nos. 1748 & 1748/2. 1829; Sweet, Hort. Brit., ed. 2, 416. 1830; Loud., Hort. Brit., ed. 2, 441. 1832; Roxb., Fl. Ind., ed. 2, 2: 75. 1832; G. Don in Sweet, Hort. Brit., ed. 3, 551. 1839; Thwaites, Enum. Pl. Zeyl. 2: 244. 1839; Voigt, Hort. Suburb. Calcut. 469. 1845; G. Don in Loud., Hort. Brit. Suppl. [3]: 657. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 502. 1858; Thwaites & Hook. f., Enum. Pl. Zeyl., imp. 1, 244. 1861; Jacks in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1214. 1895; Prain, Bengal Pl., imp. 1, 2: 833. 1903; Mold., Prelim. Alph. List Inv. Names 52. 1940; Mold., Alph. List Inv. Names 55. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 1214. 1946; Mold., Résumé 388. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1214. 1960; Thwaites & Hook. f., Enum. Pl. Zeyl., imp. 2, 244. 1964; Mold., Fifth Summ. 2: 727. 1971; Mold., Phytologia 38: 178. 1978; Hocking, Excerpt. Bot. A.33: 86. 1979.

This form, apparently confined to the Indian subcontinent, has more membranous leaf-blades, which are more uniformly narrow-elliptic and 3--4 times as long as wide, with the reticulate venation distinct and often subprominulous on both surfaces, often with pubescence along each side of the midrib beneath. In the typical form of the species the leaf-blades are more coriaceous in texture, mostly oblong to oblong-elliptic, only 2--3 times as long as wide, and usually glabrate on both surfaces, the venation more obscure and flat.

Prain (1903) refers to what is probably this form of the species as "A considerable tree" in Orissa "on islands in the river Mahanadi; perhaps only introduced". Voigt (1845) reports it cultivated in the Calcutta area (where one of Wallich's cotypes also originated). Sweet (1826) asserts that it was introduced into cultivation in England from "E. Indies" [=eastern India] in 1823. Thwaites (1839) and Thwaites & Hooker (1861) list the name, *Vitex saligna*, as a synonym of typical *V. leucoxyton*, but the C.P.1957 collection from Sri Lanka which they cite is, indeed, typical *V. leucoxyton*; and is not at all representative of Roxburgh's *V. saligna* as they seem to imply.

The form is based on Wallich 1748 and 1748/2, the former collected from cultivated material in the Calcutta Botanical Garden and the latter collected by Dr. B. Heyne on the Coromandel coast of southeastern India [Madras] in 1808, both deposited in the East India Company Herbarium at Kew. Roxburgh gives an adequate description of the taxon in his 1832 work and accepts it as a

valid species. The common name, "willow-leaved chaste-tree", has been recorded for it. Recent collectors describe it as a tree, the trunk 2 inches in diameter, and the "flowers white, with a purplish brush in the throat" [Koelz 22383], and have found it in flower in March.

Citations: INDIA: Bastar: Koelz 22383 (N). Kerala: Stocks, Law, &c. s.n. [Malabar, Concan, &c.] (M, S). Tamil Nadu: Heyne s.n. [Wallich 1748/2] (Cb--cotype, N--photo of cotype, Z--photo of cotype). CULTIVATED: India: Wallich 1748 (Cb--cotype, N--photo of cotype, Pd--cotype, T--cotype, Z--photo of cotype), s.n. (Cp).

VITEX LEUCOXYLON f. *ZEYLANICA* (Mold.) Mold., *Phytologia* 36: 164. 1977.

Synonymy: *Vitex leucoxydon* var. *zeylanica* Mold., *Phytologia* 21: 419. 1971. *Vitex leucoxydon* f. *subserata* Mold., in herb.

Bibliography: Mold., Fifth Summ. 2: 926 & 969. 1971; Mold., *Phytologia* 21: 419. 1971; Anon., *Biol. Abstr.* 53 (10): B.A.S.I.C. S.266. 1972; Mold., *Biol. Abstr.* 53: 5252 (1972) and 64: 6574. 1977; Mold., *Phytologia* 36: 164. 1977.

This form differs from the typical form of the species chiefly in its leaflets averaging smaller, 2.5--9 cm. long and 1.3--3.5 cm. wide, at least the larger ones more or less serrate with irregularly placed, often remote, appressed, antrorse teeth toward the apex or only undulate-repand, mostly dull-gray above in drying, the veinlet reticulation usually conspicuous and obtusely subprominent above, apically often obtuse.

Three of the collections cited below are in fruit and another is in flower, so the characters exhibited by the leaves cannot be dismissed as merely those of a seedling, juvenile, or sucker (watersprout) as is the case in the form of *V. altissima* L. f. with its broadly winged petioles.

Collectors describe this plant as a treelet or as a small to medium-sized tree, dense, spreading, with the aspect of *Olea europaea*, 4--10 m. tall, the trunk 30--50 cm. in diameter at breast height, the bark gray-brown or white, somewhat rough or fissured, the branches drooping, terete, stout, "white-fuscous", the leaves 5-foliolate, decidedly coriaceous and bicolored, hairy, the cymes slender, open, the rachis green, the flowers fragrant, and the fruit ovoid or olive-shaped, 2 cm. long, green or pale-green when immature, becoming bluish-black or black and soft when mature, hard-seeded, the pericarp "mushy". They have found it growing in grassy clearings near the seashore, on tank margins, near streams in wet deciduous forests, in sparse forest on rocky-knob plains, on forested sandy riverbanks, in shallow soil cap over gneiss, and in sedge *wewa* associated with *Zyzygium*, from sealevel to 160 m. altitude, in flower from September to November and in January, in fruit from September to November. The Van Beusekoms report encountering it "in a dry area near village" (an unusual habitat!). Comanor refers to it as "isolated" in Sri Lanka, but Saldanha reports it "common" in Mysore. Mueller-Dombois & Balakrishnan 68091211 and Wirawan & al. 914 were collected to serve as vouchers for ecologic observations. The only

vernacular name reported is "nir-nochchi".

The corollas are said to have been "white" on *Bernardi* 15282, *Simpson* 8508, and *Wirawan & al.* 914, "white, the lower central lobe longer and with purple hairs" on *Saldanha* 13175, "white with purplish pubescence on the upper lobes" on *Jayasuriya* 316, "white with mauve center to lower lip" on *Fosberg & al.* 51081, and "white with purplish honey-guides" on *Sohmer* 8953.

Most material of this taxon has been identified and distributed in herbaria as typical *V. leucoxyton* L. f. or, in one case, as *Bursera* sp. in the *Burseraceae*.

Citations: INDIA: Karnataka: *Saldanha* 13175 (N, W--2794867). SRI LANKA: *Bernardi* 15282 (Mu, N, W--2808312); *Comanor* 595 (Mi, Mi, N, Pd); *Davidse & Sumithraarachchi* 8234 (Ld, W--2808665); *Fosberg & Jayasinghe* 57012 (Ld); *Fosberg, Mueller-Dombois, Wirawan, Cooray, & Balakrishnan* 51081 (N, Pd, W--2720552); *Jayasuriya* 316 (Pd, W--2720851); *Mueller-Dombois & Balakrishnan* 68091211 (Pd--isotype, W--2612113--type, W--2612114--isotype, Z--isotype); *Nowicke & Jayasuriya* 280 (N, W--2707310); *N. D. Simpson* 8505 (N); *Sohmer* 8953 (Lc, N, W--2804881); *Van Beusekom & Van Beusekom* 1643 (W--2656410); *Waas* 367 (N, W--2803402); *Wirawan, Cooray, & Balakrishnan* 914 (Ld, N, Pd, W--2656634).

VITEX LIMONIFOLIA Wall.

Additional & emended bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 502. 1858; Kurz, *Forest Fl. Brit. Burma* 2: 269, 271--272, & 612. 1877; Gamble, *Man. Indian Timb.*, ed. 1, 296 & 522 (1881) and ed. 2, 541. 1902; F. N. Will., *Bull. Herb. Boiss.*, ser. 2, 5: 431. 1905; Brandis, *Indian Trees*, imp. 1, 504. 1906; Kanjilal, Das, Kanjilal, & De, *Fl. Assam* 3: 479, 483, & 561. 1939; Burkhill, *Dict. Econ. Prod. Malay Penins.* 2: 2278. 1966; Mold., *Phytologia* 17: 9, 22, & 23. 1968; Mold., *Résumé Suppl.* 16: 13 & 29. 1968; Brandis, *Indian Trees*, imp. 2, 504. 1971; Mold., *Fifth Summ.* 1: 284, 298, 303, & 374 (1971) and 2: 712, 713, & 926. 1971; Mold., *Phytologia* 23: 423 (1972), 28: 445 (1974), and 44: 355 & 356. 1979.

Clarke (1885) comments concerning this species: "The leaves are exceedingly like those of *V. pubescens* [= *V. pinnata* L.], except that the petiole is winged; the elongated interrupted panicle-branches are quite different". He records it from Ava, Pegu, and Tenasserim in Burma, as well as from Thailand, citing only "Wallich, &c." Kanjilal and his associates (1939) list it from the Khasi Hills in Assam, citing a Brandis collection, and assert that in that area it flowers from May to July and fruits from September to November.

Recent collectors describe the species as a small tree, 6--10 m. tall, the wood blaze green and orange over tan, the anthers very dark-purple, and have found it in anthesis in June, July, and October, and in fruit in September. The corollas are said to have been "violet" in color on *Larsen & al.* 2199, "cream-colored" on *King* 5474, "lavender" on *King* 5488, and "with whitish upper and blue-purplish lower lip, with a yellow streak" on *Van Beusekom & Phengkhlay* 1232. They have encountered it along open grassy road-

sides, in dry dipterocarp forests, along roadsides in open secondary forests, in open sun in streambeds, and in scrub with occasional trees to 15 m. tall along with *Bauhinia* and *Lantana*, at 40--400 m. altitude. *King* 5474 & 5488 were collected to serve as vouchers for wood samples, the latter collection accompanied by two photographs of the foliate in situ. *King* 5464 is said by the collector to have been taken from specimens growing wild and also cultivated in a garden.

The *Geesink* & *Santisuk* 4992, distributed as *V. limonifolia*, actually is *V. pinnata* L.

Additional citations: THAILAND: *R. M. King* 5474 (W--2435992), 5488 (W--2435880, W--2435892), *s.n.* [15 June 1963] (W--2436013); *Larsen, Santisuk, & Warncke* 2199 (Ac, Ld); *Maxwell* 73-683 (Ac, Ac), *s.n.* [11.10.1969] (Ac); *Shimizu, Koyama, & Nalampoon* T.10687 (Ac); *Van Beusekom & Phengkhilai* 1232 (Ac).

VITEX LINDENI Hook. f.

Additional bibliography: Bean in Chittenden, *Dict. Gard.* 2249. 1956; Mold., *Phytologia* 15: 254. 1967; Mold., *Fifth Summ.* 1: 374 (1971) and 2: 721 & 926. 1971.

VITEX LOBATA Mold.

Additional bibliography: Mold., *Phytologia* 15: 254. 1967; Mold., *Fifth Summ.* 1: 263 (1971) and 2: 926. 1971.

VITEX LOBKOWITZII Ettingsh.

Additional & emended bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 42 & 70. 1948; Mold., *Phytologia* 15: 254. 1967; Mold., *Fifth Summ.* 1: 376 (1971) and 2: 926. 1971.

VITEX LOKUNDJENSIS Pieper

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403 & 404. 1938; H. N. & A. L. Mold., *Pl. Life* 2: 67. 1948; Mold., *Phytologia* 15: 254. 1967; Mold., *Fifth Summ.* 1: 224, 232, 238, & 249 (1971) and 2: 720, 721, & 926. 1971.

Schlieben describes this species as a tree, 20--30 m. tall, and reports it "scattered" to "abundant" in Tanzania, at 1370 m. altitude, flowering in January, the corollas said to have been "light-blue" on his *no.* 3255. Material of the species has been misidentified and distributed in some herbaria as *V. lehmbachii* Gürke.

Additional citations: CAMEROONS: *Zenker* 3899 (Mu--isotype, W--554334--isotype). TANZANIA: Tanganyika: *Schlieben* 1681 (Mu), (Mu).

VITEX LOKUNDJENSIS var. *KRUCKEI* Pieper

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403 & 404. 1938; Mold., *Phytologia* 15: 254. 1967; Mold., *Fifth Summ.* 1: 224 & 232 (1971) and 2: 720, 721, & 926. 1971.

VITEX LONGIPETIOLATA Gürke

Additional bibliography: Good & Exell, *Journ. Bot. Lond.* 68:

Suppl. 144. 1930; Mold., *Phytologia* 15: 254 (1967) and 17: 35. 1968; Mold., *Fifth Summ.* 1: 224 (1971) and 2: 926. 1971.

Good & Exell (1930) report encountering this species in secondary woods grown up on old plantation grounds in what used to be Portuguese Congo, flowering in February, citing their no. 7841 and reporting the species also from Zaire and Cameroons.

Additional citations: CAMEROONS: *Zenker 1888* (Mu--3774--isotype), 3185 (Mu--4029, Z), 4795 (Mu, Mu).

VITEX LONGISEPALA King & Gamble

Additional & emended bibliography: H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 50. 1921; Ridl., *Kew Bull. Misc. Inf.* 1929: 261--262. 1929; Burkill, *Dict. Econ. Prod. Malay Penins.* 2: 2279. 1966; Mold., *Phytologia* 17: 9. 1968; Chen & Tso, *Chem. Pharm. Bull. Tokyo* 17: 1284--1286. 1969; Farnsworth, *Pharmacog. Titles* 5 (4): xii & item 4123. 1970; Mold., *Phytologia* 33: 375. 1976; Mold., *Fifth Summ.* 1: 298 & 306 (1971) and 2: 721 & 926. 1971; Mold., *Phytologia* 34: 266 (1976) and 44: 484. 1979.

Burkill (1966) describes this species as "A tree of fair size, found from Penang to Negri Sembilan. The timber is apt to be crooked, but is good and is used for objects suitable to its size." He reports the vernacular names, "gading kahua", "halban", "lěban bunga" [flowery lěban], "lěban kunyit" [turmeric lěban], and "pokok galang dapur" [hearth-frame plant]. He comments that "The name 'kahua' (coffee) ascribed to it is interesting in connexion with the use of the fruits of *V. cienkowskii* [= *V. doniana* Sweet] for coffee in Africa".

Recent collectors describe *V. longisepala* as a tree, 25 feet tall, the trunk 12--21 cm. in diameter at breast height, growing in primary forests and swamp forests, and have found it in flower in February and December.

Additional citations: MALAYA: Selangor: *Ogata Kep 110216* (Ac); *Sider 13197* (Ac, E--2047843).

VITEX LONGISEPALA var. *LONGIPES* Mold., *Phytologia* 33: 375. 1976.

Bibliography: Mold., *Phytologia* 33: 375 (1976) and 34: 266. 1976.

Collectors describe this plant as a tree, 3 m. tall, the trunk to 6 cm. in diameter at breast height, the "bracts and calyx brownish-green", and have found it growing in moist forests and at the edges of evergreen forests, at 6200 feet altitude, flowering in April and October. The corollas are said to have been "yellow" on *Maxwell 78-117*.

The variety differs from the typical form of the species in having the two lateral leaflets of each leaf distinctly petiolulate on petiolules 6--10 mm. long. It is known thus far only from Malaya.

Citations: MALAYA: Pahang: *Jong 4517* (Kl--4517); *Poore 564* (Kl--564). Selangor: *Maxwell 78-117* (Ac); *Sider s.n.* [Dec. 1969] (Ac--photo of type, Kl--13197--type, N--photo of type, Z--photo of type).

VITEX LUCENS T. Kirk

Additional synonymy: *Vitex lucen* Godley, Biol. Abstr. 54 (9): B.A.S.I.C. S.278 & S.280, sphalm. 1972; Mold., Phytologia 25: 244, in syn. 1973.

Additional bibliography: Dieffenb., Trav. N. Zeal. 1: 431. 1843; Walp., Repert. Bot. Syst. 4: 84. 1844; Schau. in A. DC., Prodr. 11: 691. 1847; Buek, Gen. Spec. Syst. Candoll. 3: 502. 1858; J. Sm., Dict. Pop. Names Pl. 341 & 408. 1882; J. Adams, Trans. Proc. N. Zeal. Inst. 17: 282. 1884; Perkin, Journ. Chem. Soc. 77: 416. 1900; Barger, Journ. Chem. Soc. 89: 1210. 1906; Alston, N. Zeal. Journ. Agric. 26: 149--156. 1923; Janssonius, Mikrogr. Holz. 812. 1926; Wangerin, Justs Bot. Jahresber. 55 (1): 834. 1935; Peteri, Journ. Chem. Soc. 1939: 1635--1637. 1939; Peteri, Chem. Abstr. 34: 764. 1940; Nakaoki, Journ. Pharm. Soc. Jap. 64: 57. 1944; J. W. Matthews, N. Zeal. Trees, ed. 2, imp. 2, [80] & 81. 1953; Fiedler, Arzneimittelforsch. 5: 609. 1955; Geissman & Jurd, Arch. Biochem. Biophys. 56: 259. 1955; Sharma, Journ. Sci. Indust. Res. India 41 B: 267. 1955; Davies, N. Zeal. Nat. Pl. Stud., ed. 1, 132--133, pl. 51. 1956; Fiedler, Chem. Abstr. 50: 2761. 1956; Geissman & Kranen-Fiedler, Naturwiss. 43: 226. 1956; Rao & Venkateswarlu, Curr. Sci. 25: 328. 1956; Evans, Mc Gookin, Jurd, Robertson, & Williamson, Journ. Chem. Soc. 1957: 3510. 1957; Hinds, N. Zeal. Forest Serv. Bull. 21: 63, 80, 92, 105, 110, & 133. 1957; Jurd, Geissman, & Seikel, Arch. Biochem. Biophys. 67: 284 (1957) and 71: 17. 1957; Robertson & Williamson, Journ. Chem. Soc. 1957: 5018. 1957; Whalley, Chem. Ind. 1958: 361. 1958; Cambie, Chem. Ind. 1959: 87. 1959; Hörhammer, Wagner, Nieschlag, & Wildi, Arch. Pharm. 292: 380. 1959; J. W. Matthews, N. Zeal. Trees, ed. 2, imp. 2, [80] & 81. 1959; Bate-Sm. & Swain, Chem. Ind. 1960: 1132. 1960; Griseb. & Patschke, Chem. Ber. 93: 2326. 1960; Liberta, Mycologia 52: 902. 1960; Brooker & Cooper, N. Zeal. Med. Pl. 36. 1961; W. B. Cooke, Mycologia 53: 584. 1961; Davies, N. Zeal. Nat. Pl. Stud., ed. 2, 132--133, pl. 51. 1961; Williamson, Chem. Ind. 1961: 1168. 1961; Anon., Hortic. Abstr. 32: 202. 1962; Belic, Bergand-Dolar, & Morton, Journ. Chem. Soc. 1961: 2523--2525. 1961; Kariyone, Ann. Ind. Rep. Pl. Chem. 1959: 94 & 95. 1962; Rao & Venkateswarlu, Journ. Sci. Ind. Res. India 12 B: 313. 1962; Brooker, Cain, & Cambie, Trans. Roy. Soc. N. Zeal. 1 (7): 61--87. 1963; Graf, Exotica 3: 1482 & 1734. 1963; Horowitz & Gentili, Chem. Ind. 1964: 498. 1964; Kariyone, Ann. Ind. Rep. Pl. Chem. 1957: 54--55. 1964; Laing & Blackwell, Pl. N. Zeal., ed. 7, 371--373, fig. 139. 1964; Hänsel, Leuckert, Rimpler, & Schaaf, Phytochem. 4: 19. 1965; Hillis & Horn, Austral. Journ. Chem. 18: 531. 1965; Hörhammer, Wagner, Rosprim, Mabry, & Rösler, Tetrahed. Lett. 1065: 1707. 1965; Neal, In Gard. Hawaii, ed. 2, 729. 1965; Seikel & Mabry, Tetrahed. Lett. 1965: 1105. 1965; Williamson, Chem. Ind. 1961: 1168. 1965; Horowitz & Gentili, Chem. Ind. 1966: 625. 1966; Seikel, Chow, & Feldman, Phytochem. 5: 439. 1966; D. E. Clark, Sunset New West. Gard. Book, ed. 4, imp. 1, 498. 1967; Cockayne & Turner, Trees N. Zeal. 133, 166, & 181. 1967; R. E. Alston in Mabry, Recent Adv. Phytochem. 1: 311, 316, & 317. 1968; Mold., Phytologia 17: 9--10. 1968;

Prox, Tetrahed. 24: 3697. 1968; Uphof, Dict. Econ. Pl., ed. 2, 122, 520, & 545. 1968; Farnsworth, Blomster, Quimby, & Schermerh., Lynn Index 6: 267. 1969; A. L. Mold., Phytologia 18: 128. 1969; Yeo in Syngé, Suppl. Dict. Gard. 551. 1969; Farnsworth, Pharmacog. Titles 5 (8): xvii & item 7654 (1970) and 5 (10): xxiv & item 11860. 1970; M. A. & I. M. Ritchie, N. Zeal. Ecol. Soc. Proc. 17: 57--57. 1970; Anon., Biol. Abstr. 52: 5448 (1971) and 52 (10): B.A.S.I.C. S.267. 1971; Boquiren, Mycologia 63: 954. 1971; Bouillant & Chopin, Compt. Rend. C.273: 1759--1762. 1971; Farnsworth, Pharmacog. Titles 5: Cum. Gen. Ind. 1971; Godley, N. Zeal. Journ. Bot. 9: 561--568, fig. 1--5. 1971; J. Lloyd, Dyes Pl. 22 & 48. 1971; Mabry, Yoshioka, & Sutherland, Phytochem. 10: 677. 1971; Mold., Fifth Summ. 1: 350 & 374 (1971) and 2: 491, 718, 729, & 926. 1971; M. A. & I. M. Ritchie, Biol. Abstr. 52: 5448. 1971; Anon., Biol. Abstr. 54 (8): B.A.S.I.C. S.282 (1972) and 59 (9): B.A.S.I.C. S.278 & S.280. 1972; I. L. Barton, N. Zeal. Journ. Bot. 10: 14. 1972; Bouillant & Chopin, Compt. Rend. C.274: 193--196. 1972; Farnsworth, Pharmacog. Titles 7 (1): xx & item 490 (1972) and 7 (2): vi & item 2816. 1972; Fogg, Newslet. Arb. Barnes Found. 8: 3. 1972; Gaffield & Horowitz, Chem. Comm. 1972: 648. 1972; Godley, Biol. Abstr. 54: 4572. 1972; L. J. Metcalf, Cult. N. Zeal. Trees Shrubs 259--260, 274, & 292. 1972; "S. L. R.", Biol. Abstr. 54: 4394. 1972; Harborne in L. P. Mill., Phytochem. 2: 352. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 661, 663, & 673. 1973; Mold., Phytologia 25: 244. 1973; Mold. in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 131. 1973; Van Hove & Craig, Ann. Bot. 37: 1013--1016, pl. 4. 1973; Wedge, Pl. Names, ed. 1, 14 & 15. 1973; Williamson, Sunset West. Gard. Book, ed. 3, imp. 11, 440. 1973; Gibbs, Chemotax. Flow. Pl. 3: 1753 & 1754 (1974) and 4: 2297. 1974; Hall & Burke, N. Zeal. Journ. Bot. 12: 287. 1974; Haslam, Shikimake Pathw. 191. 1974; Salmon, N. Zeal. Flow. Pl., ed. 2, imp. 3, 77 & 234. 1974; Van Hove & Craig, Biol. Abstr. 57: 3875. 1974; Wedge, Pl. Names, ed. 2, 19 & 21. 1974; [Farnsworth], Pharmacog. Titles 7: Cum. Gen. Ind. [118]. 1975; Kooiman, Act. Bot. Neerl. 24: 462. 1975; Meylan & Butterfield, N. Zeal. Journ. Bot. 13: 4. 1975; L. H. & E. Z. Bailey, Hortus Third 1162. 1976; D. E. Clark, Sunset New West. Gard. Book, ed. 4, imp. 2, 498. 1979; Mold., Phytologia 44: 338. 1979.

Additional illustrations: J. W. Matthews, N. Zeal. Trees, ed. 2, imp. 1, [80]. 1953; Davies, N. Zeal. Nat. Pl. Stud., ed. 1, 133, pl. 51. 1956; J. W. Matthews, N. Zeal. Trees, ed. 2, imp. 2, [80]. 1959; Davies, N. Zeal. Nat. Pl. Stud., ed. 2, pl. 51. 1961; Graf, Exotica 3: 1482. 1963; Laing & Blackwell, Pl. N. Zeal., ed. 7, 372, fig. 139. 1964; Godley, N. Zeal. Journ. Bot. 9: 562--564, fig. 1--5. 1971; Van Hove & Craig, Ann. Bot. Lond., ser. 2, 37: pl. 4. 1973; Salmon, N. Zeal. Flow. Pl., ed. 2, imp. 3, 77 (in color). 1974.

Davies (1956) comments that "The puriri is a most handsome tree, with dark glossy foliage. The leaves are of interest owing to the presence of 'domatia' or pits at the junction of the side-veins and mid-rib, as in the coprosmas. Because of the great value of its hard, durable timber for house-blocks, fence posts, etc., the

tree has become greatly depleted. A group of the trees at Waimate North owes its preservation to its former use by the Maoris as a storage place for human bones, which, of course, made it strictly tapu." Laing & Blackwell (1964) describe it as "A fine tree, from 50 ft. to 60 ft. in height, often called the New Zealand Oak, on account of the strength and durability of its timber. It is not injured by damp or exposure, and is therefore extremely valuable for ship-building purposes. The logs are often perforated with large holes, but these do not affect the timber, except in so far as it has sometimes to be cut to disadvantage. These holes are made by a soft-bodied grub, which develops into the puriti moth... The roots.....never penetrate deeply into the ground, but lie near the surface, so that the tree is easily blown over in a gale of wind. It is endemic to New Zealand, and is restricted to the northern part of the North Island. It is easily cultivated, and flowers more or less all the year round."

Matthews (1953) add that "In recent times the Puriri has become one of our most popular trees for street planting, parks, and large private gardens [in New Zealand]. There are also still natural colonies of it to be seen in some of the northern parts of the North island. It is a particularly handsome tree, with its brilliant green, glossy, crinkled leaves, its charming pink or red flowers, red fruits and pleasing form. Under favourable conditions it develops into a nicely shaped tree some 60 feet in height, with a trunk that may measure 5 feet in diameter, although it is more usual to see specimens a little more than 20 feet with a trunk twelve inches in diameter. The bark is thin, smooth, and usually light brown in colour and the trunk is usually straight with a few small branches; sometimes, however, it adopts a short stature with large spreading branches. The trunk of an adult tree is almost invariably dotted with holes made by the larvae of the Puriri-moth, but this parasite does not appear to affect the health or age of the tree.....The fruit is a round 'cherry', bright red in colour, and usually about half an inch in diameter. The wood is dark brown, extremely hard, dense and heavy". Diefenbach (1843) asserts that "Its quality of splitting renders it an excellent wood for firing". Smith (1882) says that "Its wood is hard and dark brown, much used in all kinds of work....very hard and heavy....used for purposes under water". He calls it the "New Zealand teak tree". Brooker & Cooper (1961) report that "The water from boiled leaves is still used to bathe sprains and backache....The infusion is also a remedy for ulcers, especially under the ear.....and for sore throats".

Cockayne & Turner (1967) report the species "Found in forests from the north of North Island to Mahia Peninsula on the east and Cape Egmont on the west but rare south of lat. 37°. Seasonal heartwood is a dark rich brown, extremely dense, hard, strong, and durable.....owing to its interlaced fibres, it is difficult to work. It was once used extensively for sleepers [railroad ties], posts, and house blocks, but timber sawn today goes mainly into bridges and wharves, where the almost universal occurrence

of grub holes is not a serious detriment. Puriri free from grub holes is excellent for furniture, carving, and other decorative woodwork." Uphof (1968) adds its use for "ships' blocks, machine beds and bearings; where great strength and durability are necessary". He misspells the vernacular name, "puzizi". The "Timor chaste tree" to which he also refers is *V. parviflora* A. L. Juss. and has nothing whatever to do with the New Zealand species.

Yeo (1969) describes the corolla of *V. lucens* as 7/8 inch long, the limb 4- or 5-lobed, oblique, the lobes rounded, the lateral and lower lobes reflexed, dull purplish-red, the throat and inner side of the tube tending toward straw-yellow, the outside of the tube flushed and striped pink. He recommends it for cultivation in the greenhouse.

Hinds (1957) tells us that in its native haunts *V. lucens* "is often associated with *Elaeocarpus dentatus* (Forst.) Vahl; assumes dominance on fertile soil loams over *Agathis australis* Salisb.; is an associated hardwood in the north with *Podocarpus spicatus* R. Br.; grows in mixed forests with *Laurelia novae-zealandiae* A. Cunn.; is associated with *Knightia excelsa* R. Br. and with *Beilschmiedia terairi* Benth. & Hook. f." The Ritchies (1970) record it from Whatupuke island (in the Hen-and-chicken group of islands).

Godley (1971) discusses the fruit of *V. lucens* in detail, reporting that it has 4 apertures in the endocarp, each guarded by an oval door and each leading to a seed chamber. A similar structure is known in *Tectona grandis* L. f. "and could prove characteristic of the tribe *Viticoideae*". He reports that *V. lucens* is self-fertile with autogamy possible. Seed production in 12 samples ranged from 8 to 45 percent with usually only 1 or 2 seeds in a fruit. "Low seed production is due to inefficiencies in pollination, as well as breakdown of apparently fully developed seeds. The factors controlling germination and opening of the doors are unknown, and most seed would appear to perish within the imprisoning endocarp". Perforation plates, reticulate in the early wood but scalariform throughout the rest of the growth-ring, are reported in the wood by Meylen & Butterfield (1975). The perforation plates are mostly simple, but some simple to scalariform combination plates are also present.

Hall & Burke (1974) have studied the leaf-wettability of the species. They describe the species as a member of the forest canopy from sealevel to 300 m. altitude and the leaf surface wettability during rain as 100 percent film brought about by an adaxial surface morphology of cuticle ridging or rugose appearance and little wax present.

Metcalf (1972) asserts that "In its young stages it is of rapid growth and fairly quickly makes a reasonably-sized plant. It is particularly useful as a specimen tree but only in larger gardens. Young plants will not tolerate more than a few degrees of frost, but older plants are hardier. It prefers a deep and rather rich soil and should be given plenty of space in which to grow. Propagation is usually by seed but it can also be grown from cuttings."

Lloyd (1971) reports that its bark yields with alum and soda a

maize-yellow dye and with bichromate of potash a deep maize-yellow dye, while the ripe fruit with alum and soda yield a primrose-yellow dye. Gibbs (1974) found syringin and cyanogenesis absent from the leaves and the HCl/methanol test proved negative. Cambie (1976) lists the following substances in the wood: vitexin, saponaretin (isovitexin), β -sitosterol, aucubin, agnuside, isoorientin (lutonaretin), orientin (lutexin), vitexin-0-xyloside, orientin-0-xyloside, vicenin-3, vicenin-2, vicenin-1, lucenin-5, lucenin-4, lucenin-3, lucenin-2, lucenin-1, and 3 leucoanthocyanins. Homovitexin, an isomorph of vitexin, was reported from the species by Whally (1958) and Kariyone (1962), but Cambie (1959) has shown that isovitexin, homovitexin, and saponaretin are identical. In his 1959 and 1960 works he reports vitexin, β -sitosterol, and ceryl alcohol in the bark and pentatricontane, stearic acid, and β -carotene in the leaves. Seikel and his associates (1959, 1960) isolated vitexin, saponaretin, and their glycoside in the wood. Bouillant and his associates (1971) discuss lucenin-1 and -3. The chemical structure of the yellow pigment, vitexin ($C_{21}H_{30}O_{10}$) is discussed by Peteri (1939), Evand & al. (1957), Robertson & Williamson (1958), Williamson (1961), Kariyone (1964), and Harborne (1973), mostly isolated from the milled wood.

Van Hove & Craig (1973) have found "a large population of bacteria and fungi" in the bud secretions of *Vitex lucens*. Cooke (1961) reports the species as host to the fungus, *Schizophyllum commune* (Fries) Fries, while Liberta (1960) lists *Xenasma vermiferum* (Bourd.) Liberta from the leaves and decayed wood and Boquiren (1971) found *Epithele vermifera* (Bourd.) Boquiren on this and on *Citharexylum fruticosum* L.

Recent collectors describe *Vitex lucens* as a small slender tree, 5--35 m. tall, wide-spreading, often occurring in isolated form, new trunks being formed from branches when a tree blows over, forming good stock shade, the trunk to 1.2 m. in diameter at breast height, the flowers scented, and the fruit at first green, then red and finally purple when ripe. They have encountered it in pastures, mixed lowland forests, and partially secondgrowth kauri forests, from sealevel to 335 m. altitude, flowering in April, July, and August, in fruit in February, April, and August. The corollas are said to have been "pink" on Moran 2447, "dull-red" on Schweinfurth 1136, and "rich cyclamen pink" on Collector undetermined s.n.

It should be noted that in the index to Metcalf's (1972) work listed in the bibliography (above) it is stated that the species is mentioned on page "273", but this is an error for p. 274.

The Judd s.n. [Dec. 1, 1930], distributed as *V. lucens*, actually is *V. peduncularis* Wall.

Additional citations: NEW ZEALAND: North: Banks & Solander s.n. [Cook's First Voyage, 1768--71] (W--1276430); Byrne s.n. [11/7/52] (Kh); J. H. Davis s.n. [14 Aug. 1950] (W--2037559); Hügel s.n. (Mu--1348); Kirk 304 (W--809121), s.n. [Kaipara] (W--74071);

Meebold 4972 (Ba, Mu, Z), 9924 (Mu); *U. Schweinfurth* 1136 (Mu), 1185 (Mu), 1208 (Mu); *Travers* s.n. [Auckland, April 1909] (Mu--4145, Mu--4255); *Védel* s.n. [1847] (W--74069); *E. H. Walker* 4248 (W--1993730), 5312 (W--1994481); *Wilkes* s.n. [Bay of Islands] (W--74070); *A. E. Wright* s.n. [7 January 1976] (Ac). CULTIVATED: California: *Collector undetermined* s.n. (Sd--54850); *Jerabek* s.n. [Balboa Park, May 1945] (Sd--36322), s.n. [Balboa Park, June 1945] (Sd--36462); *Mathias* 2564 (Ba); *R. V. Moran* 2447 (Ba), 14721 (Sd--51439); *Nafie, Reynolds, & McClintock* 178 (Ba).

VITEX LUNDENSIS Gürke

Additional & emended bibliography: *J. G. Baker* in *Thiselt.-Dyer*, *Fl. Trop. Afr.* 5: 317 & 327--328. 1900; *Mold.*, *Phytologia* 15: 256. 1967; *Mold.*, *Fifth Summ.* 1: 232 (1971) and 2: 926. 1971.

VITEX LUTEA Exell

Additional bibliography: *Mold.*, *Phytologia* 15: 256--257. 1967; *Mold.*, *Fifth Summ.* 1: 227 (1971) and 2: 926. 1971.

The type specimen of this species, photographed by the Missouri Botanical Garden as its photograph A.858, is deposited in the herbarium of the British Museum (Natural History) in London.

Additional citations: ANGOLA: Kongo: *Gosswailer* 7250 [Mo. Bot. Gard. photo A.858] (Gz--photo of type, N--photo of type).

VITEX LUTEOGLANDULOSA H. J. Lam

Additional bibliography: *H. J. Lam* in *Lam & Bakh.*, *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 49. 1921; *Fedde & Schust.*, *Justs Bot. Jahresber.* 47 (2): 246 (1929) and 60 (2): 576. 1941; *Mold.*, *Phytologia* 15: 257. 1967; *Mold.*, *Fifth Summ.* 1: 338 (1971) and 2: 926. 1971.

VITEX LUZONICA H. J. Lam

Additional bibliography: *H. J. Lam* in *Lam & Bakh.*, *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 50. 1921; *Fedde & Schust.*, *Justs Bot. Jahresber.* 53 (1): 1077. 1932; *Mold.*, *Phytologia* 15: 257. 1967; *Mold.*, *Fifth Summ.* 1: 318 (1971) and 2: 926. 1971.

VITEX MACROFOLIOLA Mold.

Additional bibliography: *H. J. Lam* in *Lam & Bakh.*, *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 50. 1921; *Fedde & Schust.*, *Justs Bot. Jahresber.* 47 (2): 246 (1927) and 60 (2): 576. 1941; *Mold.*, *Phytologia* 15: 257. 1967; *Mold.*, *Fifth Summ.* 1: 338 (1971) and 2: 721 & 926. 1971.

VITEX MADAGASCARIENSIS Mold.

Additional bibliography: *Mold.*, *Phytologia* 15: 257. 1967; *Mold.*, *Fifth Summ.* 1: 263 (1971) and 2: 926. 1971.

VITEX MADIENSIS Oliv.

Additional & emended bibliography: *Gürke* in *Engl.*, *Pflanzenw. Ost-Afr.* C: 339. 1895; *Durand & DeWild.*, *Bull. Soc. Roy. Bot. Belg.* 37: 124. 1898; *J. G. Baker* in *Thiselt.-Dyer*, *Fl. Trop. Afr.*

5: 316 & 322--324. 1900; Pobéguin, Pl. Méd. Guin. 339--340. 1906; Volkens, Notizbl. Bot. Gart. Berlin 5, App. 22 (2): 34--35. 1909; Fedde & Schust., Justs Bot. Jahresber. 43: 159. 1922; Pellegrin, Mem. Soc. Linn. Normand. 26 [ser. 2, 1 (3)]: 50. 1928; Pellegrin, Fl. Mayombe 2: 50. 1928; Good & Exell, Journ. Bot. Lond. 68: Suppl. 143--144. 1930; Exell, Journ. Bot. Lond. 69, Suppl. 2: 145. 1931; Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 1, 2: 276. 1931; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Glover, Prov. Check List Brit. Ital. Somal. 268. 1947; H. N. & A. L. Mold., Pl. Life 2: 50 & 62. 1948; Boaler, Journ. Ecol. Brit. 54: 467. 1966; Bouquet, Invent. Pl. Méd. Tox. Cong. Braz. 33. 1967; Bouquet, Méd. Trop. 28: 49--58. 1968; Chohic, Cah. Off. Rech. Sci. Tech. Outre-Mer Biol. 6: 113. 1968; Mold., Phytologia 17: 10 & 24. 1968; Mold., Résumé Suppl. 16: 8 (1968) and 17: 13. 1968; Richards & Morony, Check List Fl. Mbala 239. 1969; Adam, Journ. Agr. Trop. Bot. Appl. 17: 414--415. 1970; Drar, Publ. Cairo Univ. Herb. 3: 111. 1970; Farnsworth, Pharmacog. Titles 5 (10): xxiv & item 11360 (1970) and 5: Cum. Gen. Ind. 1971; Mold., Fifth Summ. 1: 210, 211, 217, 224, 226, 227, 232, 234, & 245 (1971) and 2: 714, 721--723, 726, & 926. 1971; Gray & DeZeeuw, IAWA Bull. 1974 (2): 25, fig. 3. 1974; Leith, Phenol. Season. Model. 444. 1974; Malaisse in Leith, Phenol. Season. Model. 276. 1974; Mold., Phytologia 28: 442. 1974; Mound & Halsey, Whitefly World 98. 1978; Mold., Phytologia 44: 479--481. 1979.

Additional illustrations: Gray & DeZeeuw, IAWA Bull. 1974 (2): fig. 3. 1974.

Drar (1970) cites his nos. 138, 1433, & 1503 from Sudan; Pellegrin (1928) cites *L.T. 1079* from Mayombe where he found the plant to be a shrub, 1.5 m. tall, more or less stunted by the annual brush fires, growing on savannas, with "violet" colored flowers in August. Good & Exell (1930) cite their no. 1051 from open *Combretum* forests in Angola. Pobéguin (1906) cites his no. 169 from Guinea, where he found the species as a tree, 6--8 m. tall, producing "pale-blue" flowers. Hutchinson & Dalziel (1931) cite only *Chevalier 12467* from French Sudan, but list the species also from French Guinea, Zaire, and Angola. Glover (1947) regards *V. schweinfurthii* Gürke as synonymous with typical *V. madiensis*, but I regard it as representing a variety, var. *schweinfurthii* (Gürke) Pieper, which see.

Recent collectors describe typical *V. madiensis* as a subshrub or treelet, 1--3 m. tall, the branches more or less horizontal, the leaves papery, pale-green, glossy above, and have encountered it on savannas, at 500--800 m. altitude, in flower in April and in fruit in July. The corollas are said to have been "mauve" on *Evrard 6446* and "whitish" on *Breteler 1089*.

Vernacular names reported for the species include "atyugé", "bolobé", "budég", "bugnign", "bumi", "buniau-a", "däkélékélé", "dobilé", "gitiogné", "kebôké", "kodo nfi", "kuru kudulé", "kutofiho", "kutufingo", "kutundimò", "kutuní", "kutusumágo", "lugn", "mâb", "mamb", "sèno", "sibuhò", "simbòhò", "simbò u sèno", and "tcimboò".

Chohic (1968) reports that *V. madiensis* is host to the whitefly,

Aleurodes millettiae Cohic in Congo Brazzaville.

It should be noted that the G. F. Meyer photographs of Welwitsch collections in the British Museum (Natural History) herbarium are actually not photographs of the real type collection (Grant 2) of the species in that herbarium.

The *Liben 1926*, distributed as *V. madiensis*, actually represents *V. buchneri* Gürke, while *Gossweiler 14109* is *V. doniana* Sweet and *Drar & Mahdi 138* is *V. doniana* var. *parvifolia* (Engl.) Mold.

Additional citations: SUDAN: Bahr El Ghazal: *Drar & Mahdi 1433* (Gz), *1503* (Gz). CAMEROONS: *Breteler 1089* (Mu). ZAIRE: *Carlier 217* (Mu); *Evrard 6446* (E--2044616). ANGOLA: *Welwitsch 5713* [F. G. Meyer photo 2990a] (Gz--photo, N--photo).

VITEX MADIENSIS var. *ANGUSTIFOLIA* Pieper

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 402. 1938; Mold., *Phytologia* 15: 258. 1967; Mold., *Fifth Summ.* 1: 211 (1971) and 2: 926. 1971.

VITEX MADIENSIS var. *AROMATICA* Pieper

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403. 1938; Mold., *Phytologia* 15: 258. 1967; Mold., *Fifth Summ.* 1: 218 & 234 (1971) and 2: 728 & 926. 1971.

VITEX MADIENSIS var. *BAUMII* Pieper

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403. 1938; Mold., *Phytologia* 17: 10. 1968; Mold., *Fifth Summ.* 1: 232 & 245 (1971) and 2: 714 & 926. 1971; Mold., *Phytologia* 44: 393. 1979.

VITEX MADIENSIS var. *DARBANDENSIS* A. Chev.

Additional bibliography: Mold., *Phytologia* 15: 259. 1967; Mold., *Fifth Summ.* 1: 226 (1971) and 2: 926. 1971.

VITEX MADIENSIS var. *GLABERRIMA* Mold.

Additional bibliography: Mold., *Phytologia* 15: 259. 1967; Mold., *Fifth Summ.* 1: 232 (1971) and 2: 926. 1971.

VITEX MADIENSIS var. *GOSSWEILERI* Pieper

Additional bibliography: Good & Exell, *Journ. Bot. Lond.* 68: Suppl. 144. 1930; Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403. 1938; Mold., *Phytologia* 15: 259. 1967; Mold., *Fifth Summ.* 1: 242, 245, 247, & 250 (1971) and 2: 926. 1971.

Good & Exell (1930) cite *Gossweiler 1062* & *1065* from "in primary thickets formed of *Combretum*, *Diplorhynchus*, etc." in Angola, and report the vernacular name, "muxiluxillu".

VITEX MADIENSIS var. *MILANJIENSIS* (Britten) Pieper

Additional & emended bibliography: J. G. Baker in *Thiselt.-Dyer, Fl. Trop. Afr.* 5: 317 & 330. 1900; Fedde & Schust., *Justs Bot. Jahresber.* 42: 252. 1920; Good & Exell, *Journ. Bot. Lond.* 68: Suppl. 144. 1930; Fedde & Schust., *Justs Bot. Jahresber.* 57

(2): 402. 1938; Boaler, Journ. Ecol. Brit. 54: 467. 1966; Mold., Phytologia 17: 10. 1968; Mold., Résumé Suppl. 16: 8 (1968) and 17: 13. 1968; Richards & Morony, Check List Fl. Mbala 239. 1969; Mold., Fifth Summ. 1: 232, 233, 238, 245, 247, 250, & 252 (1971) and 2: 722, 727, & 926. 1971; Lewalle, Bull. Jard. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C.29]: 39, 41, 81, 82, 102, & [231]. 1972; Mold., Phytologia 44: 481. 1979.

Recent collectors describe this plant as a tall shrub or tree, 3--20 feet tall, the fruit green when young, black when mature, and have found it growing in rocky sandy ground in woodlands, in riverine tropophile forests and open forests, along streamsides and roadsides, and on ant-hills, at 1100--1850 m. altitude, flowering in October and fruiting in February. The vernacular name, "mufulu", has been reported for it.

Lewalle (1972) cites his no. 403, while Richards & Morony (1969) cite D.B.D. 6353 and M.R. 739, 1388, 2178, 11505, & 19532 from Mbala. Good & Exell (1930) cite Gossweiler 1066 from Angola.

The Reekmans 1391 & 2204, distributed as *V. madiensis* var. *mil-anjensis*, actually are *V. epidictyodes* Mildbr., while Callens 3072 & 3300 are *V. hockii* DeWild.

Additional citations: ZAIRE: Schmitz 368 (E--2168608), OBS. 558-1247 (Mu). TANZANIA: Tanganyika: Carnochan 58 (W--2091728). ZAMBIA: Richards 21425 (E--1836221).

VITEX MADIENSIS var. *NIVEA* A. Chev.

Additional bibliography: Mold., Phytologia 15: 260. 1967; Mold., Fifth Summ. 1: 226 (1971) and 2: 927. 1971.

VITEX MADIENSIS var. *SCHWEINFURTHII* (Gürke) Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 403. 1938; Glover, Prov. Check List Brit. Ital. Somal. 268. 1947; Mold., Phytologia 15: 260. 1967; Mold., Fifth Summ. 1: 211, 224, & 232 (1971) and 2: 727 & 927. 1971; Mold., Phytologia 28: 442. 1974.

The Drar & Mahdi collection cited below is very similar to *V. simplicifolia* Oliv.; it exhibits leaves with 1 or 3 leaflets and these are basally truncate and very pubescent beneath.

Additional citations: SUDAN: Kordofan: Drar & Mahdi 1922 (Gz, Gz, Gz).

VITEX MARANHANA Mold.

Additional bibliography: Mold., Phytologia 15: 260. 1967; Mold., Fifth Summ. 1: 179 (1971) and 2: 927. 1971.

See under *V. megapotamica* var. *multinervis* (Cham.) Mold. in the present series of notes for discussion of the possibility that the *V. multinervis* referred to by Peckolt in Bericht. Deutsch. Pharm. Gesel. 14: 481 (1904) may actually be a misidentification of *V. maranhana*.

VITEX MARQUESII Pieper

Additional bibliography: Wangerin, Justs Bot. Jahresber. 56

(1): 669. 1936; Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 404. 1938; Mold., *Phytologia* 15: 260. 1967; Mold., *Fifth Summ.* 1: 245 (1971) and 2: 927. 1971.

VITEX MARTII Mold.

Additional bibliography: Mold., *Phytologia* 15: 260. 1967; Mold., *Fifth Summ.* 1: 179 (1971) and 2: 927. 1971.

VITEX MASONIANA Pittier

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 44: 254. 1922; Pittier, *Contrib. U. S. Nat. Herb.* 20: 484. 1922; Mold., *Phytologia* 17: 10--11. 1968; Mold., *Résumé Suppl.* 16: 4 & 5. 1968; Mold., *Fifth Summ.* 1: 92 & 121 (1971) and 2: 722 & 927. 1971; Mold. in Woodson, Schery, & al., *Ann. Mo. Bot. Gard.* 60: 131--134 & 148, fig. 14. 1973; Mold., *Phytologia* 28: 433. 1974; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 33. 1979.

Additional illustrations: Mold. in Woodson, Schery, & al., *Ann. Mo. Bot. Gard.* 60: 133, fig. 14. 1973.

Recent collectors describe this species as a tree, 100--150 feet tall, the trunk diameter 24--34 inches at breast height, with a widely spreading crown, and have encountered it at 100 m. altitude, flowering in February, June, and July. The corollas are said to have been "blue" on Duke 9784, "white" on Duke 8387, and "pale-purple, central lobe of lower lip purple, yellow at throat, other lobes white to lavender, anthers black, filaments white" on Stern & al. 958. Duke reports the vernacular name, "cuajado", and comments that the species is not used in any way by the native Chocoi Amerinds.

Additional citations: PANAMA: Chocó: Duke 9784 (N). Darién: Duke 8387 (W--2572278); Stern, Chambers, Dwyer, & Ebinger 958 (E--1757561). COLOMBIA: Chocó: A. Gentry 9327 (W--2788819).

VITEX MEDUSAECALYX H. J. Lam in Lam & Bakh., *Bull. Jard. Bot.*

Buitenz., ser. 3, 3: 59. 1921.

Synonymy: *Vitex nadusacalyx* H. J. Lam ex Mold., *Fifth Summ.* 1: 723, in syn. 1971.

Additional & emended bibliography: H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 50 & 59. 1921; Fedde & Schust., *Justs Bot. Jahresber.* 53 (1: 1076. 1932; Mold., *Phytologia* 15: 260--261. 1967; Mold., *Fifth Summ.* 1: 328 (1971) and 2: 723 & 927. 1971.

Van Steenis encountered this species at 1000 m. altitude, flowering in March.

Additional citations: GREATER SUNDA ISLANDS: Sumatra: Van Steenis 9427 (N).

VITEX MEGAPOTAMICA (Spreng.) Mold.

Additional synonymy: *Vitex montividentis* Cham. ex Peckolt, *Bericht. Deutsch. Pharm. Gesel.* 14: 481, sphalm. 1904. *Vitex tarumã* Cham. apud Freise, *Boi. Agricult. São Paulo* 34: 319. 1933.

Vitex megapotamicus Lombardo, Fl. Arb. Arbores. Urug., ed. 2, 124, fig. 196, sphalm. 1964. *Vitex mefapotamica* Rimpler apud Farnsworth, Pharmacog. Titles 6 (4): item 7195, sphalm. 1971.

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 612. 1843; Schau. in A. DC., Prodr. 11: 688--689. 1847; Schnitzl., Icon. Fam. Nat. 2: 137 Verbenac. [2]. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 502. 1858; Gibert, Enum. Pl. Montev. 45. 1873; Peckolt, Bericht. Deutsch. Pharm. Gesel. 14: 481. 1904; Venturi & Lillo, Contrib. Conoc. Arb. Argent. 104. 1910; Kirtikar & Basu, Indian Med. Pl., ed. 1, 1936. 1918; Freise, Bol. Agric. São Paulo 34: 319--320 & 494. 1933; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 576. 1941; Barroso, Rodriguêsia 32: 72. 1957; Hansford, Sydowia 10: 66. 1957; Cain, Man. Veg. Anal., imp. 1, 226. 1959; Veloso & Klein, Sellowia 10: 99 & 105. 1959; Hansford, Sydowia Beih. 2: 696. 1961; Reitz, Sellowia 13: 64 & 110. 1961; Willaman & Schubert, Agr. Res. Serv. U. S. Dept. Agr. Tech. Bull. 1234: 237. 1961; Rizzini in Ferré, Simpos. Cerrado 116. 1962; Veloso & Klein, Sellowia 15: 45, 47, 50, 51, & 107. 1963; Martínez-Crovetto, Bonplandia 1: 177 & 98. 1963; Lombardo, Fl. Arb. Arbores. Urug., ed. 2, 124, fig. 196. 1964; Reitz & Klein, Sellowia 16: 41 & 83. 1964; Angely, Fl. Anal. Paran., ed. 1, 580. 1965; Griff & Hyland, U. S. Dept. Agr. Pl. Invent. 166: 196. 1966; Langhammer, Excerpt. Bot. A.14: 473. 1969; Rimpler, Deutsch. Apoth.-Zeit. 107: 391 & 1413. 1967; Rimpler & Schulz, Tetrahed. Lett. 22: 2033--2035 & 5139. 1967; R. E. Alston in Mabry, Recent Adv. Phytochem. 1: 311. 1968; Hyland, U. S. Dept. Agr. Pl. Invent. 172: 247. 1968; Mold., Phytologia 17: 11. 1968; Mold., Résumé Suppl. 16: 6 & 29. 1968; Veloso & Klein, Sellowia 20: 82, 122, 147, & 177. 1968; Rimpler, Deutsch. Apoth.-Zeit. 109: 391. 1969; Rimpler, Tetrahed. Lett. 21: 329--333. 1969; Anon., Biores. Index 6: 1366, 1372, & 4087--4088. 1970; Herout in Reinhold & Liwschitz, Prof. Phytochem. 2: 183 & 189. 1970; H. & Y. Hikino, Prog. Chem. Org. Nat. Prod. 28: 256--312. 1970; Reitz, Sellowia 22: 147. 1970; Siddall in Sondheimer & Simeone, Chem. Ecol. 294. 1970; Angely, Fl. Anal. Fito-geogr. Est. S. Paulo, ed. 1, 4: 828 & xix, map 1372. 1971; Cain, Man. Veg. Anal., imp. 2, 226. 1971; Farnsworth, Pharmacog. Titles 6 (4): xv & item 7195. 1971; Huneck, Excerpt. Bot. A.18: 34. 1971; Mold., Fifth Summ. 1: 179, 188, 190, 203, 374, & 396 (1971) and 2: 614, 722, 723, 728, 731, & 927. 1971; Klein, Sellowia 24: 44 & 61. 1972; Rimpler, Arch. Pharm. 305: 746--751. 1972; Souza Sobrinho, Insula 6: 7 & 17. 1972; Anon., Biol. Abstr. 55 (10): B.A. S.I.C. S.272. 1973; Farnsworth, Pharmacog. Titles 8: 219 (1973), 8 (2): xx (1973), and 6: Cum. Gen. Ind. [122]. 1973; Heftmann in L. P. Mill., Phytochem. 2: 178 & 180. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 663, 665, 673, & 681. 1973; Mold., Phytologia 25: 230 (1973) and 28: 452. 1974; Troncoso, Darwiniana 18: 394, 395, & 412, fig. 35. 1974; Mold., Phytologia 31: 412 (1975), 36: 48 (1977), and 39: 424. 1978; Reitz, Klein, & Reis, Proj. Madeira S. Catar. 42 & 86.. 1978; Hocking, Excerpt. Bot. A.33: 88. 1979; Mold., Phytologia 44: 398 & 412. 1979; Troncoso in Burkart, Fl. Ilustr. Entre Rios 5: 292--294, fig. 138. 1979.

Additional illustrations: Lombardo, Fl. Arb. Arbores. Urug., ed. 2, 124, fig. 196. 1964; Troncoso, Darwiniana 18: 394, fig. 35. 1974; Troncoso in Burkart, Fl. Ilustr. Entre Rios 5: 293, fig. 138. 1979.

Troncoso (1979) states that the wood of this species is "dura ...muy apreciada, se utiliza para postes, tablillas de techo, etc. Su fruto da una especie de aceite y según varios autores es comestible". She records the vernacular names, "tarumá", "tarumá duro", "tarumá sin espinas", and "tarumán de ley" and cites *Collector undetermined* 44 from Corrientes, Argentina, *Niederlein 1810* from Misiones, *Herter 88856 & 94042* from Uruguay, and *Pedersen 5222* from Paraguay, all deposited in the San Isidro herbarium. Latzine (1937) and Devoto & Rothkugel (1942) list it from Entre Ríos, Argentina, as, of course, does Troncoso (1979).

Recent collectors describe the plant as a shrub, 1 m. tall, or a small slender tree, 2--20 m. tall, the flowers sweet-scented, and the immature fruit "wine-color", the size and color of a cherry when mature. They have found it growing in restinga, at the edge of woods, in wet or gallery forests along rivers, in primeval, pluvial, and *Araucaria* forests, from 5--750 m. altitude, in flower from October to March, and in fruit from December to February. Herter refers to it as the "echter [true] Tarumá".

The corollas are said to have been "blue" on *Hatschbach 28422*, *Krapovickas & al. 16810*, and *Schwarz 5133*, "anil" on *Hatschbach & Koczicki 15363 & 27240*, "sky-blue" on *Lourteig 2073*, "lilac" on *Hatschbach 23206 & 39310* and *Jorgensen 3786*, "pale-lilac" on *Hatschbach 25936*, "blue-violet" on *Schinini & Carnevali 10591*, "rose" or "rosy" on *Herter 1392b*, *Klein 106 & 151*, and *Reitz & Klein 131*, "pale-violet" on *Pedersen 5222*, "pinkish-white" on *Reitz & Klein 5968*, "white and rose" on *Reitz & Klein 7613*, "lavender and white" on *MacIntyre s.n.*, "blue at base, petals pale yellowish-white" on *Maruñak 193*, and "amarela" on *Gevieski 54*.

Reitz & Klein 7613 was collected as voucher for a wood collection; a strip of bark accompanies *Fiebrig 5382*.

Peckolt (1904) asserts that this species occurs only between 12° and 33° S. latitude in Brazil and lists the vernacular names, "tarumá do banhado" and "turumá". He describes the corolla as violet in color and the calyx as purple-red; "Nach Löfgren werden in S. Paulo die Früchte von den Fischern als Köder zum Angeln der Fische *Lambari* (*Tetragonopterus dichrourus*) und *Tobarána* (*Salminus Cuvierii*) benutzt. Das Dekokt der Blätter hat den Ruf, als die Harnsteine lösend zu wirken. Nach Martius ist die Rinde heilkräftig bei syphilitischen atonischen Affektionen. Das weisse dauerhafte Holz dient zu verschiedenen Gerätschaften."

Venturi & Lillo (1910) say that "A orillas de los arroyos [in Argentina] encuéntrase esta especie común; la madera de color rojizo, veteada, dura, es muy buena y apreciada. La corteza es frágil y estriada parecida á la del 'Mata-Ojos'. Como se conserva mucho en la humedad es utilizado para hornos, postes, etc. y siendo fácil de rajar es empleado para tablillas de techo. La fruta da

una especie de aceite y la misma madera aún después se seca, siendo enterrada vuelve a sudar el aceite y parece que nuevamente se pone verde." Freise (1933) describes its uses as follows: "folhas; usadas como diuretico e depurativo so sangue, empregando-se o infuso dellas na dose de 5 grms. de folhas por 200 grms. d' agua em fervura, para 3 ou 4 chicaras diarias. Das folhas conhece-se um oleo essencial (0,25--0,35% Freise) que tem um cheiro muito caracteristico (lembrando pão preto fresco e humido ainda), um peso esp. (15° C.) de 0,905 e um sabor acre-picante; algumas dos componentes deste oleo são Pinena, Camphene e Cineol. O embrão da semente contem um alcaloide inebriante." Rimpler (1967, 1972), Rimpler & Schulz (1967), Langhammer (1969), and Heftmann (1973) have isolated the following chemicals in *Vitex megapotamica*: viticosterone (a phyto-sterone), crustecdysol, inokosteron, pterosteron, polypodin B, viticosteron E, β -ecdysone, phytoecdysone, ecdysen, iridoide, and ecdysterone.

Hansford (1961) reports the species as host to the fungus, *Meliola cantareirensis* Hansf. in Brazil, based on *Puttemans 202*.

Souza Sobrinho (1972) records the species from Santa Catarina island. Hyland (1968) lists it as cultivated in Maryland, grown from seed of U. S. Plant Inventory no. 300985, imported from Argentina in 1964. Seed of *Ll. Williams 18555* from São Paulo, Brazil, was cultivated in Maryland, where it grew into a tree, 15 feet tall, with a flat crown.

Cain (1959) describes *V. megapotamica* as a "mesophanerophyte microphyll". Barroso (1957) reports it from Bahia, Minas Gerais, and Rio de Janeiro, Brazil, citing *Barroso 85* and *RB.24280 & 66525*, from 900 m. altitude.

Troncoso (1974) cites only *Herter 94042* from Uruguay and *Rodriguez 53* from Misiones, Argentina, deposited in the San Isidro herbarium.

It should be noted that the Angely (1971) reference cited in the bibliography (above) is sometimes cited as published in "1970", the title-page date, but the work was not actually published until 1971.

Material of *V. megapotamica* has been misidentified and distributed in some herbaria as *V. cymosa* Bert. On the other hand, the *Collector undetermined 15* and *Senaratna 193*, distributed as *V. megapotamica*, actually represent *V. capitata* Vahl, while the following collections, distributed as - and in some cases cited by me in previous installments of these notes as - typical *V. megapotamica*, actually represent the newly recognized var. *multinervis* (Cham.) Mold.: *Burchell 4250*, *Burkart 18318*, *Dusén 16165*, *Gruner 413*, *Hassler 12307a*, *Hatschbach 39782*, *Herb. Barb. Rodr. 10069*, *Herb. Inst. Bot. S. Paulo 869*, *1188*, *15600*, *19446*, & *50353*, *Herb. Mus. Nac. Rio Jan. 5994*, *Herb. Serv. Florest. Comp. Paul. Estr. Ferro 109*, *Hoehne 659 & 869*, *Klein 1852 & 1858*, *Lindeman & Haas 4718*, *Macbride photos 17563*, *Montes 1548 & 7115*, *Moreira 42*, *Mosen 642 & 4324*, *Pickel 353*, *Rambo 29358*, *Regnell I.38*, *I.38b*, & *I.583*, *Reitz & Klein 1858*, *3009*, & *6409*, *Rodriguez 53*, *Roth 840*, *A. G. Schulz 7151*, *Smith & Klein 8027*, *8284*, & *11928*, *Ule 1065*, and *Usteri 1*. *Reitz 3226* is *V. megapotamica* f. *albiflora* Mold.

Additional citations: BRAZIL: Minas Gerais: Riedel & Lund 0,3 (N); Widgren s.n. [Caldas 1845] (Mu--1521). Paraná: Dusen 7262 (Mu), 7426 (Mu); Hatschbach 23206 (Mi), 25936 (Ld), 28422 (Ld), 39310 (Ld), 41099 (N). Hatschbach & Haas 15809 (Ft). Rio Grande do Sul: Herb. Kummer s.n. (Mu--1349); Krapovickas, Cristobal, & Quarin 22900 (Ld); Pabst 6392 [Pereira 6565; Herb. Brad. 22517] (Mu); Palacios & Cuezco 526 (N); Rambo 49156 (Bl--64890); Richter 961 [Herb. Brad. 7896] (Mu). Santa Catarina: Gevieski 54 [Herb. Barb. Rodr. 8382] (W--2220119); Hatschbach & Koczicki 27240 (Ld, N); Reitz & Klein 131 (W--2141537), 5968 (W--2282014), 7613 (W--2403325, Ws); Smith & Klein 10685 (W--2251706), 13185 (Au--249872, W--2573680, Ws), 13222 (W--2573691), 14164 (N, W--2573693). PARAGUAY: Fiebrig 5382 (Mu--4254); Hassler 9640 (Ws), 11417 (E--1574728, W--2055484); Lourteig 2073 (N, S, W--2547654). URUGUAY: Herter 1392 [Herb. Herter 88856] (Mu). ARGENTINA: Corrientes: Krapovickas, Cristobal, Arbo, Maruñak, Maruñak, & Irigoyen 16810 (Ld, Ws); Schinini & Carnevali 10591 (Ld). Misiones: Krapovickas, Cristobal, & Maruñak 23389 (Ld); V. Maruñak 193 (Ld, Ws); G. J. Schwarz 5133 (N). Salta: T. Rojas 11477 (N). CULTIVATED: Egypt: V. Täckholm s.n. [10/6/1960] (Gz); Täckholm & Elsayed s.n. [15/5/1961] (Gz, Gz), s.n. [23/6/1961] (Gz, Gz, Gz), s.n. [22/11/1961] (Gz, Gz). LOCALITY OF COLLECTION UNDETERMINED: Kreuzpointner s.n. [Januar 1897] (Mu--3744, Mu--3745).

VITEX MEGAPOTAMICA f. *ALBIFLORA* Mold.

Additional bibliography: Mold., *Phytologia* 17: 11. 1968; Mold., *Résumé Suppl.* 16: 6. 1968; Mold., *Fifth Summ.* 1: 179 & 374 (1971) and 2: 927. 1971.

Reitz refers to this plant as a tree, 8 m. tall, the "fruto preto-pequeno", and encountered it in capoeira. at 50 m., altitude, flowering and fruiting in December, called locally "tarumão".

Material of this form has almost uniformly been identified as and distributed in herbaria as typical *V. megapotamica* (Spreng.) Mold. On the other hand, the Klein 2707, distributed as and previously erroneously cited by me as this form, actually is not verbenaceous.

Additional citations: BRAZIL: Paraná: Hatschbach 13392 (Ld). Santa Catarina: Reitz 3226 [Herb. Barb. Rodr. 5939] (W--2141641).

VITEX MEGAPOTAMICA var. *MULTINERVIS* (Cham.) Mold., *Phytologia* 39: 424. 1978.

Synonymy: *Vitex montevidensis* ? var. *multinervis* Cham., *Linnaea* 7: 374. 1832. *Psilogyne viticifolia* A. DC., *Rev. Fam. Bignon.* 16. 1838. *Vitex multinervis* (Cham.) Schau. in A. DC., *Prodr.* 11: 688. 1847. *Vitex montevidensis multinervis* Cham. apud Buek, *Gen. Spec. Syn. Candoll.* 3: 502, in syn. 1858. *Vitex multinervis* Schau. apud Buek, *Gen. Spec. Syn. Candoll.* 3: 502. 1858. *Vitex viticifolia* (A. DC.) B. L. Robinson, *Proc. Amer. Acad.* 51: 531. 1916. *Vitex montevidensis* var. *multinervis* Cham. ex Mold., *Prelim. Alph. List Inv. Names* 51, in syn. 1940.

Bibliography: Cham., *Linnaea* 7: 374. 1832; A. DC., *Rev. Fam. Bignon.* 16. 1838; Schau. in A. DC., *Prodr.* 11: 688. 1847; Schau. in Mart., *Fl. Bras.* 9: 297. 1851; Buek, *Gen. Spec. Syn. Candoll.* 3: 502. 1858; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 1214. 1895; Peckolt, *Bericht. Deutsch. Pharm. Gesel.* 14: 481. 1904; B. L. Robinson, *Proc. Amer. Acad.* 51: 531. 1916; Mold., *Pre-lim. Alph. List Inv. Names* 39, 51, & 52. 1940; Fedde & Schust., *Justs Bot. Jahresber.* 60 (2): 576. 1941; Mold., *Alph. List Inv. Names* 39, 54, & 55. 1942; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 1214. 1946; Mold., *Phytologia* 5: 464. 1956; Mold., *Résumé* 341, 386, & 391. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 1214. 1960; Mold., *Phytologia* 15: 261. 1967; Mold., *Fifth Summ.* 2: 614, 722, 723, & 731. 1971; Troncoco, *Darwiniana* 18: 395 & 412. 1974; Mold., *Phytologia* 39: 424. 1978; Hocking, *Excerpt. Bot. A.* 33: 88. 1979.

This rather inconstant variety is based on *Sellow s.n.* from somewhere in Brazil, photographed by Macbride as his type photograph number 17563. It differs from the typical form of the species in its leaf-blades being more regularly tapering-acute apically and the secondaries more numerous, straighter, and closer together. Similar leaflets can, however, occasionally be found among the ordinary type in the typical form of the species. In the variety such leaves are more numerous and more constant proportionally. Many of the specimens cited below were previously cited by me and annotated as typical *V. megapotamica* before the validity of this variety was established.

Recent collectors describe the plant as a tree or treelet, 4--15 m. tall, the trunk 30--35 cm. in diameter at breast height, the fruit green when immature, becoming wine-color, red, dark-red, or even black when mature and then about 1.5 cm. in diameter. They have encountered it in woods and forests, at the edges of woods, in primeval, residual, and gallery forests, at the margins of virgin forests, in meadows, monte, mata, pinheira, mato branco without Araucaria, capoeira, and dry campo, at altitudes of 300--1000 m., flowering in November and December, in fruit in September, November, and from February to April. The corollas are said to have been "lilac" on *Smith & Klein 1858*, "violet" on *Burkart 18318*, "alvo, fauce arroxeadado" on *Hoehne 869*, and "cremoso-morado" on *Montes 7115*.

Vernacular names reported for the variety are "bracuhy", "bracuí", "bracuy", "guabiropa brava", "tarumã", "tarumã blanco", "taruman", "tăruman", and "tatuman".

Peckolt (1904) asserts that this is a more northern form of the species, found "In den Staaten [of Brazil] vom 7. bis zum 27.° südl....vorkommend mit den Volksnamen Maria preta de campina -- Schwarze Marienfrucht der Wiesen in Alagôas, Salgueiro -- Weide in Pernambuco, Paó de cavallo -- Pferdebaum in den anderen Staaten. Ein bis 8 m hoher Baum. Blätter fünfsteilig, Blüten hellblau. Schwarze ovale Steinfrüchte von styptisch-süßem Geschmack, sie werden genossen. Das Holz dient zu Tüüren und Fensterladen." I am not at all certain that the plant he refers to here is really *V. megapotamica* var. *multinervis*; more likely it is *V. maran-*

hana Mold.

Material of this variety has been identified as and distributed in most herbaria as typical *V. megapotamica* (Spreng.) Mold. or as *V. cymosa* Bert. or *V. montevidensis* Cham.

Citations: BRAZIL: Mato Grosso: *F. C. Hoehne s.n.* [Herb. Inst. Bot. S. Paulo 19446] (N, Sp). Minas Gerais: *Mosén 642* (S, S, W--1323355), *4324* (N--photo, S, Z--photo); *Regnell I.38* (W--1706589), *I.38b* (B, Br, F--998446, G, K, Mu--1520, P, P, S, S, Ut, V, Vu, W--274928), *I.583* (W--274927). Paraná: *Dusén 16165* (B, Cb, It, N, N--photo, N--photo, S, W--1481850, Z--photo, Z--photo), *s.n.* [Herb. Mus. Nac. Rio Jan. 5994] (N); *Hatschbach 39782* (N); *Lindeman & Haas 4718* (N, Ws); *Moreira 42* (W--2369335). Rio Grande do Sul: *Rambo 29358* (N); *Sellow s.n.* [Brasilia; Macbride photos 17563] (B--type, B--isotype, B--isotype, B--isotype, B--isotype, Br--isotype, Dc--isotype, F--66392--isotype, Kr--photo of type, N--photo of type, N--photo of type, P--isotype, Us--isotype, W--photo of type, X--isotype, Z--photo of type). Santa Catarina: *Klein 1858* (N, W--2220607, W--2220609, W--2281908); *Reitz & Klein 1858* [Herb. Barb. Rodr. 10069] (N), *3009* (N, N, Sm, W--2321115), *6409* (Sm, W--2268814); *Smith & Klein 8027* (N, N, Ok, W--2251333), *8284* (Ok, W--2251372), *11928* (Ok, W--2251837); *Ule 1065* (W--1323354). São Paulo: *F. C. Hoehne 659* (N), *s.n.* [Herb. Inst. Bot. S. Paulo 869] (A, Bm, N, N, P, Sp, W--1543126); *Pickel 353* (N); *Roth 840* [Herb. Inst. Bot. S. Paulo 50353] (N, Sp); *Usteri 1* (Mu--4051), *s.n.* [Herb. Inst. Bot. S. Paulo 15600] (It, N, Sp); *Vecchi s.n.* [Herb. Serv. Florest. Comp. Paul. Estr. Ferro 109; Herb. Inst. Bot. S. Paulo 1188] (It, N, N, Sp). State undetermined: *Burchell 4250* (K). PARAGUAY: *Hassler 12307a* (A, B, Bm, Cb, Cp, E--848244, Ed, G, K, Le, W--1057262). ARGENTINA: Misiones: *Gruner 413* (N); *Montes 1548* (N), *7115* (N); *Rodriguez 53* (N); *A. G. Schulz 7151* (N). CULTIVATED: Argentina: *Burkart 18318* (W--2595172).

VITEX MENABEENSIS Capuron, *Adansonia*, ser. 2, 12: 51--52, 1972.

Bibliography: Capuron, *Adansonia*, ser. 2, 12: 51--52, 1972; Anon., *Assoc. Etud. Tax. Fl. Afr. Trop. Index* 1972: 56, 1973; Anon., *Biol. Abstr.* 55 (10): B.A.S.I.C. S.272, 1973; Mold., *Phytologia* 31: 389, 1975.

This species is endemic to Madagascar and is based on *Capuron 24571* from near Ambereny, Antsalova, in the Tsimembo forest, Madagascar, collected in flower on March 30, 1966, and deposited in the Paris herbarium. The author cites also *Harmelin 10200* from the same locality and notes that the species seems closest to *V. barorum* Humbert, but "espèce dont il est tout à fait distinct".

VITEX MEXIAE Mold.

Additional & emended synonymy: *Vitex sellowiana* ♂ *parviflora* Schau. in A. DC., *Prodr.* 11: 690, 1847 [not *V. parviflora* A. L. Juss., 1806]. *Vitex selliana* ♂ *parviflora* Cham. ex Buek, *Gen. Spec. Syn. Candoll.* 3: 502, sphalm. 1858. *Vitex sellowiana* var. *parviflora* Schau. ex Mold., *Prelim. Alph. List Inv. Names* 52, in

syn. 1940.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 501 & 502. 1858; Mold., Phytologia 15: 263. 1967; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 828 & xix, map 1372. 1971; Mold., Fifth Summ. 1: 179 & 374 (1971) and 2: 714, 727, & 927. 1971; Mold., Phytologia 36: 48 (1977) and 44: 412. 1979.

Recent collectors describe this plant as a shrub, "to arborescent", 3 m. tall, with shreddy bark, and have found it in flower in November and in fruit in January. They report the vernacular name, "Maria preta". The corollas are said to have been "light-purple" on *Mexia* 5251 and this excellent collector refers to the species as "common".

The Angely (1971) reference in the bibliography (above) is often cited as "1970", the title-page date, but was not actually issued until 1971.

Material of *V. mexiae* has been misidentified and distributed in some herbaria as *V. cymosa* Bert.

Additional citations: BRAZIL: Minas Gerais: Irwin 2062 (Au--172813); *Mexia* 5251 (Ba), 5474 (Ba).

VITEX MICRANTHA Gürke

Additional synonymy: *Vitex micranthis* Gürke ex Mold., Phytologia 31: 412, in syn. 1975.

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 316 & 324. 1900; Bertin, Miss. Forest. Colon. Bois Côte Iv. 176. 1918; Pellegrin, Fl. Mayombe 2: 50. 1928; Pellegrin, Mem. Soc. Linn. Normand. 26 [ser. 2, 1 (2)]: 50. 1928; Irvine, Pl. Gold Coast 438. 1930; Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 1, 2: 276 & 277. 1931; Aubréville, Ann. Acad. Sci. Colon. 9: 133 & 237. 1938; Mangenot & Mangenot, Bull. Jard. Bot. Brux. 27: 653. 1957; Hansford, Sydowia, ser. 2, Beih. 2: 695. 1961; Irvine, Woody Pl. Ghana 763. 1961; Gledhill, Check List Flow. Pl. Sierra Leone 30. 1962; Voorhoeve, Belmontia 8: 101. 1967; Mold., Phytologia 17: 11. 1968; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717. 1969; Aubréville in Eyre, World Veget. Types 52. 1971; Fox, Trop. Ecol. 12: 20. 1971; Mold., Fifth Summ. 1: 218--222 & 224 (1971) and 2: 721 & 927. 1971; Bolkh., Grif, Matvej., & Zakhar, Chrom. Numb. Flow. Pl., imp. 2, 717. 1974; Gray & DeZeeuw, IAWA Bull. 1974 (2): 25, fig. 1. 1974; Mold., Phytologia 31: 412 (1975) and 45: 487. 1980.

Illustrations: Gray & DeZeeuw, IAWA Bull. 1974 (2): fig. 1. 1974.

The Mangenots (1957) report the chromosome number for this species as 32. Hansford (1961) lists it as a host for the fungus, *Meliola cookeana* Speg., in Sierra Leone, based on *Deighton* 615 & 2234. Fox reports the species 97 percent susceptible to arsenic poisoning and 50 percent to hormone poisoning in the same country. Bertin (1918) lists the species from Ivory Coast.

Recent collectors refer to *V. micrantha* as a small tree, only 3.5--4 m. in height, or a tree, 25--75 feet tall, the trunk

2--3 inches in diameter at breast height, without buttresses, but with a slightly fluted bole. They have encountered it "in lignosis residuis inter agros pessime cultos, ad marginem segestum", flowering from February to May, fruiting in April and December.

Dalziel (1937) reports that "Snakes are said to frequent the tree and to eat the fruit, accounting for the Liberian name ["sah-sah"], which means also a person with an evil reputation and maker of trouble.....The leaves are applied to cure crawl-crawl." He also notes that "The wood is whitish or light yellow-brown, the sapwood and heart not differentiated, fairly light and of medium texture, taking a good polish. It furnishes a useful timber, used locally for light construction work, but liable to insect attack and decay. In Sierra Leone Koran boards are made of it. In Liberia the stem is hollowed out to make drums." He also records the vernacular names, "andofiti", "djin-akwa", "feve", and "fevei". Baker (1900) cites only *Cummins* 74 and *Mann* 860 from Sierra Leone. Hutchinson & Dalziel (1936) cite *Aylmer* 46, *Cooper* 70, *Cummins* 74, *Deighton* 658, *Lane-Poole* 243, and *Thomas* 9064. Irvine (1961) also reports the use of the wood to make Koranic writing-boards in schools, drums, and heddles.

The *Bernardi* 8159, distributed as *V. micrantha*, actually represents *V. grandifolia* Gürke.

Additional citations: LIBERIA: *J. T. Baldwin* 6114 (W--2672605), 10531 (W--2673058), 11250 (W--2672452); *G. P. Cooper* 70 [Herb. Mus. Yale Sch. Forest. 13720] (W--1378350). IVORY COAST: *Bernardi* 8456 (E--1828048, Mu).

VITEX MICROPHYLLA Mold.

Additional bibliography: Mold., *Phytologia* 15: 264. 1967; Mold., *Fifth Summ.* 1: 263 (1971) and 2: 927. 1971.

VITEX MILNEI Pieper

Additional & emended bibliography: *J. G. Baker* in *Thiselt.-Dyer*, *Fl. Trop. Afr.* 5: 317 & 327. 1900; *Fedde & Schust.*, *Justs Bot. Jahresber.* 57 (2): 403. 1938; Mold., *Phytologia* 15: 264. 1967; Mold., *Fifth Summ.* 1: 221 & 225 (1971) and 2: 715, 716, & 927. 1971; Mold., *Phytologia* 44: 475. 1979.

Baker (1900) cites only the type collection, *Milne s.n.*, from Fernando Po.

VITEX MOLLIS H.B.K.

Additional & emended synonymy: *Vitex mollis* Humb. ex Spreng. in *L.*, *Syst. Veg.*, ed. 16, 2: 756. 1825. *Vitex mollis* Humb. & Kunth apud *D. Dietr.*, *Syn. Pl.* 3: 611. 1843. *Vitex tomentosa* Pav. ex Mold., *Prelim. Alph. List Inv. Names* 52, in *syn.* 1940 [not *V. tomentosa* Rich., 1941, nor Wall., 1831].

Additional & emended bibliography: Spreng. in *L.*, *Syst. Veg.*, ed. 16, 2: 756. 1825; *D. Dietr.*, *Syn. Pl.* 3: 611. 1843; *Buek*, *Gen. Spec. Syn. Candoll.* 3: 502. 1858; *Sessé & Moc.*, *Pl. Nov. Hisp.*, ed. 2, 96. 1893; *H. J. Lam* in *Lam & Bakh.*, *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 50 & 59--60. 1921; *Pittier*, *Contrib. U. S. Nat. Herb.* 20: 484. 1922; *Fedde & Schust.*, *Justs Bot. Jahresber.*

53 (1): 1076. 1932; H. N. & A. L. Mold., Pl. Life 2: 44. 1948; Russell, Ann. Ent. Soc. Am. 56: 149--150. 1963; Neal, In Gard. Hawaii, ed. 2, 729--730. 1965; Rzedowski & McVaugh, Contrib. Univ. Mich. Herb. 9: 27, 38, 62, & 107. 1966; Aleman, Flores Mex. 15 (104): 12 & 19. 1968; Mold., Phytologia 17: 11--13, 28, 45, 47, 50, 54, & 56. 1968; Mold., Resume Suppl. 16: 3. 1968; Palacios Ch., Anal. Esc. Nac. Cienc. Biol. 16: 89, pl. 35, fig. 282--284. 1968; Pennington & Sarukhan, Man. Ident. Arb. Trop. 372--373. 1968; Uphof, Dict. Econ. Pl., ed. 2, 545. 1968; M. Martinez, Pl. Med. Mex., ed. 5, 403. 1969; Mold., Fifth Summ. 1: 77, 374, & 471 (1971) and 2: 718--720, 722, 725, 728, 729, 771, & 927. 1971; Altschul, Drugs Foods 246. 1973; Farnsworth, Pharmacog. Titles 8 (10): xvii. 1973; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 112. 1975; Mold., Phytologia 31: 336. 1975; Mound & Halsey, Whitefly World 207. 1978; Mold., Phytologia 44: 331. 1979.

Additional illustrations: Palacios Ch., Anal. Esc. Nac. Cienc. Biol. 16: pl. 35, fig. 282--284. 1968; Pennington & Sarukhan, Man. Ident. Arb. Trop. 372 & 373. 1968; M. Martinez, Pl. Med. Mex., ed. 5, 403. 1969.

Recent collectors describe this plant as a shrub, to 5 m. tall, or a large tree, 3--20 m. tall, much-branched, the trunk 40--50 cm. in diameter at breast height, the leaves grayish-downy, the flowers fragrant, "grouped in racemes", the fruit fleshy, at first green, then purple, and finally black. They have found it growing on igneous slopes with deciduous tropical woodland, in dry forests and much-disturbed cactus forests, in washes, on forested lava slopes with arborescent *Ipomoea* dominant, at the edges of short-thorn forests, in extensively farmed corn and sugarcane areas, and "entre arbustos leguminosos (huizaches) y matorrales", at altitudes of 33--1500 m., in flower from February to May and in October, in fruit from June to September.

Breedlove encountered the species on dry open slopes with *Ipomoea*, *Bursera*, *Quercus*, and *Lysiloma* in Sinaloa, Mexico; Hastings found it associated with *Quercus chihuahuensis*, *Bursera confusa*, *Erythrina flabelliformis*, and *Dodonaea viscosa* on rocky mountainsides in Sonora; the Andersons found it in oak woods with pines on the higher slopes and *Dodonaea* and *Lysiloma* on the lower. Johnston and his associates report it associated with *Bursera* and *Vitex pyramidata* in grassy and sandy soil made from extrusive igneous rocks in badly disturbed agricultural pastizal at pools and waterfalls along the edges of enormous barrancas in Jalisco. Littman & Pennington refer to it as the dominant species in low deciduous woods where it is "a frequent shrub" in Nayarit. Koch refers to it as "rare" in Jalisco, but Ventura calls it "abundant" in Michoacán.

The corollas are said to have been "blue" on Breedlove 19314, Koch 7485, Moran 4024, and Palacios s.n., "lilac" on Troll 615, "lavender" on Wiggins 13286, "purple" on Pérez & Hernández 852 and Rzedowski 22037, and "white outside, blue on lobes and in throat" on Anderson & Anderson 5845. Pennington & Sarukhán report the "Corteza pardo grisácea, finamente fisurada. Corteza interna crema, cambiando a verdosa. Corola: tubo blanco, limbo lila en la

superficie interior, mas pálido en la superficie exterior, tubo con bandas de lila en la superficie interior. Flores fragrantas."

Pennington reports that in Sonora the fruits are eaten and the roots are used in making a tea taken by women to alleviate menstrual pains. Altschul (1973) quotes Mexia to the effect that the fruit "is black with a pleasant acid taste, much eaten" and the bark is used as a remedy for fevers. Uphof (1968) repeats that the fruits are edible, 1--2 cm. in diameter, and eaten raw, "sold in markets in Mexico", and that both the leaves and fruits are there used to treat diarrhea. Pennington & Sarukhán (1968) assert that "No se conocen usos industriales de esta especie. El fruto es comestible." Martínez (1969) reports that the fruit "produce una mancha indeleble".

Vernacular names recently reported by collectors and writers include "agüilote", "angualama", "atuto", "atutu", "beu", "black coyote", "coyotomate", "cuyotomate", "huilote", "igualama", "negro coyote", "uvalama", and "valama". Sessé & Mocino (1893) report "Vulgo adpellatur Mate; nomen plurimis plantis fructu subrotundo, inter Indigenas commune".

Palacios (1968) describes the pollen grains as "tricolpados, tectados, prolatos, de 27 (33) 39 μ x 23 (25) 30 μ . Vista polar circular, con un diametro de 22 (26) 31 μ . Exina: 2.5 μ de grosor; elementos de la columela simples, superficie psilada. Surcos: de 21 (23) 29 μ de longitud x 4 μ de fisura, con terminaciones agudas".

Russell (1963) lists *Vitex mollis* as one of the hosts for the whitefly, *Trialeurodes abutiloneus* (Haldem.) Quaint. & Bak.

Loesener (1912) cites *Seler 3435* from Colima, Mexico, describing the flower color as "lilac", and found it in anthesis in April. He comments that "Das Exemplar stimmt gut mit *Willdenow n. 11707* überein. Ob die beiden andern Nummern 11705 u. 11706, die ebenfalls als Originale dieser Art gelten können und auch in Schauer in DC. Prodr.....dabei angeführt werden, wirklich dazu gehören oder besser als Vertreter einer besonderen Art oder Varietät zu betrachten sind, muss ich dahingestellt sein lassen. In Form und Consistenz der Blätter scheinen sie mir etwas abzuweichen."

Material of *V. mollis* has been misidentified and distributed in some herbaria as *Citharexylum* sp. On the other hand, the *J. Rzedowski 15267*, distributed as *V. mollis*, actually is *V. pyramidata* B. L. Robinson, while *L. M. Andrews 379* is *V. trifolia* var. *subtrifecta* (Kuntze) Mold.

Additional citations: MEXICO: Chihuahua: *Knobloch 901* (Ws). Guerrero: *Hernandez X. & Alexander 2018* [XA.7] (Ln--196414); *Hinton 9970* (Tu--112079), *9971* (Se--120102), *10989* (Ld), *14121* (Tu--127636); *Pennington & Sarukhán K. 9471* (N). Jalisco: *Gregg 872* (E--2168598); *Johnston, Chiang, & Wendt 12250* (Ld); *S. D. Koch 7485* (W--2754846); *Pérez & Hernández 852* (N); *Torke, Dunn, & Ellis 255* (Ld, N). Mexico: *J. Rzedowski 22037* (Au--256539). Michoacán: *Anderson & Anderson 5845* (Mi, Sd--78821); *Ventura A. 2466* (Mi, Sd--78186). Morelos: *Palacios s.n.* [18.III.1965] (Au--243575); *Reiche 702* (Mu); *W. D. Stevens 1378* (Ld, Ld); *Troll 615* (Mu). Nayarit:

Littman & Pennington 9030 (N); Norris & Taranto 13975 (Mi); Palacios s.n. [18.III.1967] (Mi); Sheldon s.n. [March 22, 1893] (Mi). Oaxaca: R. M. King 1259 (Au--177531); MacDougall s.n. [Las Tejas, 20 February 1970] (N); I. L. Wiggins 13286 (Sd--49113). Puebla: S. S. White 5069 (Ld). Sinaloa: Breedlove 19314 (Mi). Sonora: Carter, Hastings, & Turner 71-60 (Sd--77689, Tu--178629); J. R. Hastings 71-200 (Sd--79764, Tu--180788); Hastings & Turner 65-189 (Sd--61691, Tu--159253), 69-49 (Tu--172026); Mason, Jones, & Shaw 2917 (N, Tu--172427), 2919 (Tu--172426); Moran 4024 (Ba); Pennington 295 (Au--254287); Whitehead M.175 (Tu--161491); Wiggins & Rollins 452 (Tu--132041). LOCALITY OF COLLECTION UNDETERMINED: Olida s.n. [Herb. Debeaux] (P).

NOTES ON THE GENUS *SPHENODESME*

Harold N. Moldenke

This is the 48th genus to be treated by me in my series of notes in the present and other journals since 1931. In view of Munir's excellent taxonomic and nomenclatures revision of the genus in 1966 it would be presumptuous on my part to attempt the monographic study originally planned. It seems desirable, however, to place on record the notes, mainly bibliographic and derived from herbarium study, assembled by my wife and myself on this genus over the past fifty years. Herbarium acronyms employed herein--after are the same as those used by me in the previous 263 installments of this series since 1933 and are fully explained in my "Fifth Summary of the *Verbenaceae*....." (1971), pages 795 to 801, and later supplements thereto.

SPHENODESME Jack, Malay Misc., ser. 1, 1: 19. 1820.

Synonymy: *Sphenoderme* Jack ex Wall., Numer. List [47], no. 1735, in syn. 1829. *Sphenoderma* Jack apud Meisn., Pl. Vasc. Gen. 2: 200, in syn. 1840. *Viticastrum* Presl, Bot. Bemerk. 147--148. 1844. *Sphaenodesma* Jack apud Schau. in A. DC., Prodr. 11: 622. 1847. *Decadontia* W. Griff., Notul. Pl. Asiat. 4: 175--176. 1854. *Brachynema* W. Griff., Notul. Pl. Asiat. 4: 176--177. 1854 [not *Brachynema* Benth., 1859, nor F. Muell., 1862]. *Sphenodesma* W. Griff., Notul. Pl. Asiat. 4: 175, in textu. 1854; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 1059, in syn. 1966. *Sphaenodesma* Jacq. ex Schnitzl., Icon. Fam. Nat. Reg. Veg. 2: 137 Verbenac. [3]. 1856. *Sphaenodesme* Jack ex Bocq., Adansonia, ser. 1, 2: 90. 1862. *Sphenodesma* Jack apud Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1136 & 1159. 1876. *Sphaenodesma* Schau. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 959 & 961, in syn. 1895. *Sphaerodesma* Schau. apud Dalla Torre & Harms, Gen. Siphonog., imp. 1, 434, in syn. 1904. *Sphenodesma* Jacq. apud Junell, Symb. Bot. Upsal. 1 (4): 138. 1934.

Sphaenodesme "Jack ex Schau." apud Angely, Cat. Estat. 8: [2], in syn. 1956. *Sphenodesma* "Jack ex Benth." apud Angely, Cat. Estat. 8: [2], in syn. 1956. *Sphaenodesma* "Schau. apud Jack" ex Angely, Cat. Estat. 8: [2], in syn. 1956. *Sphoenodesma* Jack ex Mold., Rĕsumĕ Suppl. 14: 10, in syn. 1966

Bibliography: Roxb., Hort. Beng. 46. 1814; Jack, Malay. Misc., imp. 1, 1 (1): 19--20 & opp. A. 1820; Wall., Numer. List [47], nos. 1734--1739. 1829; Hook., Bot. Misc. 1: 258 & 285--286. 1830; Roxb., Fl. Ind., ed. 2, imp. 1 [Carey], 3: 54--55. 1832; Piddington, Tab. View Gen. Char. Roxb. x & 104--105. 1836; Meisn., Pl. Vasc. Comment. 2: 200. 1840; Spach, Hist. Nat. Vĕg. 9: 227. 1840; D. Dietr., Syn. Pl. 3: 619. 1843; Jack, Calc. Journ. Nat. Hist. 4 (13): 43--44. 1843; Presl, Bot. Bemerk. 147--148. 1844; Walp., Repert. Bot. Syst. 4: 117 (1845) and 6: 691. 1847; Schau. in A. DC., Prodr. 11: 621--624. 1847; Wight, Icon. Pl. Ind. Orient. 4 (3): 13--14, pl. 1474--1478. 1849; Wight, Illustr. Bot. 2: 217, pl. 173 bis. 1850; W. Griff., Notul. Pl. Asiat. 4: 175--181. 1854; Miq., Fl. Ind. Bat. 2: 858 & 909--911. 1856; Schnitzl., Icon. Fam. Nat. Reg. Veg. 2: 137 Verbenac. [3]. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 110, 443, & 502. 1858; Bocq., Adansonia, ser. 1, 2: 90. 1862; Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (3): 213. 1863; F. Muell., Fragm. 3: 90. 1862; Kurz, Rep. Veg. Andam. App. A: 45. 1870; Kurz, Jour. Roy. Asiat. Soc. Beng. 40 (2): 76. 1871; Roxb., Fl. Ind., ed. 2 [Clarke], 476. 1874; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1136 & 1275. 1876; Kurz, Forest Fl. Brit. Burma 2: 253--256. 1877; Gamble, Man. Indian Timb., ed. 1, 281, 282, & 519. 1881; C. B. Clarke in Hook. f., Fl. Brit. India 4: 561 & 600--602. 1885; Forbes & Hemsl., Fl. Sin. 2: 265. 1890; Kuntze, Rev. Gen. Pl. 2: 509. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew. imp. 1, 1: 595 (1893) and imp. 1, 2: 959, 961, & 1021. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 177--181 (1895) and ed. 1, 4 (3a): 383. 1897; Gamble, Man. Indian Timb., ed. 2, imp. 1, 524 & 545. 1902; Prain, Bengal Pl., imp. 1, 2: 824 & 837. 1903; C. B. Clarke in J. Schmidt, Bot. Tidsskr. 26: [Fl. Koh Chang 8:] 174--176. 1904; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 434. 1904; Post & Kuntze, Lexicon 528. 1904; F. N. Will., Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Brandis, Indian Trees, imp. 1, 502 & 513--514. 1906; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 406. 1906; King & Gamble, Journ. Roy. Asiat. Soc. Beng. 74 (2 extra): 795, 860--864, & 878. 1908; Solered., Syst. Anat. Dicot. Ergänz. 255. 1908; King & Gamble, Journ. Roy. Asiat. Soc. Beng. 74 (4): 863. 1909; Craib, Kew Bull. Misc. Inf. 1911: 445. 1911; Ridl., Journ. Str. Br. Roy. Asiat. Soc. 59: 157. 1911; Dop, Bull. Soc. Bot. France 61: [316]--320. 1915; B. L. Robinson, Proc. Amer. Acad. Sci. 51: 531. 1916; E. D. Merr., Journ. Str. Br. Roy. Asiat. Soc. 76: 114. 1917; H. Hallier, Meded. Rijks Herb. Leid. 37: 86. 1918; H. J. Lam, Verbenac. Malay. Arch. 6, 9, 331--336 & 368. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: x. 1921; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 99 & xvi. 1921; E. D. Merr., Bibl. Enum. Born. Pl. 518. 1921; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921;

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There is much diversity among botanical authors in regard to the accepted spelling of the scientific generic name of this taxon. The original and correct spelling is *Sphenodesme* and this is accepted by such authors as Spach (1840), Jack (1843), Turczaninow (1863), Jackson (1895), Brandis (1906), Robinson (1916), Hallier (1918), Lam (1919), Ridley (1923), Gamble (1924), Fletcher (1939), Fedde & Schuster (1941), Erdtman (1952), Angely (1956), Munir (1966), and Hsiao (1978). The variant and incorrect spelling, *Sphenodesma*, is accepted by Griffith (1854), Miquel (1858),

Bentham (1876), Clarke (1885, 1904), Kuntze (1891), Jackson (1893), Williams (1905), Briquet (1895), Gamble (1902), Prain (1903), Dalla Torre & Harms (1904), Dop (1915, 1935-36), Lam (1921), Junell (1934), Metcalfe & Chalk (1950), Chun & How (1958), Runner (1961), Legris (1963), Van Steenis (1963), Melchior (1964), Barkley (1965), Keng (1969), Saywer & Chermisrivathana (1969), and Henderson (1974). Airy Shaw in 1966 accepted *Sphenodesma*, but in his 1973 work uses *Sphenodesme* on p. 1214, but *Sphenodesma* on pp. 157, 343, and 1084. Ridley adopted *Sphenodesma* in 1920, but changed to *Sphenodesme* in 1923. Schauer (1847) adopted *Sphaenodesma*, as do also Miquel (1856) and Bocquillon (1862, 1863).

It is worth noting that Griffith (1854) actually merely uses the variant orthography in his statement that *Decadontia coerulescens* is "an *Sphenodesma pentandra*. *Roscoea pentandra*. Roxb. Icones", but both Jackson in the "Index Kewensis" and Airy Shaw credit the new generic spelling to him (Griffith) at that place, although in synonymy.

Spach (1840) regarded *Sphenodesme* as a generic synonym of *Congea* Roxb. Dalla Torre & Harms (1904, 1963), Briquet (1895), and Munir (1966) regard *Roscoea* Roxb. "in part" as belonging in the synonymy of *Sphenodesme*. Dalla Torre & Harms divide *Sphenodesme* into two sections: *Brachynema* (W. Griff.) C. B. Clarke, with oblong or narrow-lanceolate corolla-lobes, included anthers, and minute or obsolete style, and *Eusphenodesma* C. B. Clarke, with ovate or oblong corolla-lobes, subexserted anthers, and definite filiform style.

The *Brachynema* of Mueller, referred to in the synonymy (above), is a generic synonym of *Abrophyllum* Hook. f. in the *Escalloniaceae*, while that of Bentham is an accepted genus in the *Ebenaceae*. *Decadontia* W. Griff is erroneously regarded by Bentham and by Briquet as a synonym of *Symphorema* Roxb.

Munir (1966) divides the genus *Sphenodesme* into the same two section as did Clarke, but calls the sections *Brachynema* (W. Griff.) C. B. Clarke and *Sphenodesme* [Jack]. He subdivides the first section into subsections *Eryciboideae* (Briq.) Munir, containing only *S. eryciboides* Kurz, and subsection *Brachynema* [(W. Griff.) C. B. Clarke] containing *S. ferruginea* (W. Griff.) Briq., and *S. involucrata* (Presl) B. L. Robinson.

He subdivides Section *Sphenodesme* into Subsections *Sphenodesme* [Jack], containing *S. griffithiana* Wight, *S. mollis* Craib, *S. sarakawakensis* Mold., *S. racemosa* (Presl) Mold., *S. mekongensis* Dop, *S. pierreii* Dop, and *S. pentandra* Jack, and Subsection *Pentadontia* Munir, containing *S. thorelii* Dop, *S. amethystina* Dop, *S. stellata* Merr., and *S. triflora* Wight.

Munir uses the same characters for the Sections as those given above, but adds "calyx with no accessory teeth" for Section *Brachynema* and "calyx with or without accessory teeth" for Section *Sphenodesme*.

Sphenodesme is a genus of large scandent shrubs, glabrous or tomentose, short-canescenscent, or rufescent; leaves decussate-opposite, exstipulate, simple, deciduous; petioles short; leaf-blades chartaceous, usually marginally entire; flowers borne in capitate cymes or cymules, the inflorescence terminal or lateral, pedunculate, conspicuously involucrate; involucre bracts 6, usually conspicuous, foliaceous, ob-

long or obovate, often colored, in two groups of 3 each; cymes more or less paniculate, decussate, generally once or twice dichotomous, with a single terminal flower at each fork, forming either (typically) 3-flowered cymules (if only once dichotomous) or 7-flowered cymes (if twice dichotomous), the flower terminating the primary forks not bracteate, but the others each subtended by bracts, the bracts therefore in two groups of 3 each; leaves at the base of the panicles greatly reduced and bract-like, mostly early deciduous; calyx gamosepalous, shortly infundibular or hypocrateriform, 5- or 10-ribbed, the rim usually 5- or 10-toothed [very rarely and abnormally 4- or 6-toothed], the 5 additional teeth (when present) representing a congenitally fused 5-parted epicalyx, the accessory teeth usually alternate with [rarely opposite to] the true calyx-lobes which may be either apically entire or bifid; corolla gamopetalous, actinomorphic or slightly zygomorphic, normally 5-merous, its tube short, cylindrical or slightly ampliate apically, the lobes 5 [rarely 6], ovate-oblong or narrow-lanceolate, patent, equal or unequal, imbricate in bud; stamens 5, inserted just below the mouth of the corolla-tube, included or rarely subexserted; anthers short and ovate or rarely oblong, the thecae 2, parallel or divergent; style filiform and elongate or short to obsolete; stigma shortly bifid or obscurely 2-lobed, the lobes apically acute; ovary 2-celled to above the middle, imperfectly 2-locellate, 1-celled apically; ovules 4, pendulous from the apex of a free central placenta; fruit a small, globose or obovoid drupe, more or less completely included by the usually inflated winged calyx; seeds 1 or rarely 2; cotyledons thick.

This is a small genus of 23 known species and varieties, native to tropical Asia from northeastern and southern India, Bangladesh, Burma, and Thailand to Indochina, Hainan Island, and Borneo; often cultivated for ornament in tropical regions and there tending to escape and become naturalized.

Type species: *Sphenodesme pentandra* Jack.

Jack's 1843 description of the genus was merely "Calyx tubulosus 5-dentatus. Corolla 5-loba subirregularis. Stamina 4--5 exserta. Ovarium 4 loculare 4 sporum. Bacca monosperma. Flores fasciculati, involucreti."

Bentham (1876) amplified this description to: "Cymae capituliformes, 3- v. 7-florae, involucre patente 6-mero cinctae. Calyx ovoideo-campanulatus, 5-dentatus, post anthesin (an semper?) globoso-inflatus. Corollae tubus brevis; limbus patens, lobis 5 ovatis oblongisve subaequalibus v. parum inaequalibus imbricatis. Stamina 5, sub fauce affixa, inclusa v. breviter exserta; antherae breves v. rarius oblongae, loculis parallelis v. divergentibus. Ovarium ultra medium 2-loculare, loculis 2-ovulatis imperfecte 2-locellatis, summo apice 1-loculare; stylus elongatus, apice breviter et acute 2-fidus; ovule ab apice axeos placentiferi pendula. Fructus calyce (an semper?) vesiculosus inclusus, ei *Symphorematis* verisimiliter similis, sed maturus nobis ignotus. - Frutices scandentes, glabri v. tomento brevi canescentes v. rufescentes. Folia opposita, integerrima. Cymae capituliformes, pedun-

culatae, secus ramos paniculae terminalis oppositae, bracteis ad basin pedunculorum parvis. Involucri bracteeae 6, foliaceae, iis *Symphorematis* similes. Flores in cyma sessiles, centrifuge evoluti, parvuli."

Briquet (1895) gives virtually the same description (in German). He subdivides the Sect. *Eusphenodesma* of Clarke into two subsections: *Eryciboideae* Briq., with the bracts small, shorter than the calyx, including only *S. eryciboides* Kurz, and *Bracteosae* Briq., with the bracts larger, almost all longer than the calyx, including *S. pentandra* Jack, *S. triflora* Wight, *S. racemosa* (Presl) Mold., etc. In the genus he recognized about ten species native to the "Vorderindien, Hinterindien und im Malayischen Archipel."

Prain (1903, 1963) describes the genus as composed of "Large, scandent shrubs; leaves opposite, entire, short-petioled. Flowers in capitate cymes, 3- or 7-flowered; bracts 6, oblong or obovate, involucrate; cymes more or less paniculate, the leaves at the base of the peduncle being reduced and bract-like, mostly deciduous; bracteoles 0. Sepals connate in a funnel-shaped, 5-toothed, rarely 4- or 6-toothed calyx, enlarged or inflated in fruit. Petals connate in a short, cylindrical corolla; lobes 5, rarely 6, ovate-oblong or narrow-lanceolate. Stamens 5, included, rarely subexserted; anthers ovate. Carpels connate in an imperfectly 2-celled ovary; ovules 4, pendulous from the apex of the axis; style filiform; stigma shortly 2-fid or obscurely 2-lobed. Fruit a small, globose or obovoid drupe, more or less completely included in the calyx. Seeds 1, or rarely 2; cotyledons thick."

Clarke (1885) says virtually the same, except that he says: "Ovary imperfectly 2-celled, 4-ovuled; ovules pendulous from the apex of the placentiferous axis; style filiform, shortly bifid, or (in subgenus *Brachynema*) very short or obsolete, stigma obscurely 2-lobed.....The cyme in this genus is dichotomous with a single flower in the fork; the two lateral branches are again dichotomous with a single flower in the fork; the cyme is thus 7-flid.; or, in 1 or 2 species, 3-flid. by the lateral flowers of the 2 cyme-branches being undeveloped. The flower in the principal fork is necessarily the oldest, and ebracteate; hence the bracts are always 6."

Hsiao (1978) recognizes "About 20 species, chiefly native of southeastern Asia; one recorded from Taiwan". King & Gamble (1908) note that "The curious arrangement of the stamens inside the corolla-tube and the very short style [of *S. ferruginea*] are such well-marked characters that it would almost seem advisable to reconstitute the genus *Brachynema* or else to bring together into one genus of 4 sections *Sphenodesme* with *Symphorema* and *Congea*. We are inclined to consider the latter the best course". Bentham (1876) and Jackson (1895) include *Roscoea* Roxb., in its entirety, in the synonymy of *Sphenodesme*.

Junell (1934) notes for the genus *Sphenodesme* in general and *S. unguiculata* [= *S. involuocrata*] in particular: "Der Bau des Fruchtknotens ist im grossen und ganzen derselbe wie bei der vorgehenden Gattung [*Congea*]. Ein gewisser Unterschied liegt jedoch hinsichtlich der Plazentation der Samenanlagen vor und ist von grossem

Wert für das Verständnis der Entstehung der Plazenten. In Fig. 209 a und b sind Querschnitte durch den obersten Teil des Fruchtknotens wiedergegeben. Wir sehen, dass bei dieser Pflanze die Scheidewand zwischen den Karpellen auch im Insertionsniveau der Samenanlagen vorhanden ist. In diesem Falle kann es sich also augenscheinlich nicht um eine Zentralplazenta handeln. Erst in den obersten Schnitten durch den Fruchtknoten, über den Plazentaleitbündeln, wird die Scheidewand unvollständig. Auch auf eine andere Einzelheit sei besonders hingewiesen; im Schnitte Fig. 209 b sieht man nämlich die freien Ränder der medianen Scheidewände. Die Samenanlagen sind innerhalb derselben befestigt."

It is perhaps worth noting here that Jack's 1843 publication as listed in the bibliography (above) is erroneously cited as "1844" by some writers; other recent writers incorrectly date Wight's illustration (1849) as "1850", Wallich's Numerical List entry (1829) as "1828", and Meisner's reference (1840) as "1843". The Post & Kuntze (1904) work is mis-cited by Munir as "Post & Kunze" and the King & Gamble reference (1908) is mis-dated "1909". "Biological Abstracts" (1967) refers to this distinguished worker as "Abid, Munir Ahmed". In *Phytologia* 34: 510 it is stated that *Sphenodesme* is mentioned on page "364" of that volume, but this is an unfortunate typographic error for page 264.

Nair & Rehman (1962) describe the pollen grains of this genus as "3-zonicolpate as in *Symphorema*, not 3-zonicolporate with more than one endocolpium per colpus as in *Congea*." Gibbs (1974) found saponins absent, "or probably so", in *Sphenodesme*. Sawyer & Chermisrivathana (1969) report an unidentified species of the genus "infrequent in phytocenoses 1, 4, common in 2", at 380--512 m. altitude, in Thailand.

The *Gibot* SAN.55366, distributed as a species of *Sphenodesme*, actually is *Petraeovitex trifoliata* Merr.

Excluded taxa:

Brachynema ornans F. Muell. = *Abrophyllum ornans* (F. Muell.) Hook. f.,

Brachynema ramiflora Benth. -- in the *Escalloniaceae*

Sphenodesme larseni Mold. = *Symphorema involucreatum* Roxb.

SPHENODESME AMETHYSTINA Dop, Bull. Soc. Hist. Nat. Toulouse 64: 573. 1932.

Bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 64: 573. 1932; Dop in Lecomte, Fl. Gén. Indo-chine 4: 899 & 901--902. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 265. 1938; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59 & 99 (1942) and ed. 2, 137 & 173. 1949; Mold., Résumé 176 & 439. 1959; Munir, Gard. Bull. Singapore 21: 319, 325, 329, 366, 367, 373, & 377. 1966; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 302 (1971) and 2: 843. 1971.

This species, according to Munir (1966), is based on *Poilane* 6830 & 6895 in the Paris herbarium. Dop (1936) cites only "ANNAM: Da-lanh, prov. de Nhatrang (*Poilane*)". Munir notes that "I have not seen the types.....or their duplicates, nor has any specimen

been found agreeing with the description given by the author. Frequently young cymes may bear less than the normal number of flowers to a cyme. The fact that the author found the number of flowers to a cyme varying from 3 to 5 suggests that the panicle itself was young. The author describes the corolla in the bud [stage] only." I have also not seen any material of this taxon.

SPHENODESME ERYCIBOIDES Kurz, Journ. Asiat. Soc. Bengal 40 (2): 76. 1871.

Synonymy: *Symphorema grossum* Kurz, Forest Fl. Brit. Burma 2: 254. 1877. *Sphenodesma eryciboides* Kurz apud C. B. Clarke in Hook. f., Fl. Brit. India 4: 601. 1885. *Sphenodesma grossum* Kurz apud C. B. Clarke in Hook. f., Fl. Brit. India 4: 601, in syn. 1885. *Sphenodesma?* Wall. Cat. 9076. 1848 apud C. B. Clarke in Hook. f., Fl. Brit. India 4: 601, in syn. 1885. *Sphenodesme grossa* Kurz apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 961, in syn. 1895.

Bibliography: Kurz, Journ. Asiat. Soc. Bengal 40 (2): 76. 1871; Kurz, Fl. Burma 345. 1871; Kurz, Forest Fl. Brit. Burma 2: 254. 1877; C. B. Clarke in Hook. f., Fl. Brit. India 4: 601. 1885; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 961 & 1021. 1895; Brandis, Indian Trees, imp. 1, 514. 1906; Mold., Alph. List Inv. Names 41. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55 & 99. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 961 & 1021. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129, 173, & 174. 1949; Mold., Résumé 166, 345, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 961 & 1021. 1960; Munir, Gard. Bull. Singapore 21: 318, 319, 325, 327, 328, 340--[342], 373, & 375, pl. 4 (1966) and 22: 154 & 157, fig. 1 C. 1967; Mold., Résumé Suppl. 15: 9 & 10. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Brandis, Indian Trees, imp. 2, 514. 1971; Mold., Fifth Summ. 1: 284 & 297 (1971) and 2: 623, 634, & 843. 1971; Mold., Phytologia 23: 435 (1972) and 45: 403. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: [342], pl. 4 (1966) and 22: 157, fig. 1 C. 1967.

This species is based on *Brandis 879* from Pegu, Burma, deposited in the Kew herbarium. It is the only species in the genus with the involucre bracts shorter than the calyx and is the type species of Subsection *Eryciboideae* (Briq.) Munir of Section *Brachynema* (W. Griff) C. B. Clarke [Section *Eusphenodesma* C. B. Clarke Subsection *Eryciboideae* Briq.]. It appears to be endemic to Burma and Thailand.

Clarke (1885) cites only *Wallich s.n.* and *Helfer 6011* from Pegu and Tenasserim, Burma. Munir (1966) cites *Brandis 879*, *Chin 6834*, *Ghallyatly 577*, *Helfer 6011*, and *Lace 3037* from Burma and *Kerr 10563* from Thailand.

Recent collectors describe this species as a straggling shrub, with white, very fragrant "flowers", and have encountered it on "sandy river banks and borders", at 250 m. altitude, flowering in April.

Additional citations: BURMA: Kurz 553 (Mu--1783. THAILAND: Beusekom & Phengkhlai 454 (Ac, Ac).

SPHENODESME FERRUGINEA (W. Griff.) Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181 [as "*Sphenodesma*"]. 1895 [not *S. ferruginea* Wight, 1895].

Synonymy: *Brachynema ferruginea* W. Griff., Notul. Pl. Asiat. 4: 176. 1854. *Sphenodesma astylis* C. B. Clarke in Hook. f., Fl. Brit. India 4: 601, in obs. nom. nud. 1885. *Sphenodesma microstylis* C. B. Clarke in Hook. f., Fl. Brit. India 4: 600. 1885. *Symphorema microstylis* Bedd. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 600, in syn. 1885. *Sphenodesme microstylis* C. B. Clarke apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 961. 1895. *Sphenodesma ferruginea* (Griff.) Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895. *Sphenodesme ferruginea* Briq. apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 406. 1906. *Sphenodesme orbicularis* Fletcher, Kew Bull. Misc. Inf. 1938: 208 & 442. 1938. *Sphenodesma ferruginea* Briq. ex Mold., Résumé 345, in syn. 1959. *Sphenodesme astylis* Clarke apud Munir, Gard. Bull. Singapore 21: 331, in syn. 1966.

Bibliography: W. Griff., Notul. Pl. Asiat. 4: 176--177 & 747. 1854; C. B. Clarke in Hook. f., Fl. Brit. India 4: 600--601. 1885; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1021. 1895; C. B. Clarke in J. Schmidt, Bot. Tidsskr. 26: 174. 1904; F. N. Will., Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Brandis, Indian Trees, imp. 1, 513. 1906; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 406. 1906; King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 860 & 866. 1908; Ridl., Journ. Str. Br. Asiat. Soc. 59: 157. 1911; Ridl., Journ. Fed. Malay States Mus. 10: 111. 1920; Ridl., Fl. Malay Penins. 2: 638. 1923; Dop in Lecomte, Fl. Gén. Indo-chine 4: 899--900. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 208--209, 405, 441, & 442. 1938; Mold., Prelim. Alph. List Inv. Names 40. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 406. 1941; Mold., Suppl. List Inv. Names 7. 1941; Mold., Alph. List Inv. Names 41. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 59--61, & 99. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, imp. 2, 2: 1021. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 218. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129, 137, 138, 140, & 174. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 406. 1959; Mold., Résumé 166, 176, 178, 180, 239, 345, 350, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1021. 1960; Munir, Gard. Bull. Singapore 21: 319, 325, 328, 331--334, 336, 367, 373, & 375--378, pl. 1. 1966; Mold., Résumé Suppl. 15: 9--11, 16, 22, & 23. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold. in Menninger, Flow. Vines 328 & 330. 1970; Brandis, Indian Trees, imp. 2, 513. 1971; Mold., Fifth Summ. 1: 284, 297, 302, 306, & 401 (1971) and 2: 623, 624, 634, & 843. 1971; Mold., Phytologia 23: 423 (1972), 36: 37 (1977), and 45: 403. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: [332], pl. 1. 1966.

A large scandent shrub; branchlets very obtusely tetragonal, brownish-tomentose, subtomentose, or stellate-villous with rusty hairs; petioles rather stoutish, abbreviated, 2--12 mm. long, tomentose; leaf-blades chartaceous, elliptic or ovate, 9--14 cm. long, 4--9 cm. wide, apically subacute, marginally entire, basally obtuse or subacute, short-pubescent above (at least on the venation), varying from softly pubescent to villous or densely tomentose beneath (even when mature) with brownish hairs; midrib slender, flat above, prominent beneath; secondaries very slender, about 4 or 5 per side, arcuate-ascending, prominent beneath, flat or obscure above; inflorescence axillary, 22--26 cm. long, densely brownish-tomentose throughout, usually with a pair of leaves and several pairs of foliaceous bracts at the lower nodes; peduncles 2--5.5 cm. long; cauline bracts long-stipitate, elliptic, 3.5--4 cm. long, 1.1--1.3 cm. wide, apically attenuate-acute or short-acuminate, densely tomentose; involucre bracts 6, oblanceolate or spatulate-elliptic, 1.5--2 cm. long, apically obtuse, venose, densely tomentose on both surfaces; flowers 7 per head, sessile; calyx campanulate, 5--7 mm. long, densely brown-tomentose on the outside, its rim plainly bilabiate, the teeth ovate; corolla yellowish, its tube narrowly infundibular, about 8 mm. long, densely hairy to the base within, the lobes 5 or 6, lanceolate, 6--8 mm. long, slightly more than 1 mm. wide, pubescent or subtomentose; anthers ovate, inserted in the corolla-tube, included; style minute, included even when mature; ovary 4-ovulate.

Recent collectors describe this plant as a large, scandent, woody vine, 30--50 feet long, climbing on trees, the buds green and the flowers slightly sweet-scented. The bracts are exceptionally long on *Squires 855*. The "flowers" [corollas?] are said to have been "white" on *Smitinand 2189*, "pale-green" on *Squires 855*, "yellowish" on *Bunkhrang 22* and *Native Collector 71*, and "yellowish-white" on *Beusekom & Phengkklai 3041*.

Collectors have encountered this species in open areas, mixed deciduous forests, scrub near the sea, bamboo forests, open sandy forests, and partially disturbed dry evergreen forests, and on savannas, at 5--900 m. altitude, flowering from December to April. In Thailand it is said to be "common" in virgin forests and scrub jungles and "scattered" in evergreen jungles. The only reported vernacular name for it is "khongkha du'at".

The species is based on *W. Griffith 938* from "in sylvis Mergue" [=Mergui Archipelago, Burma]. Griffith (1854) says of it: "*Decadontiae* proximum, sed calyce bilabiat. Cor. hypocraterif. fauceque villosa, Stamimbus inclusis, antheris connectivo sub 0, per totam longitud. dehiscent. Style sub 0, valde distinct. Placentae intra ovulum nec product. Dixi ob filam. brevia, in *Congeeae*, *Decadontiaque* longe exserta."

Clarke (1885) notes that "Wight, Parish and Beddome have all referred this to *Symphorema* from the narrow corolla-lobes, but the short filaments will not suit. Supposing the state of the style to be due to dimorphism, the species is distinct and possibly indicates a new genus. It cannot be Kurz's *Symphorema involucreatum*, which Kurz says has coarsely toothed leaves." He cites only

Griffith 6000 "partly" [i.e., in part] from "Mergui and Moulmein" and an unnumbered Parish collection from Tavoy, noting that it occurs also in Thailand.

King & Gamble (1908) cite Curtis 2963 and Murton 62 from Thailand and Griffith 6007 in part and Parish s.n. from Burma. They comment that "The curious arrangement of the stamens inside the corolla-tube and the very short style are such well-marked characters that it would almost seem advisable to reconstitute the genus *Brachynema*, or else to bring together into one genus of 4 sections *Sphenodesme* with *Symphorema* and *Congea*. We are inclined to consider the latter the best course, but it should be done in discussing a Monograph of the Tribe rather than the few species found in a limited area."

Fletcher (1938) distinguishes his *S. orbicularis* as follows: corolla-lobes at least 1 mm. broad; leaves orbicular, round and slightly cordate at the base -- *S. orbicularis* Fletcher [and *S. odorata* Fletcher, which is now regarded as being *S. involucrata* (Presl) B. L. Robinson]. Corolla-lobes at most 1 mm. broad; leaves elliptic, cuneate or obtuse at the base -- *S. ferruginea*. For the former he cites only the type, Kerr 16411 from Thailand; for the latter from Thailand Collins 329, 329a, 360, & 585, Curtis s.n., Kerr 2437, 6866, 8376, 10305, 15633, & 18271, Murton 62, and Rabil 28, listing it also from Burma, Malaya, Cambodia, and Cochinchina. Dop (1936) cites only unnumbered Murton and Schmidt collections from Thailand, an unnumbered Thorel collection from Cambodia, and unnumbered Pierre and Thorel collections from Cochinchina.

Material of *S. ferruginea* has been misidentified and distributed in some herbaria as *S. involucrata* (Presl) B. L. Robinson, *S. mollis* Craib, *S. unguiculata* Schau., *Caryopteris* sp., and even *Calycopteris* sp. On the other hand, the Wang 36301, distributed as *S. ferruginea*, actually is *S. involucrata* (Presl) B. L. Robinson.

Citations: INDIA: Assam: Rock 921 (W--1090552). BURMA: Tenasserim: Rock 688 (W--1090444). Upper Burma: Meebold 14192 (S). THAILAND: Beusekom & Phengklai 3041 (Ac); Bunkhrang 22 [Roy. Forest Dept. 26221] (Z); Mrs. D. J. Collins 329 (W--1700501), 360 (W--1700526), 585 (W--1700629); Haniff & Nur 2937 (Ed); Maxwell 74-26 (Ac); Native Collector 71 [Roy. Forest Dept. 129] (S); Smitinand 2189 [Roy. Forest Dept. 11545] (Sm), 2237 [Roy. Forest Dept. 11533] (Z); Thaworn 910 [Roy. Forest Dept. 16176] (Sm). MALAYA: Penang: Haniff 250 (Ca--355135, La, N, N--photo, Z--photo). VIET-NAM: Annam: C. B. Robinson 1356 (W--713371); Squires 855 (Bz--23070, Mu, N, S, W--1433131). Cochinchina: Pierre s.n. [2/1877] (B); Thorel 650 (B), 652 (Ca--54968), 653 (S), 659 (Bz--72845). LAOS: Poilane 11598 (N, N).

SPHENODESME FLORIBUNDA Chun & How, Act. Phytotax. Sin. 7: 79--80, pl. 24, fig. 2 [as "*Sphenodesma*"]. 1958.

Synonymy: *Sphenodesma floribunda* Chun & How, Act. Phytotax. Sin. 7: 79. 1958.

Bibliography: Chun & How, Act. Phytotax. Sin. 7: 79--80, pl. 24,

fig. 2. 1858; G. Taylor, Ind. Kew. Suppl. 13: 129. 1966; Mold., *Phytologia* 34: 264. 1976.

Illustrations: Chun & How, Act. Phytotax. Sin. 7: pl. 24, fig. 2. 1958.

A scandent shrub; branches terete, gray-brown, with elevated lenticels; flowering branchlets with the juvenile leaves and bracts minutely stellate-puberulous; petioles 6--8 mm. long, glabrous; leaf-blades chartaceous, triplinerved, obovate-elliptic, the adult ones 6--9 cm. long, 2--3.5 cm. wide, very minutely glandulose throughout, sometimes slightly puberulus beneath, apically abruptly broad-acuminate or rarely acute, basally broadly cuneate, marginally entire to beyond the mid-point, irregularly sinuate-dentate beyond, the teeth 1--3 per side, very unequal in size, the largest sublobuliform, the smallest denticulate, "nervi infimi basales ultra medium procurrentes cum 2 vel 3 e costa directe egressis reticulatim confluentes", slightly prominulous beneath with obscure veinlets; cymes axillary and terminal, about 7-flowered, distichously aggregate in pseudo-paniculate fashion, disposed on slender, abbreviated, few-leaved, lateral branchlets along the present year's branches, with the apex leafy; peduncles very slender or subfiliform, 2--3 cm. long; involucre bracts spatulate-lanceolate, 8--15 mm. long during anthesis and 2--4 mm. wide, apically rounded, with more or less evanescent indument; calyx tubular-infundibular, 4--5 mm. long, externally densely stellate-tomentellous, the 5 or 6 lobes ovate-triangular, 0.---1 mm. long, apically acute, not appendiculate; corolla 7--9 mm. long, externally glabrous, the tube slender, slightly longer than the calyx, the 5 or 6 lobes somewhat unequal, oblanceolate, about 4 mm. long, apically obtuse; stamens exserted; filaments glabrous; anthers ovate-oblong, about 0.6 mm. long; ovary oblong, about 1.2 mm. long; style about 5 mm. long; fruit not known.

This species is based on *S. K. Lau* 25929 from Peisha Hsien, Yuenmen Tung, Hainan, collected on March 31, 1936. The authors also cite *Lau* 3486 originally distributed as *Alangium salvii-folium*, and compare it with *S. robinsonii* Dop [= *S. griffithiana* Wight].

SPHENODESME GRIFFITHIANA Wight, Icon. Pl. Ind. Orient. 4 (3): 14, pl. 1477. 1849.

Synonymy: *Decadontia coerulescens* W. Griff., Notul. Pl. Asiat. 4: 175--176. 1854. *Decadontia caerulescens* W. Griff., Notul. Pl. Asiat. 4: 750. 1854. *Symphorema pentandrum* Kurz, Forest Fl. Brit. Burma 2: 255. 1877. *Sphenodesma griffithiana* Wight ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 602. 1885. *Sphenodesma jackianum* Wight ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 602, in syn. 1885. *Sphenodesme jackiana* Wight ex Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 961, in syn. 1895. *Sphenodesma robinsonii* Dop, Bull. Soc. Bot. France 61: 318. 1915. *Sphenodesme jackiana* (Wall.) Wight [in part] ex Munir, Gard. Bull. Singapore 21: 343, in syn. 1966 [not *S. jackiana* DC., 1962, nor Schau., 1919, nor (Wall.) Schau., 1971].

Bibliography: Wight, *Icon. Pl. Ind. Orient.* 4 (3): 14, pl. 1477. 1849; W. Griff., *Notul. Pl. Asiat.* 4: 175--176 & 750. 1854; Kurz, *Forest Fl. Brit. Burma* 2: 254--256. 1877; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 602. 1885; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 961 & 1021. 1895; Brandis, *Indian Trees*, imp. 1, 514. 1906; Dop, *Bull. Soc. Bot. France* 61: 318. 1915; H. J. Lam, *Verbenac. Malay. Arch.* 332, 334--335, & 368. 1919; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 99 & vi. 1921; Prain, *Ind. Kew. Suppl.* 5, imp. 1, 248. 1921; Stapf, *Ind. Lond.* 6: 181. 1931; Dop in Lecomte, *Fl. Gén. Indo-chine* 4: 899, 903--904, & 906--907. 1936; Fedde & Schust., *Justs Bot. Jahresber.* 60 (2): 574. 1941; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 55, 59, 61, & 99. 1942; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 961 & 1021. 1946; H. N. & A. L. Mold., *Pl. Life* 2: 62. 1948; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 128, 129, 137, 139, 173, & 174. 1949; Chun & How, *Act. Phytotax. Sin.* 7: 80. 1958; Mold., *Résumé* 164, 166, 177, 180, 277, 345, & 439. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 961 & 1021. 1960; Prain, *Ind. Kew. Suppl.* 5, imp. 2, 248. 1960; Mold., *Dansk Bot. Arkiv* 23: 86. 1963; Mold., *Résumé Suppl.* 6: 8. 1963; Munir, *Gard. Bull. Singapore* 21: 318, 319, 325, 329, 337, 343--345, 357, 373, & 375--378, pl. 5 (1966) and 22: 161. 1967; Mold., *Résumé Suppl.* 15: 9, 10, 20, 22, & 23. 1967; Munir, *Biol. Abstr.* 48: 4097. 1967; Brandis, *Indian Trees*, imp. 2, 514. 1971; Mold., *Fifth Summ.* 1: 278, 284, 302, 306, & 475 (1971) and 2: 624, 634, & 843. 1971; Mold., *Phytologia* 23: 423 & 435 (1972) and 45: 402--404. 1980.

Illustrations: Wight, *Icon. Pl. Ind. Orient.* 4 (3): pl. 1477. 1849; Munir, *Gard. Bull. Singapore* 21: [344], pl. 5. 1966.

A scandent shrub; branchlets tetragonal, somewhat pubescent when young, becoming glabrescent in age; petioles 5--7 mm. long, somewhat pubescent, eventually glabrescent; leaf-blades chartaceous or subcoriaceous, ovate-lanceolate, 6.5--8 cm. long, 2--3 cm. wide, apically acute, basally acute or somewhat rounded, glabrous on both surfaces, but somewhat puberulent on the midrib beneath and barbellate in the axils of the secondaries beneath; secondaries 3 or 4 per side; panicles terminal, large; peduncles slender, about 1.5 cm. long, somewhat pubescent or glabrescent; cymes capitate, 7-flowered, the flowers in two groups of 3 each, with a terminal central one; involucre bracts 6, spatulate, apically obtuse, pubescent on both surfaces (especially near the base), with a prominent midrib, the larger terminal one of each 3 up to 1.7--2 cm. long and 3--3.5 mm. wide, the smaller lateral ones 1.4--1.6 cm. long and 3--3.5 mm. wide; calyx about 4 mm. long, 5-ribbed, externally hirsute, not ferruginous nor glandular, minutely pubescent within, its rim 5-toothed, the teeth deltoid and about 1 mm. long, incurved, with an additional narrow horn-like accessory tooth recurved from each sinus; corolla purple, about 5 mm. long, externally glabrous, slightly villous in the throat, the lobes 5, oblong or ovate; stamens 5, inserted in the throat of the corolla-tube; anthers exserted; style (in bud) short; stigma shortly bifid; ovary densely villous, glandular.

This species is native from Burma to Indochina and is based on *Griffith* 903-E from the Mergui Archipelago; *S. robinsonii* Dop is based on *C. B. Robinson* 1464 from Annam, Viet-Nam. Previous records of the species from India and Thailand appear to be erroneous, although the species is certainly to be expected in Thailand.

Parker describes the "petals green" and "stamens blue".

Griffith (1854) regarded *Roscoea pentandra* Roxb. as a synonym of *Sphenodesme griffithiana*, but, according to Munir (1966) Roxburgh's binomial belongs in the synonymy of *Sphenodesme pentandra* var. *wallichiana*. Griffith actually says "*Congeeae* valde affinis, ob habitu et structura placentam omnino similis, discrepans, calycis sinubus extrorsum productis. Cor. regular. Stam. 5, antheram forma et dehiscentia. Pili faucis repand. nec vere moniliformes, an *Sphenodesma pentandra* *Roscoea pentandra*, Roxb. Icones."

Concerning *Sphenodesme robinsonii* Dop (1915) says "Par ses inflorescences cette espèce se rapproche du *Sph. Griffithiana* Wight; elle s'en distingue nettement par le faible développement des dents accessoires du calice".

Clarke (1885) cites only *Griffith s.n.* from Mergui and *Helper* 6008 from Tavoy, Burma. Lam (1919) cites only *Griffith* 6008. Dop (1936) cites only *Poilane s.n.* from Annam for what he calls *S. griffithiana* and *Poilane s.n.* and *Robinson s.n.* from Annam for what he calls *S. robinsonii*. Munir (1966) cites *Griffith* 903-E, *Helper* 6008, *Meebold* 14150, *Packman* 67, *Parkinson* 1940, and *Proudlock* 45 from Burma (Tenasserim) and *Alleizette s.n.*, *Poilane* 3232, and *C. B. Robinson* 1464 from Viet-Nam (Annam). He asserts that an examination of duplicates of the type collections shows "no material difference" between *S. griffithiana* and *S. robinsonii*.

Material of *S. griffithiana* has been misidentified and distributed in some herbaria as *S. barbata* Schau., *S. pentandra* "Jacq.", and *Symphorema* sp. On the other hand, the *Larsen* 8048, 8326, 8462, and 9051, distributed as *S. robinsonii*, actually are *S. mollis* Craib.

Citations: BURMA: Tenasserim: *Helper* 43 (Bz--23046. N, S, S, W--1668987). MERGUI ARCHIPELAGO: Mergui: *R. N. Parker* 2706 (Ca--358739). VIET-NAM: Annam: *C. B. Robinson* 1464 (N, N, W--713395, Z).

SPHENODESME INVOLUCRATA (Presl) B. L. Robinson, Proc. Amer. Acad. 51: 531. 1916.

Synonymy: *Congea unguiculata* Wall., Numer. List [48], no. 1736, hyponym. 1829. *Congea ferruginea* Wall., Numer. List [48], no. 1737, hyponym. 1829. *Vitex involucratus* Presl, Bot. Bemerk. 148. 1844. *Sphaenodesma unguiculata* Schau. in A. DC., Prodr. 11: 623. 1847. *Symphorema unguiculatum* Kurz, Forest Fl. Brit. Burma 2: 255. 1877. *Sphenodesme unguiculata* Schau. apud Hance, Journ. Bot. Lond. 21: 355. 1883. *Sphenodesma unguiculata* Schau. apud C. B. Clarke in Hook. f., Fl. Brit. India 4: 601. 1885. *Congeeae* sp. Griff. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 601, in syn. 1885. *Sphaenodesma unguiculata* (Wall.) Schau. apud B. L.

Robinson, Proc. Amer. Acad. 51: 532, in syn. 1916. *Sphenodesme odorata* Fletcher, Kew Bull. Misc. Inf. 1938: 207. 1938. *Sphenodesme unguiculata* (Schau.) C. B. Clarke apud Fletcher, Kew Bull. Misc. Inf. 1938: 441, in syn. 1938. *Sphenodesme paniculata* "Clarke sensu Gamble" apud Munir, Gard. Bull. Singapore 21: 334, in syn. 1966 [not *S. paniculata* C. B. Clarke, 1885]. *Sphenodesme involucrata* var. *involucrata* [(Presl) B. L. Robinson] ex Munir, Gard. Bull. Singapore 21: 334. 1966. *Sphenodesme ornata* Fletcher ex Mold., Phytologia 34: 277, in syn. 1976.

[to be continued]

NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXVIII

Harold N. Moldenke

LANTANA CUJABENSIS var. *HISPIDA* Mold., var. nov.

Haec varietas a forma typica speciei ramulis plusminusve hispidis, foliis amplioribus, et bracteis multum amplioribus recedit.

This variety differs from the typical form of the species in having the branchlets more or less densely hispid, the leaf-blades much larger, to 15 cm. long and 10 cm. wide, and the bracts very much larger and subfoliose, to 3 cm. long and 2 cm. wide.

The type of the variety was collected by M. T. Madison, T. C. Plowman, H. A. Kennedy, and L. Besse (no. 5016) in a wet submontane forest, at an elevation of 550--650 m., in the environs of Lita, on the Ibarra to Dan Lorenzo railroad, Esmeraldas, Ecuador, on June 8, 1978, and is deposited in the herbarium of the Botanisk Institut, Aarhus University, in Denmark.

LANTANA CUJABENSIS f. *SCABRIFOLIA* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum firme rigidis supra impresso-rugosis scabris, pilis numerosis brevibus rigidulis basi inflato persistenteque recedit.

This form differs from the typical form of the species in having its leaf-blades firmly rigid in drying, impressed-rugose and scabrous above, the hairs numerous, uniformly short and rigid, with inflated and persistent bases.

The type of this form was collected by Henry Hurd Rusby (no. 715) at the cataracts of the Bopi River, a tributary of the Beni River, in Sur-Yungas, La Paz, Bolivia, at an altitude of 3000 feet, on September 6, 1921, and is deposited in the Britton Herbarium at the New York Botanical Garden.

LANTANA GLUTINOSA var. *RUGOSA* Mold., var. nov.

Haec varietas a forma typica speciei laminis foliorum firme rigidis supra impresso-rugosis valde scabris basi pilorum plusminusve inflato persistenteque recedit.

This variety differs from the typical form of the species in having its leaf-blades firmly rigid in drying, conspicuously impressed-rugose and scabrous above, the deciduous hairs with persistent inflated bases.

The type of the variety was collected by Padre Jaroslav Soukup (no. 2862) at Latipo, Junin, Peru, in August 1945, at 500 m. altitude, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collector describes the plant as a bush, about 2 m. tall, the corollas yellowish, turning to orange and red.

SURFACEA Mold., gen. nov. *Verbenacearum*

Frutices interdum scandentes vel arbores; ramis ramulisque tetragonis annotinis saltem vulgo cinereo- vel fulvo-pubescentibus; foliis simplicibus exstipulatis decussato-oppositis deciduis aliquantum magnis brevipetiolatis vel sessilibus, laminis ellipticis ovatisve obovatisve apicaliter acuminatis marginaliter integris vel crenatis basaliter acuminatis cuneatisve undique glabris vel interdum subtus punctulatis vel in venarum reticulo stellato-tomentosis, venis secundariis binatim 4--8; inflorescentiis racemiformibus vel subspicatis simplicibus compositisve vel thyrsoformibus interdum cymulis capitatis in ramulis distanter verticillatis; bracteis lineari-lanceolatis ellipticis numerosis conspicuisque vel parvis inconspicuisque; calyce hypogyno gamosepalo externo glabrato vel plusminusve piloso stellato-tomentoso plusminusve bilabiato vel bilobato, lobis integris vel 2--3-dentatis; corolla gamosepala tubulosa parva alba, faux plusminusve pilosa, limbo bilabiato vel subaequaliter 4-lobulato; staminibus 4 alte corollae tubo insertis didynamis inclusis; filamentis brevissimis; antheris bilocellatis; pistillum unum compositum bicarpellatum; ovario glabro 2-loculato vel false 4-loculato, plerumque 4-ovulato; fructu drupaceo parvo subgloboso vel obovoideo plerumque abortu monospermo.

Large, sometimes scandent shrubs or trees; branches and branchlets more or less tetragonal, at least the younger parts mostly cinereous- or fulvous-pubescent, villous, or stellate-tomentose; leaves simple, exstipulate, decussate-opposite, deciduous, rather large, short-petiolate or sessile; leaf-blades elliptic or ovate to obovate, apically acuminate, marginally entire or crenate, basally acuminate or cuneate, usually glabrous on both surfaces, sometime punctulate beneath or more or less stellate-tomentose, especially along the venation, the secondaries 4--8 pairs; inflorescence racemiform or subspicate, simple or compound and thyrsoid-paniculate, occasionally with capitate cymules in distant whorls on the thyrse-branches; bracts linear-lanceolate or elliptic, numerous and conspicuous or small and inconspicuous; calyx hypogynous, gamosepalous, campanulate, externally glabrate or more or less puberulent-pilose to stellate-tomentose, more or less bilabiate or bilobed, the lobes entire or more or less plainly 2- and 3-toothed; corolla small, gamopetalous, tubular or hypocrateriform, 4--6 mm. long, greenish-white or white, the throat

more or less hairy, the limb bilabiate or subequally 4-lobulate; stamens 4, inserted high in the corolla-tube, didynamous, included; filaments very short; anthers 2-celled; pistil one, compound, bicarpellary; ovary 2-celled, globose, sometimes spuriously 4-celled, usually 4-ovulate; fruit drupaceous, small, subglobose or obovoid, by abortion usually 1-seeded.

Type species: *Premna racemosa* Wall.

This small genus has hitherto been united with the very large and difficult genus *Premna* L. in which the inflorescence of almost uniformly compound corymbs is manifestly and conspicuously different from the racemiform, subspicate, or thyrsoid inflorescences of the new genus. The genus is named in honor of and in appreciation of Dr. Harvey Adam Surface (1867--1941), distinguished and inspiring teacher of all phases of biology, geology, and premedical science, newspaper columnist, author of numerous scientific papers, lecturer, innovator of the chart-and-key method of teaching field and laboratory science, and devoted public servant in the Pennsylvania State Department of Agriculture.

SURFACEA BRACTEATA (Wall.) Mold., comb. nov.

Premna bracteata Wall., Numer. List [48], no. 1172. 1829; C. B. Clarke in Hook. f., Fl. Brit. India 4: 572. 1885.

SURFACEA DERRYANA (King & Gamble) Mold., comb. nov.

Premna derryana King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 813. 1908.

SURFACEA INTERRUPTA (Wall.) Mold., comb. nov.

Premna interrupta Wall., Numer. List [48], no. 1778. 1829; Schau. in A. DC., Prodr. 11: 633. 1847.

SURFACEA INTERRUPTA var. *SMITINANDI* (Mold.) Mold., comb. nov.

Premna interrupta var. *smitinandi* Mold., Phytologia 8: 163. 1962.

SURFACEA PUNDUANA (Wall.) Mold., comb. nov.

Premna punduana Wall., Numer. List 82, no. 2651. 1831; Schau. in A. DC., Prodr. 11: 637--638. 1847.

SURFACEA RACEMOSA (Wall.) Mold., comb. nov.

Premna racemosa Wall., Numer. List [48], no. 1777. 1829; Schau. in A. DC., Prodr. 11: 633. 1847.

SURFACEA RACEMOSA var. *SIKKIMENSIS* (Mold.) Mold., comb. nov.

Premna racemosa var. *sikkimensis* Mold., Phytologia 5: 18 & 20. 1954.

BOOK REVIEWS

Alma L. Moldenke

"THE PRE-GLACIAL PLEISTOCENE OF THE NORFOLK AND SUFFOLK COASTS"
by R. G. West, x + 236 pp., 36 b/w photo plates, 49 tab.,
& end pocket w. 26 stitched & folded pp. with 54 fig. & 42
tab. Cambridge University Press, Cambridge CB2 1RP & New
York, N. Y. 10022. 1980. \$84.00.

This excellently prepared and presented study of the immediate preglacial time period as revealed through years of intensive work on the receding cliffs of north and northeast Norfolk and northeast Suffolk gives "evidence of great vegetational change, faunal change, climatic change and sea-level change, compressed into a few metres thickness....The description and interpretation of each stretch of coast entails the following heads: lithostratigraphy, periglacial stratigraphy, biostratigraphy, sedimentary and vegetational history....The environmental history of the whole succession is then summarised stage-by-stage and the final chapter draws conclusions about the succession, flora and fauna and suggests possible correlations with sequences elsewhere." The many tables and figures coordinate much valuable information. This study is bound to become a very important sourcebook.

"PHYTON -- Annales Rei Botanicae" edited by O. Hrtel & H. Teppner, Vol. 20 (1 & 2), 206 pp., color & b/w photos, figs., tabs. Ferdinand Berger u. Shne OHG, Verlag, Horn A-3580, Austria. 1980. AS 600.00 per volume, paperbound.

This fine botanical journal, established in 1948, with two numbers for each yearly volume, publishes articles on original studies in any phase of botany in German with English summaries or vice versa. Papers are also accepted in French with German/English summaries. Some reviews of botanical or botanically related books appear at the end. The printing is readily readable and neat. Two papers in this volume are "Der Flechtenparasit - *Buellia pulverulenta* - eine bleibend interne parasitische Flechte", pp. 129--135, by J. Hafellner & J. Poelt and "Differential tolerance of *Agrostis tenuis* populations growing at two mine soils to Cu, Zn and Pb", pp. 15--22, by S. S. Karataglis.

"INTERNATIONAL ENGLISH" by Virginia Baker Haley, 204 pp, 333 b/w line draw. & 2 maps. Charles E. Tuttle Co., Inc., Rutland, Vermont 05701. 1979. \$6.75 paperbound.

"There are about 1,500 languages in the world, and that many more dialects. Yet English is used by more members of the Family of Man than any of the other languages." English is today's and tomorrow's language of science. In this book the author stresses initially the personal and oral approach before any written grammar exercises. A teacher is advised for this introductory part, but from there on the student can teach himself just with the aid of a dictionary. Many scientists, who have done field work in far away places and would like to provide a gratuity for some native assistants who might want to learn more English, could well consider this book.

"FLORISTICS AND ENVIRONMENTAL PLANNING IN WESTERN NEW YORK AND ADJACENT ONTARIO: Distribution of Legally Protected Plants and Plant Sanctuaries" by Richard H. Zander, iv & 47 pp. & 60 b/w maps. Buffalo Museum of Science, Buffalo, New York 14211. 1976. Paperbound.

This study is listed as "Occasional Papers of the Buffalo Society of Natural Sciences, No. 1" and should be particularly helpful to persons and their organizations concerned with environmental planning and conservation. The list of plants legally protected in this area is given with scientific and common names. The dotted county maps of the area show 113 species of rare or uncommon protected plants in groups sharing a common habitat. There is a list of public and private sanctuaries.

"FLORA OF THE NIAGARA FRONTIER REGION: Second Supplement and Checklist", by Richard H. Zander & Gary J. Pierce, iii & 110 pp. Bulletin of the Buffalo Society of Natural Sciences, Volume 16, Supplement 2, Buffalo, New York 14211. [1979] 1980. Paperbound.

The geographic area of this checklist is within a 50-mile radius of the City of Buffalo. The scientific nomenclature follows Gleason and Cronquist in which the first listing is of the plant families and their genera; the second listing is of genera and their species with indications as to whether they are native or adventive, new additions, whether protected, endangered, rare or now absent, and with common names; and the third listing is of synonyms and excluded names. This book should be very useful to students and teachers in the area.

"A NATURE CONSERVATION REVIEW. The Selection of Biological Sites of National Importance to Nature Conservation in Britain" Volume I edited by Derek Ratcliffe, xvi & 401 pp., b/w illus. of 9 maps, 24 photo pl. & 46 tab. & 1 color frontispiece. Cambridge University Press, Cambridge CB2 1RP & New York, N. Y. 10022. 1977. \$95.00.

This is an effectively presented compendium on behalf of both the Nature Conservancy Council and the Natural Environment Research Council. It highlights and grades as to rarity and vulnerability so that future use or non-use could safeguard in their natural sites those wild plant and animal treasures of the British Isles. First discussed are the seven major formations of Coastlands; Woodlands; Lowland Grasslands; Heaths and Scrub; Open Waters; Peatlands; Upland Grasslands and Heaths. Artificial Ecosystems and their subdivisions are described as to soil, habitat and vegetation in terms of geographical and ecological relationships and lists of flora and fauna. This valuable volume is "written for a mixed audience, including landowners, administrators, planners and developers" as well as assorted conservationists. Comparative tabular arrangements, maps and photographic plates, along with cross-referencing, add to the value of this study.

"A NATURE CONSERVATION REVIEW. The Selection of Biological Sites of National Importance to Nature Conservation in Britain" Volume II SITE ACCOUNTS edited by Derek Ratcliffe, viii & 320 pp. Cambridge University Press, Cambridge CB2 1RP & New York, N. Y. 10022. 1977. \$75.00.

This carefully compiled "Volume 2 gives a detailed account of the important biological and environmental features of each [735] site, insofar as these are known, and with emphasis on vegetation.....The site accounts aim to give a concise description of the principal features by which the nature conservation value of the site is assessed" and reassessed in some few cases on the basis of change or further information as given in the Appendix. There is also an alphabetical site index with page numbers. The descriptive accounts are arranged according to types (coastlands; woodlands; lowland grasslands; heaths and scrub; open waters; peatlands; and upland grasslands and heaths) and then within each according to geographical areas of the British Isles. These two volumes will surely prove of great value to many readers.

"AGRICULTURAL RESEARCH FOR DEVELOPMENT - The Namulonge Contribution" edited by M. H. Arnold, xi & 353 pp., b/w illus. of 99 figs., 3 maps, 44 tab. & 52 photos & 20 color photos. Cambridge University Press, Cambridge CB2 1RP & New York, N. Y. 10022. 1976. \$32.50.

This is a carefully prepared summary of the years of practical and experimental cotton farming at the Namulonge farm in Ghana. There are reports by nine authors besides the editor on agrometeorology, soil productivity, crop physiology, entomology, plant pathology, resistance breeding and agricultural science application to national development which can be "no greater than the readiness of the stage of development to accept it." An importance emphasis is made that where farming is generally at the subsistence level science can better contribute through plant breeding (with seed) rather than expensive mechanizations. For developing countries a National Research Council could encourage and direct agricultural expansion and enrichment. The special advantage of these authors' contributions go beyond skills in agronomy into psychological, sociological and ecological considerations that dictate much of the success of "improvements proffered".

"WORLD GUIDE TO TROPICAL DRIFT SEEDS AND FRUITS" by Charles R. Gunn & John V. Dennis, xiii & 240 pp., illus. by 1 b/w map & 93 figs. & 15 photo pl. Demeter Press of Quadrangle/ The New York Times Book Co., New York, N. Y. 10016. 1976. \$17.50.

"This book is prepared for those amateurs and professionals who find pleasure and excitement in.....stranded tropical seeds and fruits.....collectively termed stranded disseminules or sea-beans.....Data are gathered from a worldwide comprehensive collection and specimens are fully and effectively illustrated by Pamela J. Paradine. There is also information on growing such sea-beans and on polishing them and making them into attractive artifacts. There are systematic descriptions, illustrations and a disseminule key." It is stated that the "Black mangrove, *Avicennia germinans* (L.) L. was introduced into West Africa by man", but H. N. Moldenke knows of no evidence to substantiate this claim. He regards the west (not east) African plant as the distinct *A. africana* P. Beauv. This is an interesting and worthwhile study that should prove of much interest to amateur collectors and professional botanists over much of the world especially near coastlines.

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SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES

OF STRYCHNOS. XIX.

B. A. Krukoff

Consulting Botanist of Merck Sharp & Dohme Research Laboratories, N.J., and Honorary Curator of New York Botanical Garden.

Since the latest paper of this series was published 116 new collections were examined. The newly examined collections added to our knowledge of several species and extensions of range noted for 15. It is most satisfying that we received specimens from 5 previously unexplored or poorly explored regions of South America, namely Apur  (Venezuela), Choc  (Colombia), Madre de Dios (Peru), also Ecuador and Bolivia. The Department of Apur  yielded a new species, S. davidsei, four extensions of ranges, and series of sterile specimens, related to S. erichsonii, which may be a new species. Of considerable interest is the second and third collection of S. schunkei, a new record from Ecuador and the first collection in fruit. An extension of range of S. pachycarpa to Choco previously known from four collections from Amazonas (Brazil) not too far from Manaus and one from Surinam is of interest.

3. Strychnos colombiensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 12 (1): 21. 1965.

Colombia: Choc : Hoya del Rio San Juan, E. Forero 4038, 4564, 4793; Vaupes: Rio Piraparana, R. E. Schultes 17059 (GH) (28/8-52-flrs).

This is the first record of the species from Vaupes.

5. Strychnos romeu-belenii Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20 (1): 22. 1969.

Brazil: Bahia: munic. Itiru , T. S. dos Santos 3444.

Two samples, one consisting of 7 ounces of inner root bark and another of two ounces of outer root bark were sent to Prof. Marini-Bettolo.

From the root bark of this species (Romeo Belem 3504 from Bahia, Brazil) 11-methoxydiaboline was isolated. Previously it was isolated from the stem bark of the same species (3: 296).

For the previous information on the alkaloids in S. romeu-belenii see Lloydia 35: 215, 1972 and Phytologia 25: 49. 1972.

6. Strychnos rondeletiioides Spruce ex Bentham, Jour. Linn. Soc. 1: 104. 1856.

Venezuela: Terr. Fed Amazonas, ca 20 kms S of confluence of rio Negro and Cassiquiare, R. L. Liesner 7331. Brazil: Amazonas: O. C. Nascimento 833 (MG) (Rio Miuál), O. P. Monteiro 1395 (INPA) (Rio Canuma), C. A. Cid 103 (INPA) and 499 (INPA) (Rio Uatuma). Colombia: Vaupés: Mitu, James L. Zarucchi 1823, 2453.

This is the first record of the species from Terr. Fed. Amazonas.

Gentry 18530 is correctly labelled on sheets but through typographical error cited as S. erichsonii in 11th supplement (Phytologia 41: 237. 1979).

- 12 Strychnos panamensis Seemann, Bot. Voy. Herald 166. 1854.

Mexico: Jalisco: vicin. Jirotto, H. H. Iltis 1470. Panama: Isla Bayano, Christina Garibaldi 234 (MO). Colombia: Chocó: E. Forero 1614 (MO) and 1889 (mun. Riosucio), 1991 (mun. Acandí), 2531 (MO) and 2659 (mun. Quibdó), 2703 (MO) and 2708 (Yuto-Lloró), 4458 and 4640 (Hoya del Río San Juan).

These are the first records of the species from Jalisco.

13. Strychnos tabascana Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Mexico: Veracruz, San Andrés Tuxtla, R. Cedillo T. 205 (MO).

14. Strychnos divaricans Ducke, Bull. Mus. Hist. Nat. Paris II. 4: 746, 1932.

Brazil: Bahia: Maricas, S. A. Mori et al 11177.

This is the first record of the species from Bahia.

15. Strychnos bahiensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20 (1): 29. 1969.

Brazil: Bahia: mun. Santa Cruz de Cabralia, S. A. Mori 11654.

- 19 Strychnos toxifera Robert Schomburgk ex Bentham, Jour. Bot. Hook. 3: 240. 1841.

Colombia: Chocó: E. Forero 1629, 1666, and 1810 (mun. Riosucio), 2702 (MO) (Yuto-Lloró), Ecuador: Los Ríos or Pichincha, C. H. Dodson 8419 (MO).

This is the first record of the species from Los Rios.

20. *Strychnos tomentosa* Bentham, Jour. Linn. Soc. 1: 104. 1856.

French Guiana: Grenand 437.

In connection with the transfer of four sterile specimens, previously identified as of *S. tomentosa* to the newly described *S. davidsei* it appears that the former species has been collected in the three Guianas and the Amazonian Brazil (Terr. of Amapa, Pará, Roraima, Amazonas, and Maranhão). It was not collected in Venezuela

20a. *Strychnos davidsei* Krukoff & Barneby sp. nov.

Ad sectionum *Strychnos* referenda *S. tomentosae* affinis, sed corollae tubo gracili 5-6,5 (nec 11--20) mm longo intus ad orem corona omnino destituta baccaeque maximae 12--13 cm usque diam pericarpio lignoso tenuiori \pm 1.5 (nec 2--3)mm crasso diversa.

Macroscopic: Young blades, elliptic, obtuse to rounded at base, acute to acuminate at apex, membranaceous, 3 (5) - plinerved, with the inner pair opposite or alternate, the secondaries impressed above and prominent beneath, reticulation faint on both surfaces.

Microscopic: Petioles densely fulvous-pubescent and so are the blades especially on principal nerves and secondaries.

Inflorescences terminal to lateral branchlets, densely cymose-glomerate at anthesis 2--3 cm diam, the peduncle \pm 3--6 mm, the pedicels 0.3--1.3 mm, the bracts and bracteoles minute caducous; calyx and corolla externally densely pilosulous with spreading-ascending straightish hairs 0.4--0.7 mm; calyx 1.3--2 mm, the narrowly subulate lobes 1--1.6 X 0,2--0,3 mm; tube of corolla 5--6,5 mm long, at middle 0.5--0.6 mm diam, internally glabrous near base, thence thinly pilosulous up to the unappendaged orifice; lobes of corolla narrowly triangular, internally densely papillose beardless; anthers sessiloid at the sinuses elliptic-oblong 0.8--0,9 X 0.5 mm glabrous, the connective mucicous; pistil glabrous, the stigma exerted \pm 1 mm from orifice of corolla.

Mature fruits globose, very large, 12-13 cm in diam, shell thin, hard but fragile, \pm 1.5 mm thick, testa crustaceous; seeds many, more or less discoid, about 27 mm long and 20 mm broad.

The plant is a bush-ropes with tendrils. The species is distinguished from the related *S. tomentosa* as shown in the diagnosis. In addition, their ranges are probably different. See under *S. tomentosa*.

Venezuela: Apuré: district Pedro Camejo. Gerrit Davidse & Angel C. Gonzalez 14347 (Holotype-NY, MO) (ca 3 km E of Mata de Guanabano along the bank of Rio Meta, riverbank with gallery forest) (not fully mature leaves, mature flowers & fruits - Feb. 20, 1978) 15885 (ox - bow lake, ca. 1 km SE of Yaruro, + 50 m, dry deciduous forest surrounding the inundated gallery forest) (not fully mature leaves, mature flowers, and fruits - Feb. 28, 1978): district Rómulo Gallegos, caño Caribe, + 90 m, deciduous gallery forest on high bank - 16196 (not fully mature leaves, and mature flowers).

In addition to the flowering specimens on which the description is based, the following sterile ones, previously cited as S. tomentosa, probably belongs here: Venezuela: Distrito Federal: 1300-1500 m, Steyermark & Farinas 97583 (NY, VEN); Lara: R. F. Smith V 7415 (VEN); Sucre: Rio Grande, Victor Carreno Espinosa s/n (30/6-1973) (VEN); Aragua: La Misa, Parque Nacional, Pittier & Nakichenovich 15680 (VEN, US), A. H. G. Alston 5280 (BM, TEX).

Of Steyermark & Farinas 97583 three sheets with immature and mature leaves are available. Immature leaves of this collection are a perfect match those of the type collection; the mature leaves are described below:

Macroscopic: Petioles 2-4 mm long, blades elliptic 3-12 cm long, 1.5-4.5 cm broad, obtuse at base, acuminate at apex, chartaceous, 3 (5)- plinerved, with the inner pair opposited on alternate and diverging at 3-10 mm from base, at maturity impressed above, the secondaries impressed above and prominent beneath, reticulation faint on both surfaces.

Microscopic: Petioles densely fulvous pubescent becoming less densely in age; blades beneath becoming nearly glabrous except for nerves below and above, tubercles usually absent on both surfaces.

24. Strychnos jobertiana Baillon, Adansonia. 12: 367. 1879.

Peru: Loreto: Maynas, A. Gentry 22191.

From the bark of roots of this species collected near Manaus, Amazonas, Brazil (Prance 3943) tertiary alkaloids diaboline and akagerine were isolated together with quaternary alkaloids which are still under examination (private communication from Marini-Bettolo).

For the previous information on the alkaloids in S. jobertiana see Lloydia 35: 226. 1972.

25. Strychnos pseudo-quina A. St. Hilaire, Mem. Mus. Paris 9: 340. 1822.

Brazil: Mato Grosso: Cuiaba-Santarem, M. G. Silva 4481 (MG).

26. *Strychnos xinguensis* Krukoff, *Brittonia* 4: 283. 1942.

Brazil: Para: Sao Felix do Xingu, Carlos S. Rosario 60.

28. *Strychnos solimoesana* Krukoff, *Brittonia* 4: 280. 1942.

From the root bark of two samples of this species (Prance 21254 and 13929, from Rio Purus, Amazonas, Brazil) diaboline was isolated. From the later samples two dimeric alkaloids - C - calebassine (0.5%) and C - curarine (0.1%) were also isolated (3: 296).

The above chemical assay confirm our identifications of sterile specimens from the basin of Rio Purus as of this species, rather than of the unrelated *S. recognita*.

For the previous information on the alkaloids in *S. solimoesana* see *Lloydia* 35: 228. 1972.

31. *Strychnos peckii* B. L. Robinson, *Proc. Amer. Acad.* 49: 504. 1913.

Venezuela: Miranda: Cerros del Bachiller, J. A. Steyermark 116562, 116804. Brazil: Amazonas: mun. Itapiranga, C. A. Cid 777 (INPA).

32. *Strychnos erichsonii* Richard Schomburgk, *Reisen* 3: 1082 1848, nomen ex Progel in *Mart. Fl. Bras.* 6 (1): 274. 1868.

Peru: Loreto: Maynas, C. Dias 214.

M. R. Cordeiro 1122 from Fazenda Cachimbo, Mato Grosso was cited as *S. parviflora* in *Suppl. #18 (Phytologia 44: 5, 1979)*. It is not known whether this is an error in labelling the collections or two different collections are cited by the collector under the same number.

E. Forero 3922, 4134, 4485, 4818, 4828, and 5027 from Hoya del Rio San Juan, also 3924 (locality not given), and A. Gentry 23838 (Quibdo-Istmina) were anotated provisionally as *S. cf. erichsonii*. A new collection in flower is needed to ascertain whether it is a new species or specimens belong to *S. erichsonii*.

From the root bark of this species (Prance 18651, from Rio Aripuana, Mato Grosso, Brazil) diaboline was isolated (3: 296).

For the previous information on the alkaloids in *S. erichsonii* see *Lloydia* 35: 230. 1972.

- 32a. *Strychnos croatii* Krukoff & Barneby, *Phytologia* 33: 313. 1976.

E. Forero 2660, Cuatrecasas 17531 (F) was identified in Suppl. #10 as S. erichsonii. It is probably S. croatii.

33. Strychnos gardneri A. DeCandolle in DeCandolle Prodr. 9: 14. 1845.

From the bark of roots of this species collected in Rio de Janeiro (Grajau), Brazil (Luiz Emiglio de Mello Filho s.n.) one quaternary alkaloid - N hexane and two tertiary alkaloids, 11 - methoxydiaboline, which is found in bark of many species of Strychnos, and surprisingly akagerine, previously isolated only from African species, were isolated (private communication from Marini-Bettolo)

For the previous information on the alkaloids in S. gardneri see Lloydia 35: 231. 1972.

35. Strychnos bredemeyeri (Schultes) Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Venezuela: Apur : Gerrit Davidse 13962 and 14435 (distr. Pedro Camejo), 14744, 14810, and 14854 (distr. Mu oz), 16170 (distr. Romulo Gallegos): Terr. Fed. Amazonas: J. A. Steyermark 117130.

This is the first record of the species from Apur .

- 36a. Strychnos mitscherlichii Richard Schomburgk Reisen 2: 451. 1848. var. mitscherlichii.

Venezuela: Bolivar: Ronald Liesner 5679, 5979. Colombia: Vaupes: Mitu, James L. Zarucchi 1231. Peru: Loreto: Maynas (near Iquitos), Franklin Ayala 1556.

38. Strychnos darlienensis Seemann, Bot. Voy, Herald 166. 1854.

Panama: Canal Zone: A. Gentry 3247 (MO). Venezuela: Delta Amacuro: J. A. Steyermark 115349; Terr. Fed. Amazonas, R. L. Liesner 6625. Peru: Loreto: Maynas, Christopher Davidson 5363 (MO), Filomeno Encarnacion C. 974 (MO), Juan Revilla 1891 (MO).

This is the first record of the species from Venezuela.

39. Strychnos guianensis (Aublet) Martius, Syst. Mart. Med. Bras. 121. 1843.

Venezuela: Apur : Gerrit Davidse 13856, 15020, 15660.

Brazil: Amazonas: Rio Canuma, O. P. Monteiro 1399 (INPA).
 Colombia: Vaupes: Mitu, James L. Zarucchi 2169, 2474. Bolivia:
 Beni: Guayaramerin - Riberalta, William R. Anderson 12015.

These are the first records of the species from Bolivia and from Apure, Venezuela.

40. *Strychnos glabra* Sagot ex Progel in Mart. Fl. Bras. 6 (1): 275. 1868.

French Guiana: Oldeman 2818.

46. *Strychnos hirsuta* Spruce ex Bentham, Jour. Linn. Soc. 1: 106, 1856.

Brazil: Amazonas: C. D. A. Mota s.n. (09/07-1976) (INPA) (Nova Prainha), Pe. J. Maria Albuquerque s.n. (03/07-1977) (INPA) (Manacapuru).

From the root bark of this species (Prance 22104 - from the basin of Rio Maues, Amazonas, Brazil) two new alkaloids - strychnohirsutine - and tetrahydrostrychnohirsutine were isolated and structural formulas were determined. They are both ~~β~~-carboline derivatives representing another link between the alkaloids of Loganiaceae and Apocynaceae (3: 295).

For the previous information on the alkaloids in *S. hirsuta* see Lloydia: 35: 240. 1972.

47. *Strychnos cogens* Bentham, Jour. Bot. Hook. 3: 241. 1841.

Venezuela: Bolivar: Ronald Liesner 5396, 5415, 5416, and 5710; Terr. Fed. Amaz. R. Liesner 6203. Bolivia: Beni: Rio Yata, William R. Anderson 11972.

This is the first record of the species from Bolivia.

53. *Strychnos fendleri* Sprague & Sandwith, Kew Bull. 1927: 129. 1927.

Venezuela: Guarico: L. A. Aristeguiata 6435; Sucre: J. A. Steyermark 107848, 108047, 108313 (MO), 108713 (MO).

From the stem bark of this species (Murça Pires 14687, from Roraima, Brazil) - a new alkaloid 11 - methoxystrychnofendlerine was isolated and structural formula was determined. From the same plant three known alkaloids were also isolated: diaboline, heningsamine, (O-acetyldiaboline A) and spermostrychnine.

For the previous information on the alkaloid in *S. fendleri*

see Phytologia 36: 316. 1976 and 36: 21. 1977.

55. Strychnos rubiginosa A. DeCandolle in DeCandolle Prodr. 9: 16, 1845.

This species was studied chemically for the first time and a new alkaloid - strychnorubigine was isolated from the root bark and structural formula was determined. Two already known alkaloids, 11 - methoxydiaboline and normacusine were also isolated from stem and root bark of the same plant (Harley 19142, from Bahia, Brazil) (3: 293).

56. Strychnos parvifolia A. DeCandolle in DeCandolle Prodr. 9: 16. 1845.

Brazil: Para: basin of Rio Araguaia, N. T. Silva 4763 (MG); Maranhão: N. A. Rosa 2536 (MG); Bahia: Scott Mori et al 11074, 11129, 11795, and 11806 (all from Maracas), W. R. Anderson 36874.

This is the first record of the species from the basin of Rio Araguaia.

From the bark of roots of this species collected in Bahia, Brazil (S. A. Mori & T. S. dos Santos 11795) akagerine was isolated as the sole tertiary alkaloid present. Several quaternary alkaloids, still under examination, were detected by T. L. C. and paper chromatographic analysis (unpublished manuscript).

For the previous information on the alkaloids in S. parvifolia see Lloydia 35: 248. 1972.

From another sample, also from Bahia, (Mori 11806) different alkaloids were isolated.

- 57a. Strychnos recognita Krukoff & Barneby, Phytologia 27: 103. 1973.

Brazil: Bahia: mun. Uruçuca, Scott Mori 11744.

Two ounces of root bark of this species were sent to Prof. Marini-Bettolo for assay.

According to the private communication from Prof. G. B. Marini-Bettolo (his letter to me of 18/1-1980) from root bark of this species collected in Bahia, Brazil (Scott Mori 11744) very small quantity of tertiary alkaloids were isolated, hardly sufficient for structure determination. This finding is very interesting taxonomically as it confirms our placing sterile

specimens from the basin of Rio Purus with *S. solimoesana* (see under this species) and permit to define the range of these two species more accurately.

59. *Strychnos brasiliensis* (Sprengel) Martius, Flora 24 (Beibl., 2): 84. 1841.

Paraguay: T. M. Pedersen 8614 (MO). Argentina: Corrientes: A. Krapovickas 25785 (F).

Subsectio *Eriospermae* Krukoff & Barneby, Mem. NY Bot. Gard: 20: 68. 1969.

61. *Strychnos pachycarpa* Ducke, Bol. Tech. Inst. Agron. Norte 3: 15. 1945.

Colombia: Chocó: Quibdo-Istmina Road, A. Gentry 23839.

This is the first record of this species from Colombia.

65. *Strychnos mattogrossensis* S. Moore, Trans. Linn. Soc. II. 4: 392. 1895.

Venezuela: Miranda: Cerros del Bachiller, J. A. Steyermark 116300.

69. *Strychnos poeppigii* Progel in Mart. Fl. Bras. 6 (1): 282. 1868.

Peru: Loreto: Maynas, A. Gentry 22147.

70. *Strychnos tarapotensis* Sprague & Sandwith, Kew Bull. 1927: 131. 1927.

Venezuela: Apuré: Gerrit Davidse 14481. Brazil: Amazonas: basin of Rio Demeni, G. T. Prance 10368; Acre: basin of Rio Purus, G. T. Prance 12859. Peru: Amazonas: Rio Genipa, Ernesto Ancuash 1404, A. Kujikat 388; Madre de Dios: Robin B. Foster 6471 (F).

These are the first records of the species from Apuré (Venezuela) and Madre de Dios (Peru).

71. *Strychnos schunkei* Krukoff & Barneby Phytologia 25: 53. 1972.

Peru: Loreto: Coronel Portillo, Schunke 9175, Ecuador: Los Rios or Pichincha, C. H. Dodson 7771 (MO).

These are the second and third collection of this species, a new record for Ecuador and the first collection in fruit which are ± 2.4 cm in diam.

Bibliography

(In order to conserve space, I am citing here only the papers which are not cited in Suppl. VII -XVIII).

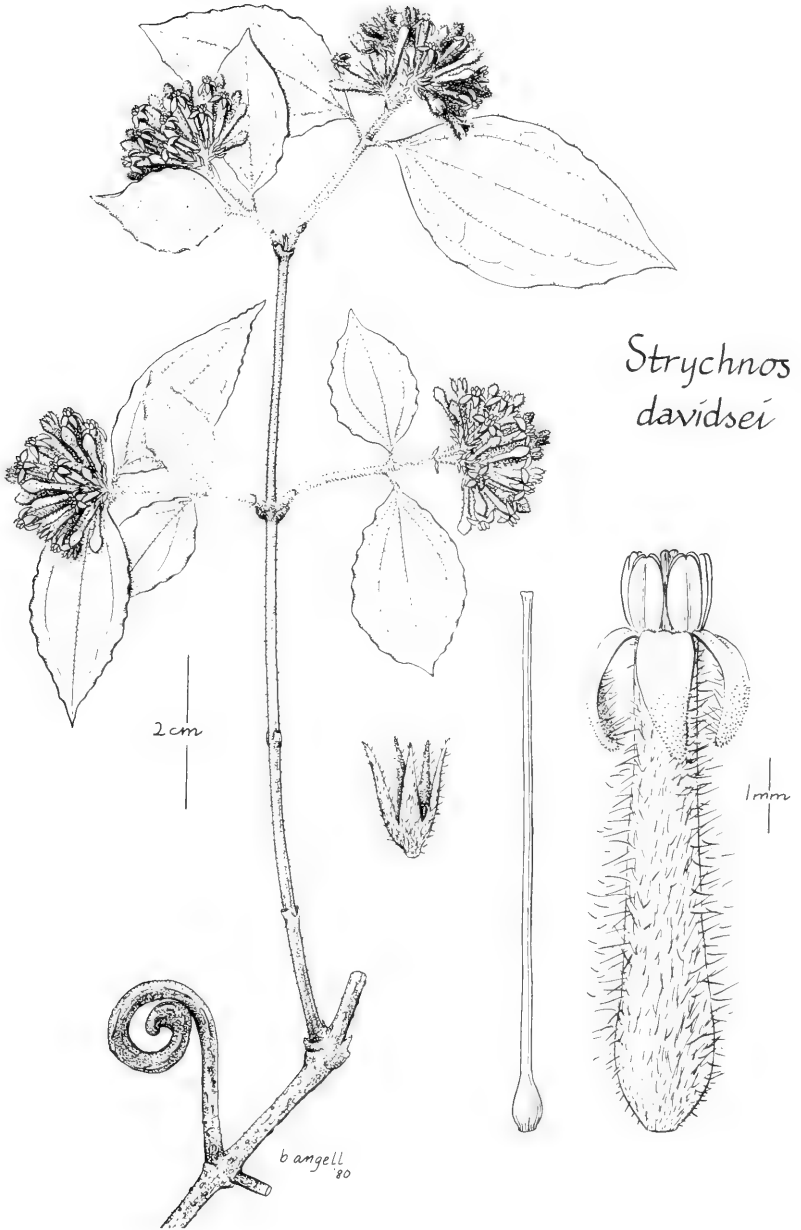
1. Krukoff, B. A. Supplementary notes on the American Species of Strychnos. XVII. *Phytologia* 41: 201-238. 1979.
2. Krukoff, B. A. Supplementary notes on the American Species of Strychnos. XVIII. *Phytologia* 44: 1-10. 1979.
3. Marini-Bettolo, G. B. et al. Strychnorubigine, strychnohirsutine, tetrahydrostrychnohirsutine and 11-methoxyxistnofenlerine: new alkaloids of American Strychnos. *Kendic, della classe di Scienze fisiche, matem. e natur.* 65 (fasc. 6): 294-296 Dic. 1978.

List of Exsiccatae

The first list of Exsiccatae covering papers on *Strychnos*, including supplement XI, was published in *Lloydia* 35 (3): 262-270. 1972, the second covering supplements XII, XIII, and XIV in *Phytologia* 33: 319-322. 1976, the third covering Supplements XV and XVI in *Phytologia* 39: 281-282. 1978, the fourth list covering Supplement XVII in *Phytologia* 41: 237-238. 1979, the fifth list covering Supplement XVIII in *Phytologia* 44: 9. 1979. The present list covers Supplement XIX. Only numbered collections and those of which the dates of collection are recorded have been listed. Collections identified with doubt are not listed. If a collector gathered his collection together with others, only his name is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

- Albuquerque, J. Maria, s.n. (03/07-1977) (46)
 Alston, A. H. G., 5280 (20a)
 Ancuash, Ernesto, 1404 (70)
 Anderson, W. R., 11972 (47), 12015 (39), 36874 (56)
 Aristeguieta, L., 6435 (53)
 Ayala, F., 1556 (36a)
- Cedillo, T. R., 205 (13)
 Cid, C. A., 103 (6), 499 (6), 777 (31)
 Cordeiro, M. R., 1122 (32)
 Cuatricasas, J., 17531 (32a)
- Davidse, G., 13856 (39), 13962 (35), 14347 (20a), 14435 (35),
 14481 (70), 14744 (35), 14810 (35), 14854 (35), 15020 (39),
 15660 (39), 15885 (20a), 16170 (35), 16196 (20a)
 Davidson, Christopher, 5363 (38)
 Diaz, C., 214 (32)
 Dodson, C. H., 7771 (71), 8419 (19)
- Encardacion C., F., 974 (38)
- Forero, E., 1614 (12), 1629 (19), 1666 (19), 1810 (19), 2531 (12),
 2659 (12), 2660 (32a), 2702 (19), 2703 (12), 3922 (32(?)),
 3924 (32(?)), 4038 (3), 4134 (32(?)), 4458 (12), 4485 (32(?)),
 4564 (3), 4640 (12), 4793 (3), 4818 (32(?)), 4828 (32(?)),
 5027 (32(?))
- Foster, Robin B., 6471 (70)
- Garibaldi, C., 234 (12)
 Gentry, A., 3247 (38), 18530 (6), 22147 (69), 22191 (24), 23838
 (32(?)), 23839 (61)
 Grenand, 437 (20)
- Iltis, H. H., 1470 (12)

- Krapovickas, A., 25785 (59)
Kujikat, A., 388 (70)
- Liesner, R., 5396 (47), 5415 (47), 5416 (47), 5679 (36a), 5710 (47), 5979 (36a), 6203 (47), 6625 (38), 7331 (6)
- Monteiro, O. P., 1395 (6), 1399 (39)
Mori, S. A., 11074 (56), 11129 (56), 11177 (14), 11654 (15), 11744 (57a), 11795 (56), 11806 (56)
Mota, D. A., s.n. (09/07-1976) (46)
- Nascimento, O. C., 833 (6)
- Oldeman, R. A. A., 2818 (40)
- Pedersen, T. M., 8614 (59)
Prance, G. T., 10368 (70), P12859 (70)
- Revilla, Juan, 1891 (38)
Rosa, N. A., 2536 (56)
Rosario, Carlos S., 60 (26)
- Santos, T. S. dos, 3444 (5)
Schultes, R. E., 17059 (3)
Schunke V., J., 9175 (71)
Silva, M. G., 4481 (25)
Silva, N. T., 4763 (56)
Steyermark, J. A., 97583 (20a), 107848 (53), 108047 (19), 108313 (53), 108713 (53), 115349 (38), 116562 (31), 116804 (31), 117130 (35)
- Zarucchi, J. L., 1231 (36a), 1823 (6), 2169 (39), 2453 (6), 2474 (39)



SUPPLEMENTARY NOTES ON AMERICAN MENISPERMACEAE XVI

NEOTROPICAL TRICLISIEAE AND ANOMOSPERMEAE

B. A. Krukoff

Consulting Botanist of Merck Sharp & Dohme Research Laboratories, N.J. and Honorary Curator of New York Botanical Garden.

The extensive explorations of lowland forests in Neotropics by Missouri Botanical Garden in Venezuela and Chocó (Colombia) and by New York Botanical Garden in Brazil in cooperation with respective governments, and local institutions, also in Ecuador and in French Guiana yielded 95 new collections. These added to our knowledge of several species. Extensions of ranges were noted for nine but ^{no} new species were described. Due to the extreme difficulties of collecting flowers, which are very small, by now we have accumulated ten species and four subspecies which are probably new but cannot be described because of insufficient material. In order to facilitate their collections, the localities of their collections are listed below. By now it is evident that Chocó in Colombia and tropical lowland forests in Venezuela are very rich in species of this family.

I. Chondrodendron Ruiz & Pavón, Syst. Veg. 261. 1798.

1. Chondrodendron tomentosum Ruiz & Pavón, Syst. Veg. 261. 1798.

Peru: Loreto: Nanay, L. Williams 19003; San Martín: T. Plowman 7494 (F), 7495 (F); Huanuco: T. Plowman 7576 (F), Huallaga valley, Rio Soza, E. Vogel s.n. (Sept. 10, 1946) (F). Ecuador: Napo: M. T. Madison 5353, 5355 (F), 5412 (F), 5413 (F), 5437 (F).

3. Chondrodendron microphyllum (Eichler) Moldenke in Krukoff & Moldenke, Brittonia. 3: 11. 1938.

Brazil: Bahia: Scott Mori et al. 11341 and Romeu Belem 3502 (mun. Marau), A. Euponino 397 (mun. Santa Cruz de Cabralo).

II. Curarea Barneby & Krukoff, Mem. N.Y. Bot. Gard. 22 (2): 7. 1971.

1. Curarea toxicofera (Weddell) Barneby & Krukoff, Mem. N.Y. Bot. Gard. 22 (2): 9. 1971.

Venezuela: Terr. Fed. Amazonas, T. Plowman 7712. Peru: Loreto: Maynas, A. Gentry et al 21624 (MO) and Juan Revilla 2566

(MO); San Martin: T. Plowman 7439 (F). Ecuador: Napo: Limococha, + 240 m, M. D. Madison 5356, 5357.

This is the first record of the species from Ecuador.

III. Sciadotenia Miers, Ann. Nat. Hist. II, 7: 43. 1851.

1. Sciadotenia cayennensis Benthams, Jour. Linn. Soc. Bot. 5 (Suppl. 2): 51, 1861.

French Guiana: M. F. Prevost 221. Brazil Para: Cuiaba-Santarem Road, G. Prance 25510 (MG).

4. Sciadotenia paraensis (Eichler) Diels in Engler, Pflanzenreich 4 (94): 86, 1910.

Brazil; Rondonia: M. G. Silva 4117.

This is the first record for the species from Rondonia.

7. Sciadotenia sprucei Diels in Engler, Pflanzenreich 4 (94): 84, 1910.

Venezuela: Terr. Fed. Amazonas: R. L. Liesner 7115.

9. Sciadotenia brachypoda Diels in Engler, Pflanzenreich 4 (94): 84, 1910.

Brazil: Para: G. T. Prance 25705 (MG).

This is the first record of the species from Para.

V. Telitoxicum Moldenke in Krukoff & Moldenke, Brittonia 3: 42. 1938.

1. Telitoxicum minutiflorum (Diels) Moldenke in Krukoff & Moldenke, Brittonia. 3: 49. 1938.

Brazil: Amazonas: Rio Negro, M. R. Santos 104.

8. Telitoxicum rodriguesii Krukoff, Phytologia 33: 329. 1976.

Brazil: Amazonas: Manaus-Itacoatiara Road, km 26, Reserva Florestal Ducke, J. Aluisio s.n. (02/09-1976) (INPA), (20/10-1976) (INPA).

VI. Abuta Barrere ex Aublet, Pl. Guian. 1: 618. Pl. 250. 1775.

1. Abuta rufescens Aublet, Hist. Pl. Guian. 1. 618, pl. 250. 1775.

French Guiana: Cabassou, M. F. Prevost 684. Venezuela: Bolivar: SE of Icabaru. J. Steyermark 117774. Brazil: Pará: Serra dos Carajás, A. S. Silva AS 58 (MG).

4. Abuta grisebachii Triana & Planchon, Ann. Sci. Nat. IV, 17: 47. 1862.

French Guiana: Cabassu, Fournet A. F. 56. Venezuela: Terr. Fed. Amazonas, Paul E. Barry 2186 (MO).

5. Abuta candollei Triana & Planchon, Ann. Sci. Nat. IV, 17: 47. 1862,

Brazil: Amazonas: Manaus-Itacoatiara Road, J. Aluisio s.n. (23/07-1976) (INPA).

11. Abuta barbata Miers, Contr. Bot. 3: 83. 1871.

French Guiana: Grenand 1453b.

13. Abuta imene (Martius) Eichler, Flora 47: 389. 1864.

Venezuela: Bolivar: Grand Savana, J. Steyermark 115561, 115562.

16. Abuta solimoesensis Krukoff & Barneby, Mem. NY Bot. Gard. 20 (2): 18. 1970.

Peru: Loreto: Maynas, A. Gentry 21984, 22405, C. Diaz S. 231.

17. Abuta velutina Gleason, Bull. Torrey Club 58: 361. 1931.

Venezuela: Bolivar: SE of Icabaru, J. Steyermark 117773.

This is the first record of the species from Bolivar.

18. Abuta obovata Diels, Notizbl. Bot. Gard. Berlin 13: 29. 1936.

French Guiana: Cabassou, M. F. Prevost 679. Venezuela: Bolivar: J. Steyermark 115546, 117644.

This is the first record of the species from French Guiana.

21. Abuta sandwichiana Krukoff & Barneby, Mem. NY Bot. Gard. 20 (2): 18. 1970.

Brazil: Mato Grosso: Aripuana, M. G. Silva 4216 (MG), J. M. Ayres 02 (MG).

27. Abuta grandifolia (Martius) Sandwith, Kew Bull. 1937: 397. 1937.

French Guiana: Grenad 1530. Venezuela: Bolivar: R. Liesner 5555, 5607, 5836. Brazil: Roraima: near Maraca, J. L. de Sousa 265 (INPA); Para: J. M. Pires 16091, C. D. A. Mota s.n. (01/07-1971) (INPA), Rio Trombetus, A. C. Silva AS-118 (MG), 4604 (MG), Rio Tocantins, A. C. Silva AS 171 (MG), 3481 (MG), Altamira-Itaituba Road, C. C. Berg 764 (MG), Santarem, K. Vilhena 351 (MG), Serra dos Carajas, C. C. Berg 559 (MG); Amazonas: Manaus, L. F. Coelho 616 (INPA), Manaus-Itacuatlara Road, J. Aluisio s.n., (29/07-1976) (INPA), Labrea, C. D. A. Mota s.n. (1/07-1976) (MG); Matto Grosso: G. T. Prance 26120 (Acurizal), A. A. Maciel 115 (INPA) (Rio Corixão).

30. Abuta longa Krukoff & Barneby, Mem. NY Bot. Gard. 20 (2): 21. 1970.

Venezuela: Miranda: Angel C. Gonzalez 804 (Paez), J. Steyermark 116844 (Cerros del Bachiller).

VIII. Anomospermum Miers, Ann. Nat. Hist. III, 14: 101. 1864.

1. Anomospermum grandifolium Eichler, Flora 47: 388. 1864.

Colombia: Santander: Magdalena valley + 300 m, A. Gentry 20073 (MO). Peru: Loreto: Maynas, A. Gentry 21124 (MO).

- 4b. Anomospermum chloranthum Diels spp. confusum Krukoff & Barneby, Mem. NY Bot. Gard. 22 (2): 69. 1971.

Ecuador: Napo: frontier with Peru, A. Gentry 22067.

- 4d. Anomospermum chloranthum Diels ssp. pacificum Krukoff & Barneby, Mem. NY Bot. Gard. 22 (2): 70. 1971.

Ecuador: Los Rios: 150-200 m, C. H. Dodson 6309 (SEL), 6504. 6514 (SEL), 6622 (SEL), 6729 (SEL); M. T. Madison 5216 (SEL).

These specimens are sterile and they may belong to A. chloranthum ssp. asplundii Krukoff & Barneby.

- 5a. Anomospermum reticulatum (Martius) Eichler ssp. reticulatum Mem. NY Bot. Gard. 22 (2): 73. 1971.

Venezuela: Terr. Fed. Delta Amacuro, J. Steyermark 114674. Peru: Loreto: A. Gentry et al 21280, 22466.

The sterile NY sheet was cited through error as Orthomene

schomburgkii. The specimen at MO has a fruit and it obviously belongs here.

This is the first record of this subspecies from Delta Amacuro.

- 5b. Anomospermum reticulatum (Martius) Eichler ssp. dielsianum (Moldenke) Krukoff & Barneby, 22 (2): 74. 1971.

Brazil: Rondonia: J. U. Santos 191 (MG).

This is the first record of this subspecies from Rondonia.

- 5g. Anomospermum reticulatum (Martius) Eichler ssp. allenii Krukoff & Barneby, Mem. NY Bot. Gard. 22 (2): 77. 1971.

Colombia: Chocó: Lloró-Yuto, A. Gentry 24374, 24379, 23754.

IX. Orthomene Barneby & Krukoff, Mem. NY Bot. Gard. 22 (2): 79. 1971.

1. Orthomene schomburgkii (Miers) Barneby & Krukoff, Mem. NY Bot. Gard. 22 (2): 80. 1971.

Colombia: Chocó: Rio San Juan, E. Forero 4426. Peru: San Martin: J. Schunke V. 5988, 6070, 6092. Brazil: Pará: Itaituba, M. G. Silva 3790 (MG); Amazonas: O. C. Nascimento 828 (MG). Mato Grosso: J. M. Pires 16647 (MG).

Species not described because of absence of sufficient material.

Ten species and four subspecies are left undescribed because of lack of fertile or sufficient material. In order to facilitate their collection, the known localities are listed here.

18. Sciadotenia sp.

Peru: Loreto: down river from Yurimaguas.

Mathias & Taylor 3933 (o with inflorescence - axes, carpophores but no drupes) (see Mem. NYBGard. 22: 25. 1971).

19. Sciadotenia sp.

Brazil: Pará: Serra do Cachimbo, Cuiabá - Santarem highway, km. 1300, terra firme, Prance 25705 (sterile) (see Phytologia 39: 285. 1978).

20. Sciadotenia sp.

Ecuador: Napo: Rio Pucino (first major tributary of Rio Aguatico) + 250 m, A. Gentry 9748 (sterile).

This is the second species of the genus so far found in Ecuador, the first being S. toxifera.

31. Abuta sp.

Brazil: basin of Rio Negro, Maturaca on Rio Gauaburi, R. E. Schultes 24577 (INPA) (sterile) (See Mem. NYBGard. 22: 52. 1971).

32. Abuta sp.

Colombia: Choco: Gentry & Forero 7203 (MO-NY) - hills behind Bahia Solano (Puerto Mutis) alt. 0-250 m, tropical wet forest (see Phytologia 33: 333. 1976); Gentry & Fallen 17731 - Rio San Juan, just below Tado, + 100 m (see Phytologia 39: 289. 1978). Both collections are sterile.

33. Abuta sp.

Colombia: Choco: vicinity of Unguia, + 50 m, Gentry 16723 (NY) (sterile) (see Phytologia 39: 289. 1978).

34. Abuta sp.

Peru: Loreto: Rio Corrientes (near Ecuadorian border, 280-300 m, Gentry 18964 (MO).

35. Abuta sp.

Panama: Canal Zone: 4 m N of Gamboa, Gentry 3243 (MO).

5. Caryomene grandifolia Barneby & Krukoff, Phytologia 41: 247. 1979.

Until flowering collection became available, it has been referred to as 5. Caryomene sp. - see Mem. NYBGard. 22: 60. 1971.

6. Caryomene sp.

Surinam: Brokopongo Dct.: 8 km of village Brownsweg, Van Donselaar 2211 (U, NY-fragment) (sterile) (see Mem. NYBGard. 22: 61. 1971).

77. Caryomene sp.

French Guiana: Saul, M. Fournet 25 (frts collected on the ground).

Fournet states on the label: "a vine 40-50 cm in diam." This is the first record of this genus from French Guiana.

4g. Anomospermum chloranthum Diels ssp. (?)

Ecuador: Carchi: Penas Blancas, 900-1000 m, M. T. Madison 4622 (SEL) (sterile) (base cordate).

5d. Anomospermum reticulatum (Martius) Eichler ssp. idroboi Krukoff & Barneby.

Until specimens in flower and fruit became available it has been referred to as 9. Anomospermum sp.

5h. Anomospermum reticulatum (Martius) Eichler, ssp (2)

Peru: Huánuco: southwestern slope of the Rio Llulla Pichis watershed, on the ascent of Cerros del Sira (in rain forest, + 1290 m), Frank Wolfe 12339 (F), 12340 (F). (Both collections are sterile) (see Phytologia 25: 44. 1972).

5i. Anomospermum reticulatum (Martius) Eichler, ssp. (2)

Venezuela: Terr. Fed. Delta Amacuro, J. Steyermark 114777.

5j. Anomospermum reticulatum (Martius) Eichler ssp. (2)

Ecuador: Esmeraldas: Lita, M. T. Madison 5222.

8. Anomospermum andersoni Krukoff, Phytologia 39: 290. 1978.

Until fruiting specimen became available it has been referred to as 8. Anomospermum sp. (see Mem. NYBGard. 22: 78. 1971).

9. See under 5d.

10. Anomospermum sp.

Colombia: Valle: Costa del Pacifico, Rio Cajambre, silva. alt. 5-80 m, Cuatrecasas 17528 (F) (sterile), (see Phytologia: 33: 335. 1976).

Bibliography

In order to conserve space, I am citing only the papers which are not cited in Supplements VII - XIV.

1. Krukoff, B. A. and R. C. Barneby. Supplementary notes on American *Menispermaceae* XIV. *Phytologia* 39: 239-255. 1978.
2. Krukoff, B. A. and R. C. Barneby. Supplementary notes on American *Menispermaceae* XV. *Phytologia* 44: 11-18. 1979.

List of Exsiccatae

The first list of Exsiccatae covering papers on Menispermaceae including Supplement VIII was published in Mem. NY Bot. Gard 22: 1-89. 1971, the second list covering Supplements IX, X, and XI in Phytologia 33: 337-340. 1976, the third covering Supplements XII and XIII in Phytologia 39: 292-293. 1978, the fourth list covering Supplement XIV in Phytologia 41: 254-255. 1979 and the fifth list covering Supplement XV in Phytologia 44: 17-18. 1979. This list covers Supplement XVI. The number in parenthesis corresponds with the species - number of this and other papers (Supplements XIII to XV). Only numbered collections and those of which the dates of collection are recorded have been listed. If a collector gathered his collection together with others, only his name is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

Aluisio, J., s.n. (23/07-1976) (A-5), (29/07-1976) (A-27), (02/09-1976) (T-8), (20/10-1976) (T-8)

Ayres, J. M., 02 (A-21)

Belem, Romeu P., 35 02 (CH-3)

Berg, C. C., 559 (A-27), 764 (A-27)

Berry, Paul E., 2186 (A-4)

Coelho, L. F., 616 (A-27)

Diaz, C., S., 231 (A-16)

Dodson, C. H., 6309 (AN-4), 6504 (AN-4), 6514 (AN-4), 6622 (AN-4), 6729 (AN-4)

Euponino, A., 397 (CH-3)

Forero, E., 4426 (O-1)

Foster, Robin B., 3239 (A-27), 3817 (A-27), 3864 (O-1), 5289 (CH-1), 6480 (CU-1), 6141 (AN-1), 6178 (CH-1)

Fournet, A. F., 56 (A-4)

Gentry, A., 3243 (A-34), 9748 (S-19), 20073 (AN-1), 21124 (AN-1), 21280 (AN-5a), 21624 (CU-1), 21984 (A-16), 22067 (AN-4b), 22405 (A-16), 22466 (AN-5a), 23754 (AN-5g), 24374 (AN-5g), 24379 (AN-5g)

Gonzalez, Angel C., 804 (A-30)

Grenand, 1453b (A-11), 1530 (A-27)

Liesner, Ronald, 5555 (A-27), 5607 (A-27), 5836 (A-27), 7115 (S-7)

Maciel, A. A., 115 (A-27)

Madison, M. T., 4622 (AN-4), 5216 (AN-4), 5222 (AN)-5 spp. (?), 5353 (CH-1), 5355 (CH-1), 5356 (CU-1), 5357 (CU-1), 5412 (CH-1), 5413 (CH-1), 5437 (CH-1)

- Mori, S. A., 11341 (CH-3)
Mota, C. D. A., s.n. (1-07-76) (A-27), (01-07-77) (A-27)
- Nascimento, O. C., 828 (O-1)
- Pires, J. M., 16091 (A-27), 16647 (O-1)
Plowman, T., 7439 (CU-1), 7494 (CH-1), 7495 (CH-1), 7576 (CH-1),
7712 (CU-1)
Prance, G. T., 25510 (S-1), 25705 (S-9), 26120 (A-27)
Prevost, M. F., 221 (S-1), 679 (A-18), 684 (A-1)
- Revilla, Juan, 2566 (CU-1)
- Santos, M. R., 104 (T-1), 191 (AN-5b)
Schunke V., J., 5988 (O-1), 6070 (O-1), 6092 (O-1)
Silva, A. S., AS-58 (A-1), AS-118 (A-27), AS-171 (A-27)
Silva, M. G., 3481 (A-27), 3790 (O-1), 4117 (S-4), 4216 (A-21)
Silva, N. T., 4604 (A-27)
Souza de, J. L., 265 (A-27)
Steyermark, J., 114674 (AN-5a), 114777 (AN-5-ssp. (?)), 115546 (A-18),
115561 (A-13), 115562 (A-13), 116844 (A-30), 117644 (A-18),
117773 (A-17), 117774 (A-1)
- Vilhena, R., 351 (A-27)
Vogel, ., s.n. (9-10-46) (CH-1)
- William, Ll., 19003 (CH-1)

NOTES ON THE SPECIES OF ERYTHRINA. XV.

B. A. Krukoff

Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey; Honorary Curator of New York Botanical Garden.

Erythrina Symposium III was published in Ann. of the Missouri Bot. Garden in 1979. Thirteen additional papers are planned for publishing late in 1980 as Erythrina Symposium IV. I plan to submit a brief paper for this symposium, reserving the present paper for information which is best published separately.

53 new collections are cited in this paper, but the data on many others were lost on my flight to the South America and these are not cited here. No novelties are described in this paper and no extensions of range are given as these are reserved for Supplement XVI which will be published as a part of Erythrina Symposium IV.

1. Erythrina fusca Loureiro, Fl. Cochinch. 427. 1790, based on Gelala aquatica Rumphius, Herb. Amb. 2: 235. tab. 78. 1750.

Colombia: Cundinamarca: Girardot, H. Garcia Barriga 20302 (F). Thailand: Angtong Province: J. F. Maxwell 75-573 (L). New Guinea: Western Det., R. Pullen 7078 (A), 7079 (A).

2. Erythrina crista-galli L. Mant. 99. 1767.

Two specimens from cult. plants were seen, one at MIN, cultivated in South Carolina, and another at TEX cultivated in Galveston, Texas.

3. Erythrina falcata Bentham in Mart., Fl. Bras 15 (1): 172. 1859.

Brazil: Paraná: Campo Novo, G. Hatchbach 19833 (F).

4. Erythrina dominguezii Hassler, Physis 6: 123. 1922.

Argentina: Corrientes (cult.), C. L. Cristobal 1719 (MO).

7. Erythrina poeppigiana (Walpers) O. F. Cook, U.S. D.A. Div. Bot. Bull. 25: 57. 1901.

Venezuela: Lara: J. Steyermark 108762 (F); Miranda: Cerros de Bachiller, J. Steyermark 116412. Peru: Cuzco: C. Vargas 13684 (US). Bolivia: La Paz: Yungas, St. G. Beck 1862. West Indies: Grenada (cult.), R. A. Howard 18753.

10. *Erythrina stricta* Roxburgh, Hort. Beng. 53, nomen 1814; Fl. Ind. 3: 251. 1832.

Thailand: Uta Thani, C. F. van Beusekom 2823A; Saraburi Province: J. F. Maxwell 74-921, Chonburi Province: J. F. Maxwell 75-57.

15. *Erythrina edulis* Triana in M. Micheli, J. Bot. (Morot) 6: 145. 1892.

Ecuador: Napo: Baeza, 2000-2200 m, H. Balslev 10324 (grading into *E. aff. edulis*).

- 15b. *Erythrina megistophylla* Diels, Biblioth. Bot. 116: 96. 1937.

Ecuador: Los Rios: Hugh H. Iltis E-131.

20. *Erythrina leptorhiza* Alph. DeCandolle, Prodr. 2: 413. 1825.

Mexico: Hidalgo: Brian Marcks 696 (WIS).

- 22a. *Erythrina herbacea* L. subsp. *herbacea*. *Erythrina herbacea* L., Sp. Plant. 706. 1953 sens. str.

U.S.A., Louisiana: Joseph Ewan 21365 (A); Texas: Fred R. Waller 3600 (A), Alfred Traverse, 1113 (A). In addition, I examined 31 specimens from Herbarium of Minnesota (4 specimens from Georgia, 4 from S. Carolina, 2 from Louisiana, 2 from Alabama, 2 from Mississippi and 18 from Florida) and 4 specimens from Herbarium of Texas (1 from Georgia, 1 from Florida and 2 from Texas).

- 22b. *Erythrina herbacea* L. ssp. *nigrorosea* Krukoff & Barneby Phytologia 25 (1): 6. 1972.

Mexico: Veracruz: J. J. Fay 920 (F), 926 (US).

24. *Erythrina flabelliformis* Kearney, Trans. NY Acad. Sci. 14: 32. 1894.

Mexico: Michoacan: West of Zamora, Gregg 586 (MO). In addition, I examined from Herbarium of Texas six specimens and from Herbarium of Minnesota one specimen - all from Santa Rita Mountains, Arizona.

30. *Erythrina caribaea* Krukoff & Barneby, Phytologia 25: 9. 1972.

- Mexico: Veracruz: Marino Rosas R. 1290 (A).
41. Erythrina chiriquensis Krukoff, Brittonia 3: 322. 1939.
Panama: Chiriqui: Barry Hammel 7146.
53. Erythrina berteriana Urban, Symb. Ant. 5: 370. 1908.
Costa Rica; A. Gentry 516 (WIS); Guanacaste; J. D. Sauer 5811 (WIS). Colombia: Santa Marta: Starker White 428 (WIS).
54. Erythrina rubrinervia H. B. K., Nov. Gen. & Sp. 6: 434. 1824.
Colombia: Cundinamarca: H. Garcia Barriga 20200 (US), 20954 (US), 20960 (US), 21039 (A).
58. Erythrina gibbosa Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10: 34. 1934.
Costa Rica: Corcovado Nat. Park, D. A. Janzen 10627 (MO).
62. Erythrina mitis Jacquin, Hort. Schoenb. 2: 47. 1797.
Venezuela: Miranda: Cerros del Bachiller 116240, 116336.
Africa: Amani (cult.) A. Peter 49359 (MO).
- 64b. Erythrina corallodendrum var. bicolor Krukoff, Brittonia 3: 275. 1939.
West Indies: Montserrat: R. A. Howard 18956; Grenada: R. A. Howard 18743, 18752.
74. Erythrina zeyheri Harvey, Fl. Cap. 2: 236. 1862.
S. Rhodesia: Matopos Res. Sta., Plowes 1383 (MO).
78. Erythrina vogelii Hooker f., Niger Flora 307. 1849.
Upper Volta: C. Geerling 1086 (MO). (Sindou, savanna), 1215 (MO) (Bobo-Dioulasso in creek ravine), 1631 (MO) (3 km E of Bouna).
94. Erythrina latissima E. Meyer, Comm. Pl. Afr. Austr. 1: 151. 1836.
S. Africa: van Steenis 24008 (L).
96. Erythrina variegata L., Herb. Amboin. 10. 1754; Amoen. Acad. 4: 122. 1759, based on Gelala alba Rumphius, Herb.

Amboin. 2: 234, tab 77. 1750.

Borneo: Brunei: Mitsuru Hotta 13420. Marshall Islands, H. St. John 21745. Mangareva Islands: H. St. John 14671 (A), 14808 (A), F. R. Fosberg 11623 (A). Grenada (cult.), R. A. Howard 18827. Belize: Cayo: (cult.) Dieckman 189 (MO).

97. Erythrina tahitensis Nadeau, Enum. Pl. Tahiti 80. 1873.
Hawaii: Glen Spence s.n. (July 17, 1978).

Hawaii: Otto Degener 33677 (A).

102. Erythrina velutina Willdenow in Ges. Nat. Freunde Berlin Neue. Schriften 3: 426. 1801.

Brazil: Bahia: S. A. Mori 11816. Ecuador: El Oro: Linda Albert de Escobar 708, 912.

- 102a. Erythrina velutina Willdenow, f. aurantiaca (Ridley) Krukoff, Brittonia 3: 329. 1939.

Venezuela: Island Fernando Noronha, G. T. Prance 26343.

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1. Carter, E. J. H. Wayside trees of Malaya 1: 367-371. 1940.
2. El-Olemy, M. M. *Erythrina* alkaloids. *Lloydia* 41: 342-348. 1978.
3. Ito, Kazuo, and Hitoshi Tanaka, Studies on the *Erythrina* x *bidwillii* Lindl. Chem, Pharm. Bull. 22 (9): 2108-2112. 1974.
4. " " et al. Studies of *Erythrina* alkaloids IX. Reactions of *Erythrina* - Alkaloids by Metallic Sodium in Liquid Ammonia. J. Pharm. Soc. J. P. N. 95 (2): 170-175. 1975.
5. " " et. al. Studies of *Erythrina* alkaloids X. Alkaloids of several *Erythrina* plants from Singapore. J. Pharm. Soc. J. P. N. 95 (3): 358-362. 1975.

List of Exsiccatae

The first list of Exsiccatae was published in Supplement #13 (Phytologia 41: 256-300. 1979) it covers all papers up to and including Supplement #11; the second list was published in Supplement #14 (Phytologia 44: 28-32. 1979 and it covers Supplements #12 and 13. The present list covers the present paper.

The first figure in Exsiccatae after the collector's name is the collection number of the specimen, and the figure in parenthesis is the number of species as they are arranged in conspectus of the species of the genus Erythrina (Lloydia 37 (3): 332-459. 1974 and the Supplements VII - XV).

Only numbered collections and those of which the dates of collections are recorded have been listed. If a collector gathered his collection together with others, only his is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

Balslev, H., 10324 (15)
Beck, St. G., 1862 (7)
Beusekom, van C. F., 2835A (10).

Degener, Otto, 33677 (97)
Dieckman, L., 189 (96)

Escobar de, Linda Albert, 912 (102), 708 (102)
Ewan, Joseph, 21365 (22a)

Fay, J. J. 920 (22b), 926 (22b)
Fosberg, F. R., 11623 (96)

Garcia-Barriga, H., 20200 (54), 20302 (1), 20954 (54), 20960 (54),
21039 (54)

Gentry, A., 516 (53)
Gregg, 586 (24)

Hammel, Barry, 7146 (41)
Hatschbach, G., 19833 (3)
Hotta, Mitsuru, 13420 (96)
Howard, R. A., 18743 (64b), 18752 (64b), 18753 (7), 18827 (96),
18956 (64b)

Janzen, D. A., 10627 (58)

Marcks, Brian, 696 (20)
Maxwell, J. F., 74-921 (10), 75-57 (10), 75-107 (10), 75-573 (1),
75-1123 (13)

Mori, S. A., 11816 (102)

Oyayomi, OF00A 338 (79)

Peter, A., 49359 (62)

Plowes, D. C., 1383 (74)

Prance, G. T., 26343 (102a)

Pullen, R., 7078 (1), 7079 (1)

Rosas R., Marino, 1290 (30)

St. John, H., 14671 (96), 14808 (96), 21745 (96)

Sauer, J. D., 5811 (53)

Steenis, van, 24008 (94)

Steyermark, J. A., 108762 (7), 116240 (62), 116336 (62), 116412 (7).

Traverse, Alfred, 1113 (22a)

Vargas, C., 13684 (7)

Waller, Floyd R., 3600 (22a)

White, Starker, 428 (53)

TWO NEW COMBINATIONS IN STACHYS (LABIATAE)

John B. Nelson

Florida State University, Tallahassee 32306

Extensive research on the morphology and biogeography of Southeastern *Stachys* necessitates the recognition of two new combinations. These are formally presented in anticipation of the forthcoming revision of the genus. Treatments and discussions of these taxa will be included within the revision.

Stachys hyssopifolia Michx. var. lythroides (Small) J. Nelson,
comb. & stat. nov.

Basionym: S. lythroides Small, Fl. S. E. U. S., 1031. 1903.
TYPE: Florida, Leon Co., near Tallahassee, summer 1895,
N. K. Berg s.n. (NY-holotype!).

Stachys tenuifolia Willd. var. latidens (Small) J. Nelson,
comb. & stat. nov.

Basionym: S. latidens Small in Britton, Man. Fl. N. U. S., 793. 1901.
TYPE: Virginia, Washington Co., summit of White Top Mountain, August
11-12, 1892, J. K. Small s.n. (F!, MO[2]!, NY[2]!, PENN!, PH[2]!;
NY-holotype!)

A REVIEW OF DIATOM PREPARATION FOR THE LIGHT MICROSCOPE

MaryAnn Foote
Department of Ecology - Rutgers University
New Brunswick, New Jersey 08903

Diatoms (Bacillariophyta), unicellular algae with cell walls composed of silica, are very important members of marine and freshwater microalgal assemblages. In many cases, they account for a large proportion of the primary production in freshwater and marine systems (Hutchinson, 1975).

During recent years, diatoms have been used with increasing frequency to assess the condition of inland waters (Lowe, 1972). They are singularly well-suited for this function as they easily can be identified to the species level. The taxonomy of diatoms, based on the ornamentation of the inert silica wall, can be accomplished using a few pertinent taxonomic references such as Weber (1966), Patrick and Reimer (1976, 1966) and Hustedt (1930).

Diatom valves must be properly prepared prior to taxonomic study. Many techniques exist for diatom preparation but there is no one source to which the beginning diatomist may refer. Many techniques are unique to specific labs. This paper will examine most of the methods currently in use.

Although diatoms may be examined as wet mounts, their true morphology can only be seen on frustules cleaned of all organic material and sand.

1. Burn or Incineration Mounts -- Freshwater

Lightly silicified species such as Rhizoselenia and Attheya must be cleaned by this method. Homogenize the sample by sucking the material up and down a pipette, and place 1-2 drops on a coverslip already on a hot plate at low or no heat. Allow the sample to dry slowly; as the material dries, the frustules will become plastered to the coverslip. After the material is dried, increase the heat to incinerate all the soft parts. Although Weber (1966) recommends 1000°F, temperatures in excess of 500-600°F will approach the melting point of silica and must be avoided. It takes 15-30 minutes for a complete incineration. Plankton net samples can be used this way if the samples are relatively clean. Since the organic material burns to blackness, it is best not to use ephytes this way.

2. Burn or Incineration Mounts -- Marine

Many marine diatom spp such as Skeletonema and Thalassiosira are lightly silicified and incineration of the samples is required. Furthermore, the salt must be removed before the frustules can be studied. If salt is present, a milky-white precipitate will form upon addition of some silver nitrate. There are several methods

to remove the salt. The samples may be taken through a series of alcohol baths or they may be centrifuged, allowing the diatoms to collect at the bottom of the tube and the salt water to be poured off. Centrifugation of any sample is an unsuitable method, however, as it breaks many frustules. A slower but more reliable method is sedimentation with the diatoms allowed to settle out of the sample and the salt water decanted off. Very lightly silicified diatoms may float so the decanted water must be microscopically examined for them. A small amount of material is placed in vials and filled with distilled water. The vials may be tightly capped and rolled between the hands to wash the material. After settling 4-12 hrs, the water is suctioned off. This is repeated 5-10 times. The above method is then followed.

3. Hydrogen Peroxide Method #1

Put the samples into tall beakers and set them in a sink, if possible. Flood with hydrogen peroxide and allow to sit 3 minutes before adding a pinch of potassium dichromate. After 4-5 minutes, there should be a violent colour and temperature change. The solution will boil vigorously, removing all organic materials.

4. Hydrogen Peroxide Method #2

Samples are placed in 100 ml beakers with about 40 ml hydrogen peroxide and some boiling beads. The solution is placed on a hot plate and boiled almost to dryness.

5. Hydrogen Peroxide Method #3

Swift (1967) suggests using 5 drops of 30% hydrogen peroxide per 50 cc sample in quartz test tubes which are then placed 6 cm from a 1200W mercury lamp for 2 hrs.

6. Nitric Acid Method

Acid must always be used under a hood and always with extreme caution. The hot plates should be covered with heavy-duty aluminum foil to protect them. This method is the most efficient and will rid samples of persistent materials like cellulose. Preserved samples must be washed with distilled water before the acid is added, as formalin and nitric acid may explode under these conditions. Batches of samples may be cleaned at once but care should be taken that the beakers are not placed too close together on the hot plates. Splattering may cause cross-contamination of samples. Use 100 ml beakers and about 50 ml acid and boiling beads, bring to the boiling point and let boil almost to dryness. As soon as the beakers are removed from the heat, add a pinch of potassium dichromate to oxidize whatever organic materials are left.

7. Sulfuric Acid Method #1

Water samples may be filtered through Whatman #1 filter paper to collect the diatoms. These frustules are prepared by placing the filter paper in a 300 ml tall beaker and dampening it with

distilled water. Approximately 20 ml sulfuric acid, 50 ml nitric acid and some glass boiling beads are added and the sample boiled on a hot plate until the volume is reduced. After the beaker is removed from the heat, add potassium dichromate as above.

8. Sulfuric Acid Method #2

Hasle and Fryxell (1970) agitate equal volumes of sample and sulfuric acid, then add potassium permanganate until the water becomes purple coloured. Oxalic acid is added dropwise until the sample becomes clear. The authors also suggest centrifugation.

9. Potassium Persulfate Method

Ma and Jeffrey (1978) have developed a method using potassium persulphate (.2-.4 $\mu\text{g}/5$ ml sample) and a sand bath to clean diatom frustules. When this method is used, the valves of some species remain intact showing the intercalary bands.

After the material is cleaned using methods 3-8, the cooled beakers are filled with distilled water and the diatoms permitted to settle out. This usually takes 4 hrs. The water is decanted and the beakers refilled. This procedure is repeated until the decanted water is clear. This will remove all unvolatized organic material. Care must be used when decanting material for quantitative studies. After the initial few decantations, it is usually best to transfer the frustules to progressively smaller beakers to minimize loss. If there is a skin on top of the water, a drop of it must be examined microscopically before decanting. If many diatoms are seen in this film, the sample must be recleaned.

The decanted material is transferred to labeled shell vials and preserved with a few drops of neutral formalin (1.4ml NaB_4O_7 /liter formalin; CuSO_4 to saturate). If long-term storage is required, dip the cork⁴ end and part way down the vial into melted paraffin to retard evaporation.

The cleaned diatoms are mounted using Hyrax or some other suitable material. Place a drop of distilled water in the center of a #0 or #1 square coverslip and then one to a few drops of cleaned material. The amount of sample used depends on its concentration. A solution which yields about 10 frustules per field of vision under oil immersion is ideal. Mix the material and the distilled water with a pipette, filling out the edges of the coverslip. Sometimes a wetting agent is added to aid in spreading the material. If the coverslips are soaked in ethanol prior to use, the alcohol will both clean them and aid in diatom dispersal. Alternately, sample and 1 ml distilled water may be mixed in a small beaker. This suspension is placed on coverslips in varying amounts with a dropping pipette to give different sample densities one of which will probably be correct (Heins, 1977). The coverslips should be allowed to dry slowly at low or no heat. If the coverslips are dried too fast, concentric rings of material will form. Examine the coverslips with high-dry magnification before mounting to ascertain that the material is not too dense. With a toothpick,

place a large drop of Hyrax in the center of an ethanol-cleaned 3x1 inch slide. Put the slide on a hot plate. Immediately pick up a coverslip and invert it into the Hyrax. Let the solvent boil off; the coverslip should dance lightly on top of the slide but the Hyrax must not burn (golden-amber colour). Remove the slide from the heat and press the coverslip down evenly and firmly; allow to sit about 30 seconds before testing the Hyrax with a dissecting needle. If the Hyrax is not brittle, reheat the slide to remove the rest of the solvent. When the slides are cooled, remove excess Hyrax with a razor blade, taking care not to lift off the coverslip and use xylene to clean the slide. Two labels should be added: one on the left of the coverslip with the date, sample number, sampling location and any other pertinent information, and another to the right of the coverslip. The taxon of the dominant diatoms or the legend to the ringed and numbered specimens is placed here.

Patrick and Reimer (1966) give detailed instructions for the preparation of slides with only one to a few diatoms. A suitable frustule is transferred to a gelatin-coated coverslip and then mounted in Hyrax as above.

Hart (1957) offers techniques for small quantities of diatoms from invertebrate guts or whale skin while Moller (1967) provides a method of ringing diatoms and recording their positions.

The author wishes to thank Dr. John D. Koppen and Dr. Charles Reimer for their instructions in diatom preparation.

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STUDIES IN THE LIABEAE (ASTERACEAE). XIV.

NEW SPECIES OF *LIABUM* AND *OLIGACTIS*.

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

Two undescribed species of Liabeae have been encountered during recent identification efforts. One of the species proves to be a distinctive member of the genus *Liabum*, having anomalous leaf venation, while the second species is an unusually narrow-leaved member of the genus *Oligactis*.

LIABUM DIEHLII H. Robinson, sp. nov.

Plantae herbaceae suffruticosae? erectae? 0.5-1.0 m altae? non vel pauca ramosae. Caules leniter hexagonales vel subteretes dense persistentiter albo-tomentosi, nodis disciferis, discis ad 9 mm in diametro. Folia opposita; laminae anguste ellipticae ad 15 cm longae et 2 cm latae base sensim anguste subpetioliformibus margine remote mucronate serrulatae interdum anguste recurvatae et in visis subintegrae apice anguste acutae minute apiculatae supra glabrae laeves vel vix rugosulae subtus dense albo-tomentosae, nervis secundariis pinnatis brevibus ca. 50° ascendentibus leniter arcuatis. Inflorescentiae terminales vel superne axillares uni- vel pauci-capitatae, pedicellis 5-15 mm longis dense sordide tomentosae. Capitula late campanulata ca. 13 mm alta et 15-20 mm lata; squamae involucri ca. 200 ca. 5-6-seriatae laxe subimbricatae lineares 3-10 mm longae base plerumque 0.5-0.7 mm latae margine superne dense spiculiferae apice vix attenuatae extus viridescentes distincte uni-costatae superne sparse spiculiferae; laciniae receptaculorum irregulares ca. 1 mm longae. Flores radii ca. 50; corollae flavae ca. 12 mm longae, tubis ca. 5 mm longis perangustatis glabris, limbis anguste ellipticis vel oblanceolatis ca. 7 mm longis et 1.2 mm latis glabris. Flores disci in capitulo ca. 150; corollae flavae ca. 10 mm longae, tubis 5.5-6.0 mm longis plerumque angustis superne leniter infundibularibus glabris, faucibus 1.5 mm longis subcylindraceutis glabris, lobis linearibus 1.8-2.0 mm longis et ca. 0.3 mm latis apice obtusae appendiculatis valde spiculiferis et pauce stipitato-glanduliferis sub apicem pauca breviter setiferis et glanduliferis caeterum glabris; thecae antherarum 2.5 mm longae; appendices antherarum oblongo-ovatae 0.4 mm longae et 0.16 mm latae. Achaenia matura ca. 1 mm longa 10-costata dense breviter setifera; setae pappi biseriatae exteriores ca. 8-10 plerumque 0.5 mm longae interiores ca. 27 ad 7 mm longae apice non latiores. Grana pollinis leniter oblata ca. 30 μ m alta et 35 μ m lata.

TYPE: PERU: Cuzco: Quellouno, 750 m. Mayo 22, 1930. *C. Bues 923* (Holotype, F). PARATYPES: PERU: Cuzco: (Pi_ to?), 700 m. Mayo 13, 1930. *C. Bues 920* (F); Cuzco: Pavayoc, Valle Lares. Sept. 1925. *A. Diehl* (F); Cuzco: Quebrada Versailles. Sept. 1925. *A. Diehl 2450a* (F).

Liabum diehlii is unique in the genus by the narrowly elliptical leaves with pinnate venation. Pinnate venation is usually a character that distinguishes the genus *Oligactis* from *Liabum*, but the achene pubescence and general aspect of the new species clearly indicate a position in the latter genus. The narrow involucre bracts and slender stems of the new species are particularly suggestive of relationship to *L. wurdackii* Ferreyra from the area of Amazonas in northern Peru.

OLIGACTIS GARCIA-BARRIGAE H. Robinson, sp. nov.

plantae volubiles multo ramosae. Caules brunnescentes teretes dense canescentiter evanescentiter arachnoideo-tomentosi. Folia opposita sessilia trans nodis anguste connata; laminae lineares ad 5.5 cm longae et 0.12-0.25 cm latae base sensim angustiores margine valde anguste revolutae apice sensim angustiores acutae supra glabrae vel subtiliter plerumque in nervis evanescentiter arachnoideo-tomentosae subtus dense tomentosae, nervis secundariis pinnatis brevibus. Inflorescentiae axillares breviter thyrsoideo-paniculatae, ramis dense arachnoideo-tomentosis, ramis ultimis 2-3 mm longis. Capitula ca. 7-8 mm alta; involucre ca. 4 mm alta et 3.0-3.5 mm lata; squamae involucri ca. 25 subimbricatae 4-5-seriatae ovatae vel lanceolatae 1-3 mm longae et 0.5-1.0 mm latae apice acutae extus fusciscentes sparse arachnoideo-tomentosae. Flores radii 3; corollae flavae, tubis ca. 2.2 mm longis extus glabris, limbis ellipticis 4 mm longis et 1.0-1.2 mm latis extus glabris vel subglabris. Flores disci in capitulo 3; corollas flavae, tubis ca. 2 mm longis inferne angustis superne distincte infundibularibus extus glabris, faucibus ca. 1 mm longis subcylindraceis glabris, lobis linearibus ca. 2.5 mm longis ad 0.4-0.5 mm latis plerumque glabris subapice breviter unisetiferis, axillis sinorum 1-2 longe arachnoideo-pilosis; thecae antherarum ca. 2 mm longae; appendices antherarum oblongo-ovatae ca. 0.5 mm longae et 0.2 mm latae supra leniter mamillosae. Achaenia immatura ca. 1 mm longa ca. 5-costata dense breviter saepe contorte setifera et sparse glandulifera; setae pappi biseriatae exteriores ca. 20 plerumque 0.5-1.0 mm longae interiores ca. 30 ad 5 mm longae apice non vel vix latiores. Grana pollinis in diametro 30 μ m.

TYPE: COLOMBIA: Cundinamarca-Meta: Cordillera Oriental, Vertiente oriental. Fomeque : camino de herradura al Lago de Chingaza y cordillera de Cerro Verda; alt. 1900-3200 m. Yerba bejucosa de tallos largos, cilíndricos. Flores blancas, lígulas amarillas. Hojas verde claras por la haz, por el envés con tricomas blancos. Dic. 26-28, 1962. *H. Garcia-Barriga 17689* (Holotype, COL; isotype, US).

Oligactis garcia-barrigae is a member of the subgenus *Oligactis*, a subgenus that is concentrated in Colombia with two species reaching Venezuela and one species endemic to Costa Rica. The new species is most distinct in the narrow leaves which are often closely spaced or clustered on lateral branches. The species has only 6 flowers in the heads, 3 ray flowers and 3 disk flowers, compared to ca. 10 flowers per head in more common species of the group such as *O. volubilis* (H.B.K.) Cass. and *O. sessiliflora* (H.B.K.) R. & B. The involucre bracts of the new species are also laxly tomentose on the outer surface, while those of other species are mostly glabrous or glabrescent.



Liabum diehlii H. Robinson, Holotype, Field Museum. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Oligactis garcia-barrigae H. Robinson, Isotype, United States National Herbarium.

NEW SPECIES OF VERNONIEAE (ASTERACEAE). VI.

LYCHNOPHORA SOUZAE

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

Recent revisions and additions to the subtribe Lychnophorinae of the tribe Vernoniaeae involved primarily the genera *Chresta* Vell. ex DC. and *Eremanthus* Less., but included one new species in the genus *Lychnophora* Mart. (Robinson, 1980). Since that time material has been seen of an additional undescribed species which seems best placed in the latter genus, although it possesses some anomalous features. The species is named here for one of the collectors, R. Souza.

The new species has narrowly strap-shaped, twisted pappus elements, a characteristic of most species of *Lychnophora*. There is no outer pappus series, and the species resembles *L. passerina* (Mart. ex DC.) Gardn. and *L. ramosissimum* Gardn., species that are sometimes placed in a segregate genus *Haplostephium* Mart. ex DC. characterized by a reduced outer pappus series. *Lychnophora souzae* is distinguishable from *L. passerina* by having glanduliferous rather than glabrous corollas, and it is distinguishable from *L. ramosissima* by having narrow twisted rather than broad flattened pappus elements. The new species differs from both of the related species by the more loosely congested almost pyramidal inflorescence with a more elongated axis, by the more terete leaves without an evident recessed abaxial surface, by the appendaged tips on the outer involucreal bracts, by the generally glabrous often reddish-tinged inner involucreal bracts, and by the few, usually only 5 pappus elements.

Lychnophora souzae seems most unique in details of the individual head-like structures which might be interpreted as multi-flowered paleaceous heads. The flowers, however, occur singly or in pairs with bracts often turned to surround them. The structures are interpreted here as syncephala which in turn are grouped into a larger compound inflorescence.

LYCHNOPHORA SOUZAE H. Robinson, sp. nov.

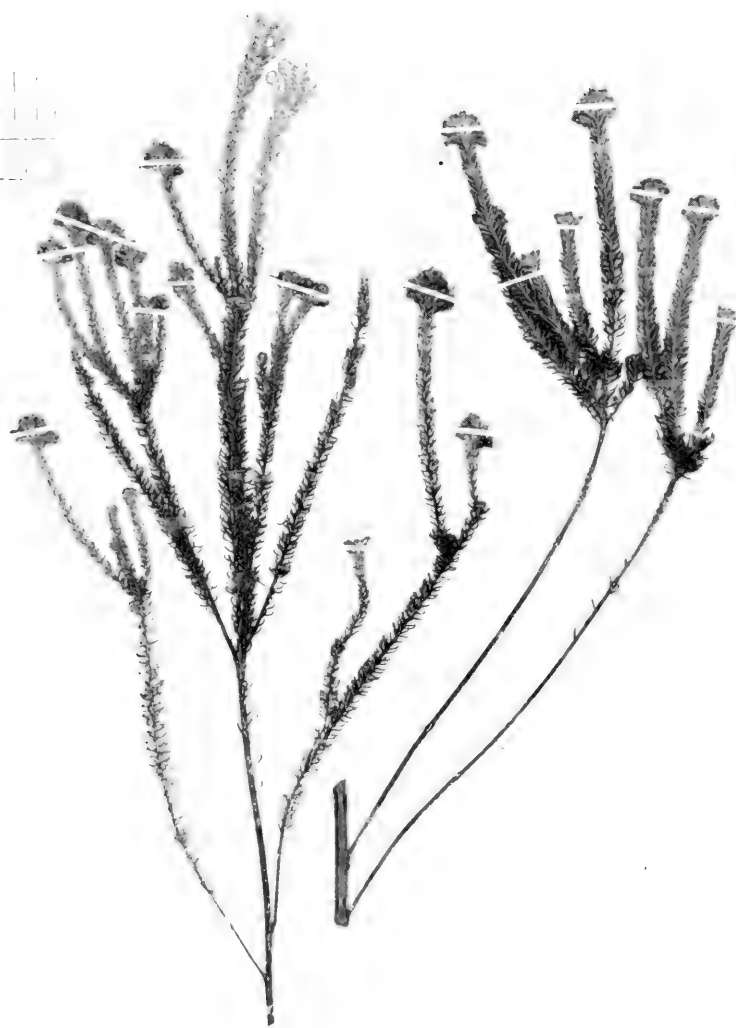
Plantae fruticosae ca. 1 m altae multo ramosae. Caules inferne atro-brunnescentes teretes vel irregulariter undulati superne dense appresse canescentiter stellato-lepidoti. Folia ericiformia dense spiraliter inserta, petiolis ca. 0.5-1.0 mm longis glabrescentibus rubescentibus; laminae subcylindratae ca. 4 mm longae et ca. 1 mm latae integrae apice anguste obtusae scleroideae laeves atrescentes supra et lateraliter rugosulae

glandulo-punctatae sublucidae subtus in vittis latis medianis dense appresse canescentiter stellato-lepidoti. Inflorescentiae in ramis terminales. Syncephala in axillis terminalibus et sub-terminalibus dense congesta unusquisque anguste campanulata ca. 7-10 mm alta et 2-3 mm lata; squamae involucri exteriores ca. 5 ca. 2-3 mm longae inferne glabrae vel subcoriaceae apice in partibus foliiformibus appendiculatae; squamae interiores saepe rubro-tinctae ultra 25 plerumque 4-6 mm longae anguste oblongae vel lineari-lanceolatae apice acutae margine anguste scariosae minute serrulatae extus glabrae; squamae in fasciculis unfloris vel bifloris dispositae. Corollae magentae 6-7 mm longae, tubis 2.5-3.5 mm longis cylindraceutis extus etiam ad basem glandulo-punctatae, faucibus leniter infundibularibus ca. 1 mm longis, lobis oblongo-lanceolatis ca. 2.5 mm longis et ca. 0.6 mm latis, faucibus et lobis extus dense glanduliferis; thecae antherarum ca. 1.6-1.8 mm longae; appendices antherarum lanceolatae ca. 0.7 mm longae et inferne ad 0.22 mm latae margine inferne inflexae extus glabrae; basi styli non noduliferi; scapi styli in partibus hispidulis superioribus ca. 1.5 mm longi; rami styli ca. 1 mm longi. Achaenia immatura ca. 1.5 mm longa glabra; setae pappi albae ca. 5 perfacile deciduae ca. 3.5 mm longae anguste taeniatae ca. 5-pla tortilae, exteriores nullae. Grana pollinis leniter oblata ca. 42 μ m alta et ca. 50 μ m lata irregulariter areolata et spinulosa (*Lychnophora*-Type).

TYPE: BRASLL: Minas Gerais: Serra do Espinhaço, ca. 12 km N.E. of Diamantina, road to Mendanha. Elev. 1300 m. Rocky creek margin. Sandy cerrado and thickets in sandy pockets in outcrops. Shrub ca. 1 m tall. Heads magenta. 27 January 1969. *H.S. Irwin, R. Reis dos Santos, R. Souza, & S.F. da Fonseca* 22690 (Holotype UB; isotypes, NY, US).

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Lychnophora souzae H. Robinson, Isotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

NEW SPECIES OF VERNONIEAE (ASTERACEAE). VII.

FIVE NEW SPECIES OF *VERNONIA* FROM BRASIL.

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

Collections of additional new species of *Vernonia* have recently been obtained from a number of sources. The present paper is primarily to furnish names for the two species collected by R. M. King, one of which is a voucher for chemical analysis. The new species collected by Dr. Calderon comes from one of the botanically least known regions of Brasil in southern Amazonas. The remaining two species are also from poorly botanized regions in southern Pará. The latter three species all occur in regions rather isolated from the better known centers of Vernonian diversity in Brasil.

VERNONIA ALMEDAE H. Robinson, sp. nov.

Plantae suffruticosae erectae ca. 1 m altae non vel paucè ramosae. Caules brunnescentes leniter multo costati vel subteretes dense pilosi et puberuli. Folia alterna raro in ramis opposita sessilia vel subsessilia lineari-oblonga inferiora ad 8 cm longa et 0.9 cm lata superiora decrescentia base anguste rotundata vel breviter obtusa margine integra anguste recurvata apice breviter acuta minute apiculata supra dense subscabridula et glandulo-punctata subtus dense minute glandulo-punctata et plerumque in nervis et nervulis puberula, nervis secundariis utrinque ca. 12 brevibus erecto-patentibus leniter arcuatis. Inflorescentiae terminales corymbosae vel pyramidaliter paniculatae multo ramosae, ramis divaricate cymosis, internodiis dense minute pilosis, bracteis minutis indistinctis. pedicellis in capitulis inferioribus nullis in capitulis ultimis ad 5-8 mm longis. Capitula anguste campanulata 7-9 mm alta et 5-7 mm lata; squamae involucri brunnescentes vel in partibus vioscentes ca. 25 subimbricatae ca. 5-seriatae appressae anguste ovatae vel oblongo-lanceolatae 1.0-4.5 mm longae et 0.5-1.2 mm latae apice breviter acutae minute apiculatae in bracteis interioribus leniter recurvatae margine scariosae sparse pilosulo-fimbriatae extus sparse evanescentiter puberulae superne obscure glandulo-punctatae; receptacula dense breviter tomentosa. Flores ca. 11 in capitulo. Corollae lavandulae 7.5-8.5 mm longae extus glabrae, tubis anguste cylindraceis ca. 4 mm longis, faucibus vix infundibularibus ca. 1.5 mm longis, lobis lineari-lanceolatis ca. 3 mm longis base 0.6 mm latis; thecae antherarum ca. 2.7 mm longae; appendices antherarum lanceolatae ca. 0.6 mm longae et 0.2 mm

latae extus abaxialiter non glanduliferae pauce minute papillosoe; basi stylorum leniter breviter nodulosi; scapi stylorum in partibus breviter hispidulis superioribus subnulli ad 0.5 mm longi. Achaenia ca. 2.2-2.4 mm longa in costis dense breviter hispidulo-setifera inter costas dense pustulifera, pustulis 1-3-cellularibus; setae pappi albae persistentes ca. 50 plerumque ca. 6 mm longae plerumque in marginem dense scabridulae, series exteriores setiformes facile deciduae ca. 0.5-1.0 mm longae dense minute scabridulae. Grana pollinis in diametro ca. 37 μ m irregulariter areolata et spinulosa (*Lychnophora*-Type).

TYPE: BRASIL: Distrito Federal: 32 km N of the bridge at Asa Norte in Brasília on the road to Alto Paraiso. Wet savanna area bordering stream at an elevation of 2250 ft. Shrub 2 m tall; florets lavender. Jan. 19, 1980. *R.M.King & F.Almeda 8208* (Holotype, UB; isotype US). PARATYPES: BRASIL: Distrito Federal: Riberão Bananal, Brasília. Elev. 975 m. Disturbed gallery forest. Shrub ca. 1 m tall. Heads lilac. Only one seen. Jan. 8, 1966. *H.S.Irwin, R.Souza, & R.Reis dos Santos 11484* (NY); Cerrado slopes near Córrego Corguinho, immediately east of Sobradinho. Elev. 1000 m. Erect herb ca. 1.5 m tall. Heads lavender-purple. Jan. 25, 1966. *H.S.Irwin, R.Souza & R.Reis dos Santos 12007* (US); Chapada da Contagem, ca. 15 km E of Brasília. Elev. 1050 m. Cerrado. Herb ca. 1 m tall. Heads rose-lavender. Jan. 30, 1966. *Irwin et al. 12150* (US).

Vernonia almedae belongs in the large group related to *V. polyanthes* Less., but is rather distinctive in its more oblong or linear leaves and its more elongate involucre bracts. The new species somewhat resembles *V. westiniana* Less. and *V. subpaludosa* Malme. The Lessing species differs by its distinct petioles and non-glanduliferous tomentellous leaf undersurfaces. The Malme species differs by its mostly 7-flowered heads and glabrous upper leaf surfaces.

VERNONIA CLEOCALDERONAE H. Robinson, sp. nov.

Plantae suffruticosae ca. 1 m altae pauce ramosae. Caules leniter striati canescentiter dense appresse puberuli, pilis in cellulis principalibus subulatis obliquis interdum sub-T-formibus. Folia alterna, petiolis ad 7 mm longis; laminae ellipticae vel obovatae ad 7 cm longae ad 3 cm latae superne decrescentes base acutae vel vix acuminatae margine plerumque integrae ad apicem leniter sinuatae vel sub-trilobatae apice obtusae supra dense breviter appresse tenuiter puberulae subtus pallidiores dense glandulo-punctatae dense breviter appresse puberulae, nervis secundariis 5-8 mediocriter patentibus leniter arcuatis. Inflorescentiae multo ramosae, ramis breviter serialiter cymosis internodis sensim tenuibus, pilis dense breviter appresse puberulis, bracteis aliquantum foliiformibus in ramis distalibus aliquantum minutis 3-10 mm longis et 1-3 mm latis. Capitula axillaris vel extra-axillaria solitaria sessilia vel breviter pedicellata raro in pedicellis ad 7 mm longis ca. 8 mm alta et lata; squamae

involucri extus superne brunnescentes inferne et margine pallidiores ca. 44 subimbricatae ca. 5-seriatae appressae vel subappressae oblongae vel oblongo-lanceolatae 0.5-5.0 mm longae et 0.3-1.2 mm latae apice breviter acutae interiores argute acutae margine subscariosae vix fimbriatae extus dense breviter sericeae. Flores ca. 13 in capitulo. Corollae lavandulae ca. 6.0-6.5 mm longae, tubis ca. 3.0-3.5 mm longis cylindratis extus glabris, faucibus ca. 1 mm longis leniter infundibularibus extus glabris vel persparse pilosis, lobis oblongo-lanceolatis 2.0-2.5 mm longis et 0.5-0.6 mm latis superne sensim dense breviter sericeis; thecae antherarum ca. 2 mm longae; appendices antherarum anguste ovatae ca. 0.5 mm longae et 0.18 mm latae; basi stylorum subdisciformes; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longis. Achaenia 2.7-3.0 mm longa inter costis dense breviter setifera et dense pustulifera, pustulis plerumque uni-cellularibus; setae pappi albae aliquantum facile deciduae ca. 30-35 plerumque 4.5 mm longae apice vix vel non latiores margine et extus minute scabridulae, squamae exteriores distinctae lanceolatae ca. 1 mm longae et 0.10-0.15 mm latae margine dense scabridulae extus sparse minute scabridulae. Grana pollinis in diametro ca. 40 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. cognata*-Type).

TYPE: BRASIL: Amazonas: Transamazon Highway, 53 km W of Aripuanã River; "campina" region. In open campina of white sandy soil. Shrub up to 2 m tall with flowers lilac-violet color. June 27, 1979. *Cleofe E. Calderon, O.P. Monteiro & J. Guedes 2689* (Holotype, INPA; isotype, US).

The pubescence of *Vernonia cleocalderonae* suggests relation to species having *V. arenaria*-Type pollen, many of which have T-formed a sub-T-formed hairs. The pollen of the new species, however, is of the *V. cognata*-Type. Of the species having the latter type of pollen, the *V. lilacina* Mart.-*V. salzmannii* DC.-*V. silvae* sp. nov. series has only simple hairs, and the *V. cognata* group is notably sericeous. The new species is individually distinctive in the irregularly multi-branched inflorescence with variously pedicellate to sessile heads. The broadly elliptical to obovate leaves with sometimes slightly trilobed tips are also rather distinctive.

VERNONIA EITENII H. Robinson, sp. nov.

Plantae herbaceae perennes erectae ca. 4.5 dm altae non ramosae. Caules leniter pentagonales dense sordide tomentosi. Folia alterna sessilia anguste elliptica vel oblanceolata inferne ad 7.5 cm longa et 1.8 cm lata superne decrescentia base cuneata margine integra vel superne paucis subrenulata apice obtusa vel anguste rotundata supra dense scabrida subtus dense pallide tomentosa, nervis secundariis utrinque 5-6 valde ascendentibus. Inflorescentiae breviter racemiformiter cymosae 4-5-capitatae in nodis non deflectis in internodiis dense sordide tomentosae, bracteis sub-foliiformibus anguste oblongis 1-2 cm longis et 0.3-

0.4 cm latis. Capitula axillares in pedicellis 9-25 mm longis dense sordide tomentosus solitaria late campanulata; involucri ca. 9-11 mm alta et lata; squamae involucri inferne virides in apices purpureo-tinctae ca. 100 subimbricatae 5-6-seriatae appressae in apicibus junioribus interdum leniter incurvatae in squamis interioribus maturis leniter recurvatae; squamae anguste ovatae vel lanceolatae 3-10 mm longae et 1-2 mm latae apice argute acutae non acuminatae extus et margine sparse aut evanescentiter sordide pilosulae inferne et margine induratae superne subdistinctae uni-costatae margine dense scabrido-serrulatae. Flores ca. 45 in capitulo. Corollae magentae ca. 11 mm longae, tubis inferne anguste superne distincte infundibularibus ca. 5.5-6.0 mm longis extus superne sparse glanduliferis, faucibus ca. 1.2 mm longis subcylindraceis sparse breviter stipitato-glanduliferis, lobis linearibus ca. 3.5-3.8 mm longis ca. 0.6 mm latis extus plerumque glabris apice dense breviter spiculiferis; thecae antherarum ca. 3 mm longae; appendices antherarum oblongo-ovatae ca. 0.45 mm longae et 0.23 mm latae apice rotundatae abaxialiter glabrae; basi stylorum non noduliferi; scapi stylorum in partibus superioribus sparse hispidulis 0.5-1.0 mm longi. Achaenia submatura 1.8 mm longa dense longe setifera; setae pappi ca. 40 plerumque 6.5 mm longae superne distincte clavatae inferne plerumque in marginis scabridulae apice margine et extus dense scabridulae, scabridulis distincte apiculatis; series exteriores setiformes vel anguste squamiformes ca. 2 mm longae extus sublaeves. Grana pollinis leniter oblata ca. 55 μ m alta et ca. 60 μ m lata valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Distrito Federal: Chapada da Contagem. 23 km NW of the central sector of Brasilia. Wet campo (seasonal marsh) at 3400 ft. elev. Suffrutescent herb 0.5-1.0 m tall. Florets magenta. Jan. 26, 1980. *R.M.King, F.Almeda & G.Eiten 8313* (Holotype, UB; isotype US). PARATYPE: BRASIL: Distrito Federal: Chapada da Contagem, ca. 10 km E of Brasilia. Elev. 1000 m. Cerrado. Herb ca. 1 m tall. Heads magenta. Dec. 17, 1965. *H.S.Irwin, R.Souza & R.Reis dos Santos 11364* (NY, US).

The vegetative habit and the series of pedicellate heads in *Vernonia eitenii* both resemble those of *V. secunda* Sch.Bip. ex Baker, but the former clearly differs by the presence of distinct bracts in the inflorescence, by the order of maturation of the heads in the inflorescence, and by details of the involucrial bracts and florets. The new species seems more closely related to the recently described *V. irwinii* Barroso and *V. cristalinae* H.Robins., both from the general region of the Federal District. The three species share the same general habit, the uncostate involucrial bracts, the short pappus with exserted throats of the corollas, and the distinct apiculate tips on the barbules of the pappus setae. The new species differs by the regularly pedicellate heads and by the much shorter-tipped involucrial bracts. The broad tips of the pappus setae are more like *V. cristalinae*, but

the latter species seems to have only 1 or 2 heads in the inflorescence.

The immediate species group seems to have inflorescences in which the internodes represent a continuation of the main axis and the heads are axillary. This is reflected in the order of maturation of the heads, the upper heads maturing first and the lowest heads last. In most members of the genus, including the comparatively closely related *V. bardanoides* Less., the lower heads mature first. In these species the individual heads are apparently terminal and the inflorescence is continued by axillary innovations.

VERNONIA PARAENSIS H. Robinson, sp. nov.

Plantae herbaceae erectae ca. 5-6 dm altae non ramosae. Caules obscuro-virides ca. 7-8 angulati superne sparse pilosuli et inter costis minute glandulo-punctati inferne glabrescentes. Folia alterna, petiolis indistinctis; laminae subcarnosae lineares inferne ad 5.5 cm longae et 0.6 cm latae superne decrescentes et subfiliformes base sensim angustatae subpetioliformes margine integrae apice acutae supra et subtus multo minute glandulo-punctatae et sparse interdum evanescentiter pilosae, nervis primariis subtus leniter exsculptis, nervis secundariis obscuris valde ascendentibus. Inflorescentiae terminales subscaposae dense cymosae in nodis vix vel distincte deflectis, internodis appresse vel subappresse pilosulis. bracteis minutis vel nullis. Capitula solitaria interdum congesta plerumque sessilia interdum in ramis usque ad 1 cm longis plerumque 8-9 mm alta et lata; squamae involucri ca. 25 subimbricatae 4-5-seriatae oblongo-ovatae vel oblongo-lanceolatae 1-6 mm longae et 0.7-1.5 mm latae apice breviter acutae minute apiculatae extus plerumque brunnescentes dense breviter sericeae obscure minute glanduliferae margine pallidiores subscariosae dense pilosulo-fimbriatae; receptacula plana dense breviter hirsuta. Flores ca. 15-20 in capitula. Corollae roseae 8.5-9.5 mm longae, tubis inferne angustatis superne anguste infundibularibus 3.5-4.5 mm longis extus glabris, faucibus ca. 0.5 mm longis extus sparse sericeis, lobis linearibus 4.5-5.0 mm longis et ca. 0.5 mm latis extus sericeis superne densioribus; thecae antherarum ca. 2.5 mm longae; appendices antherarum oblongae vel oblongo-ovatae ca. 0.40-0.45 mm longae et ad 0.2 mm latae breviter obtusae vel irregulariter truncatae abaxialiter glabrae; basi stylorum leniter nodulosi; scapi stylorum in partibus superioribus sparse hispidulis ca. 2 mm longi. Achaenia submatura ca. 2.0-2.5 mm longa inter costas longe setifera inferne glabra; setae pappi persistentes ca. 25-27 plerumque ca. 5 mm longae apice tenuiores margine inferne perdense late scabrido-fimbriatae extus vix vel sparse scabridulae, squamae exteriores lineares ca. 1 mm longae et ad 0.18 mm latae margine perdense late scabrido-fimbriatae extus sparse scabridulae vel sublaeves. Grana pollinis in diametro ca. 40-42 μ m irregulariter areolata et spinulosa (*Lychnophora*-Type).

TYPE: BRASIL: Para: Maraba, Serra dos Carajas, _____ para o n.l. Campo, arredores de aeroporto. Arbusto de 60 cm, flor rosa. 2/4/1977. *M.G.Silva & R.Bahia 3013* (Holotype, INPA; isotypes, MG, NY, US).

Vernonia paraensis has a general habit that is most closely approached by various members of the *V. cognata* group, especially *V. lithospermifolia* Hieron. However, the new species has a pollen type and receptacle pubescence that would indicate closer relation to the *V. polyanthes* and *V. scorpioides* groups. The corolla pubescence of the new species is most like the latter group. Nevertheless, the narrow, glabrous, subcarnose leaves and the small cymose inflorescences are thoroughly distinctive, and the closest relationship of the species remains uncertain.

VERNONIA SILVAE H. Robinson, sp. nov.

Plantae suffruticosae ad 6 dm altae multo ramosae. Caules brunnescentes subteretes leniter striati in partibus parce costati antrorse appresse pilosi. Folia alterna, petiolis indistinctis; laminae lineari-ellipticae plerumque 2.5-4.0 cm longae et 0.2-0.3 cm latae base sensim perangustatae margine integrae apice anguste acutae supra et subtus appresse pilosulae et dense glandulopunctatae, nervis secundariis 5 aut 6 obscuris brevibus valde ascendentibus. Inflorescentiae serialiter cymosae in nodis vix deflectis in internodis bracteis et squamis involucri appresse pilosae, bracteis foliiformibus. Capitula in nodis solitaria axillaria vel plerumque supra-axillaria campanulata ca. 9 mm alta et 6-8 mm lata; squamae involucri ca. 40 subimbricatae 5-6-seriatae exteriores lineari-lanceolatae 3-6 mm longae et 0.5-1.0 mm latae apice longe aristatae extus in medio unicostatae superne glandulopunctatae margine anguste scariosae et minute spiculiferae interiores oblongo-lanceolatae 7-8 mm longae apice acuminatae breviter aristatae margine late scariosae inferne integrae superne minute puberulo-fimbriatae. Flores ca. 20 in capitulo. Corollae lavandulae 7.5-8.0 mm longae, tubis perangustatis superne vix infundibularibus 4 mm longis extus sparce breviter stipitato-glanduliferis, faucibus infundibularibus ca. 0.8 mm longis extus sparce pilosis, lobis linearibus ca. 2.5-3.0 mm longis et 0.45 mm latis extus glandulopunctatis et pilosis superne densioribus; thecae antherarum ca. 2 mm longae; appendices antherarum anguste ovatae ca. 0.6 mm longae et base 0.18 mm latae apice acutae extus glabrae; basi stylorum leniter noduliferi; scapi stylorum in partibus hispidulis superioribus ca. 1 mm longi. Achaenia submatura ca. 1.2 mm longa dense longe setifera obscure sparce minute glandulifera; setae pappi subpersistentes ca. 22 plerumque 3.7-4.2 mm longae apice vix vel non latiores margine et extus dense scabridulae, squamae exteriores oblongo-lineares ca. 0.7-1.0 mm longae et 0.10-0.14 mm latae extus distincte scabridulae. Grana pollinis in diametro ca. 40 μ m valde lophorata, cristis altis minute spinuliferis, spinis majoribus nullis (*V. cognata*-Type).

TYPE: BRASIL: Para: Rio Araguaia, Ilha em frente ao Rio Piranha, vegetação de várzea, solo de areia branca. Planta de 60 cm de altura, capítulos lilás. 10/VIII/1978. *N.T.Silvae* 4780 (Holotype, INPA, isotypes NY, US).

Vernonia silvae has heads with a differentiated outer series of spreading slender bracts as in *V. remotiflora* Rich. and some members of the *V. geminata* group. The new species differs from both of the latter groups, however, by having *V. cognata*-Type pollen. The narrow leaves, the form of the involucre, and the fine appressed pubescence distinguish the species from others having similar pollen. The new species is clearly not a member of either the *V. cognata* or the *V. salzmannii*-*V. lilacina*-*V. cotton-easter* groups which contain most of the species with *V. cognata*-Type pollen, and it may prove to be more closely related to *V. remotiflora* which has pollen of the *V. argyrophylla*-Type.



Vernonia almedae H. Robinson, Holotype, Herbário Universidade de Brasília. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Vernonia cleocalderonae H. Robinson, Isotype, United States National Herbarium.



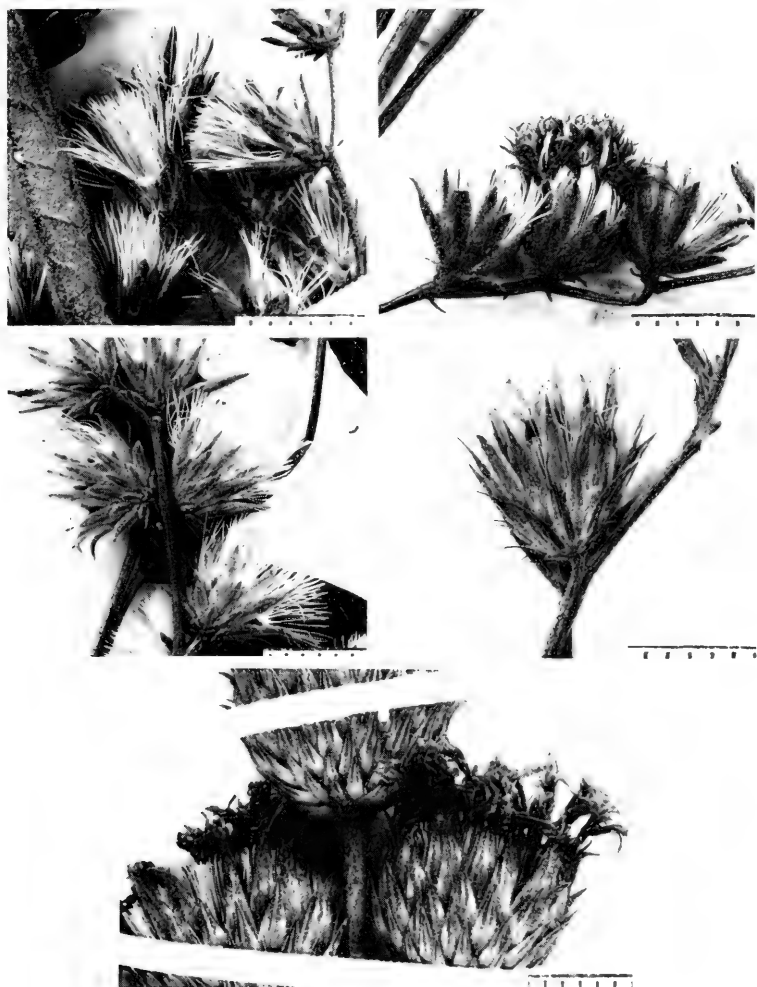
Vernonia eitenii H. Robinson, Holotype, Herbário Universidade de Brasília.



Vernonia paraensis H. Robinson, Isotype, United States National Herbarium.



Vernonia silvae H. Robinson, Isotype, United States
National Herbarium.



Enlargements of heads of *Vernonia*. Top. *V. almedae*, *V. paraensis*. Middle. *V. cleocalderonae*, *V. silvae*. Bottom. *V. eitenii*.

STUDIES IN THE HELIANTHEAE (ASTERACEAE). XXIV.

A NEW SUBTRIBE, LYCAPSINAE

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

The following new subtribe is validated at this time for inclusion in the review of the tribe Heliantheae.

LYCAPSINAE H. Robinson, subtribus nov.

Plantae herbaceae perennes; folia dense spiraliter inserta distincte petiolata; laminae profunde paucè lobatae aliquantum carnosae. Inflorescentiae axillares anguste pedunculatae. Capitula paleacea. Flores radii fertiles feminei; corollae late limbatae adaxialiter papillosae. Flores disci hermaphroditi; corollae 4-lobatae in lobis intus papillosae; thecae antherarum pallidae, cellulis endothecialibus quadratis in parietibus transversalibus 2-3-noduliferis; appendices antherarum ovatae laeves; lineae stigmataeae duplices; canales resiniferi indistincti. Achaenia subfusiformia ca. 4-costata non striata; carpodia obturaculiformia. Pappus nullus. Grana pollinis in diametro ca. 27 μ m.

Type genus: *Lycapsus* Philippi

ADDITIONAL NOTES ON THE GENUS *SPHENODESME*. I

Harold N. Moldenke

SPHENODESME Jack

Additional & emended bibliography: J. C. Willis, Dict. Flow. Pl., ed. 5, 617. 1925; Fletcher, Kew Bull. Misc. Inf. 1938: 208--209, 401, 405--407, 409, & 441. 1938; Hill & Salisb., Ind. Kew. Suppl. 10: 218. 1947; J. C. Willis, Dict. Flow. Pl., ed. 6, 617. 1951; Angely, Cat. Estat. 8: [2]. 1956; Rouleau, Guide Ind. Kew. 177 & 348. 1970; Mold., Phytologia 45: 469, 510, & 511 (1980) and 46: 43--60. 1980.

SPHENODESME INVOLUCRATA (Presl) B. L. Robinson

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Illustrations: Parkinson, Forest Fl. Andam. Isls. pl. 2, fig. 38. 1923; Junell, Symb. Bot. Upsal. 1 (4): fig. 209 a & b. 1934; Munir, Gard. Bull. Singapore 21: [335], pl. 2. 1966.

A large scandent shrub or climbing vine, to 16 m. long, branched from the base; stems obtusely tetragonal, to 1 cm. in diameter, glabrous; bark grayish or brownish-gray, corky-lamellate or warty; branches with prominent lenticels, shortly flavescenscent-tomentellous or glabrescent; branchlets obtusely tetragonal, mostly rusty-pubescent or stellate-tomentose with flavescenscent hairs, rarely glabrescent; principal internodes 1--11 cm. long; petioles rather slender, short, 5--13 mm. long, rusty-pubescent or strigillose, glabrescent in age; leaf-blades thin-coriaceous, dark-green above, pale-green beneath, ovate to ovate-oblong or ovate-lanceolate to lanceolate or oblong, 9--15 cm. long, 2.7--6 cm. wide, apically short-acuminate or acute and often apiculate, marginally entire, basally obtuse or rounded (rarely acute), pubescent or stellate-tomentose on both surfaces when young with flavescenscent-rufescenscent hairs, brownish-pubescent only beneath or glabrescent on both surfaces in age; midrib slender, flat above, prominent beneath; secondaries very slender, 4--7 per side, arcuate-ascending, obscure above, prominulous beneath, rather indistinctly joined in many loops near the margins; inflorescence paniculate, usually large, 6--30 cm. long, in the upper leaf-axils, stellate-tomentose with flavescenscent hairs throughout, the branches filiform, elongate, to 3 cm. long, wide-spreading, subflaccid; involucreal bracts 6, white, turning purplish-red, varying from oblong or obovate to spatulate-lanceolate or spatulate, conspicuously venose, slightly unequal, 2--4.5 cm. long, 5--18 mm. wide, apically obtuse or subacute to emarginate, basally long-attenuate, floccose with flavescenscent-rufescenscent hairs; flower-buds green; flowers rather small, sessile, 7 per head, slightly odorous; calyx cyathiform, 2.5--10 mm. long, to 5 mm. wide, externally varying from rusty- or rufous- to tawny-tomentose, interior surface sericeous, the limb equally 5-toothed, the teeth triangular, apically acute; corolla pale-green to white or cream-colored, finally pink or deep-red, infundibular, the throat pubescent, the limb exserted, the lobes 5, obovate, apically blunt or truncate-obtuse; stamens very short, inserted in the corolla-throat; ovary resinous-punctate; stigma bifid; fruit green,

pseudo-capsular, globular, about 6 mm. in diameter, glabrous, enclosed in the fruiting-calyx.

This species is found naturally from India, Bangladesh, and the Andaman and Nicobar Islands, through Burma and Thailand, to Indochina, Malaya, and Borneo, north to Hainan and Taiwan. It is sometimes cultivated.

Recent collectors describe the species in the field as a scandent shrub, 2 1/2 feet tall, a woody climber, a "vine twining on trees", or even as a "tree" (*Shimizu & al. T.7676*); the bark smooth and green, the outer bark slash brittle, soft, the inner bark 1/4 in. thick, the cambium and sapwood yellow, subtending bracts 6, and fruit greenish. They have found it growing on flatlands and hillsides, in thickets, on roadside banks, in rocky places and open sandy forests, and in light woods, as well as on rocky ground in sunny places on limestone hills, at 30--1000 m. altitude, and have found it in flower from May to September and in December, in fruit in July and August. Phengkhilai says that it is "common on trees in evergreen forests" in Thailand, where Suvarnakosas reports it also "common in dry deciduous forests", but Phloenchit found it "not common in evergreen jungles". It is employed locally for medicine in Thailand and vernacular names recorded for it are "akar kulizat", "kanwè", "ka-nway", and "yan duk".

The "flowers" [corollas?] are described as having been "white" on *Clemens & Clemens 4143*, "greenish" on *Phloenchit 479* and *Suvarnakosas 1321*, "greenish-yellow" on *Kodoh & Abar SAN.82000*, and "pink, deep-red, and white" on *Chun & Tso 44669*. The Clemenses speak of its "beautiful masses of white flowers".

Kurz (1870) asserts that the species is "Common throughout the [Andaman] islands, especially along the eastern coasts". In his 1877 work he says that it is "Frequent in mixed forests [of Burma], from Pegu and Martaban down to Tenasserim; occasionally entering the drier hill forests up to 3,000 ft. elevation," flowering there in December and January and fruiting in April. Hsiao (1978) gives its natural distribution as "India, Malaya, and southern China" and saw no material of it from Taiwan.

Gamble (1902) describes the species as "A large deciduous climbing shrub of the Khasia Hills, Eastern Bengal, Burma and the Andaman Islands". Kanjilal & Das (1939) report that in Assam it flowers, as in Burma, in December and January, but fruits in February and March, occurring in the Northeastern Tract, Khasi Hills, Naga Hills, and Cachar. He misspells Schauer's surname as "Schaucer". Prain (1903) refers to the species as "A large climber" in the Chittagong region of Bangladesh. Clarke (1885) cites unnumbered collections of Wallich and of Hooker & Thomson from Khasia, of Keenan from Cachar, Wallich from Chittagong, Griffith from Moulmein, and Kurz from South Andaman island, as well as *Helper 6010* from Tenasserim. Dop (1936) cites only unnumbered Clemens and Poilane collections from Annam [Vietnam], giving the overall distribution as "Inde, Chine, Haïnan, Malaisie, Formose". Fletcher (1938) cites only *Kerr 9812 & 20030* and *Winit 1586* from Thailand.

Erdtman (1966) has examined the pollen of *Hainan Exped. 44281*

from China and describes the grains as 3-colpate (longicolpate), subprolate, about 22 x 19 μ , the sexime slightly thinner than the nexine (the latter thicker at the poles than at the equator), very finely reticulate.

The *Congea paniculata* Wall., often included in the synonymy here, actually belongs in that of *S. involucrata* var. *paniculata* (C. B. Clarke) Munir.

It is of interest to note that Fletcher (1938), for his so-called *S. odorata*, cites Kerr 11815 (the type collection) and Winit 1264 from Thailand. Munir (1966) regards *S. involucrata* var. *pubescens* Mold. as identical to the typical form of *S. involucrata* (Presl) B. L. Robinson. He cites the following collections: INDIA: Khasi States: *Hooker f. & Thomson s.n.*; *Mc Lelland s.n.*; *Silva s.n.* [Wallich 1736]; *Simon s.n.* Madras: *Perrottet 101 & 160*. Manipur: *Bullock 811 & 868*. ANDAMAN ISLANDS: Long: *Ram 3640*. South: *Heining s.n.*; *King's Collector s.n.*; *Parkinson 16396*; *Prain s.n.* NICOBAR ISLANDS: *Kamphovener 3121*; *King's Collector s.n.* BURMA: *Ba-Pe 10529*; *Beddome 6526 & 6528*; *Chin 6044*; *Falconer 496*; *Helper 42 & 54*; *Kau 273*; *Kurz 6525 & 6527*; *Lace 2736, 2796, & 6072*; *Maung 12931*; *Meebold 14054*; *Parkinson 11283*; *Rogers 308*; *Wallich 1737*. THAILAND: *Garrett 1210*; *Hansen 6629*; *Kerr 1185, 9812, & 20030*; *Phengkhilai 574*; *Suvarnakoses 1321*; *Winit 1264 & 1586*. VIETNAM: Annam: *Clemens 4143*; *Poilane 4984*. CHINESE COASTAL ISLANDS: Hainan: *Chun & Tso 44281 & 44669*; *A. Henry s.n.*; *How 73729 & 73733*; *Lau 3113 & 28317*; *Liang 64243*; *McClure 8331*; *Tang 483*; *Wang 36301*. GREATER SUNDA ISLANDS: Sabah: *Pereira 43691*. CULTIVATED: India: *Herb. Hort. Bot. Calcut. s.n.* Java: *Herb. Hort. Bogor. XF.26 & XII.B. 206*.

It is perhaps worth noting here that the dates given by some recent authors for bibliographic references cited appear to be inaccurate -- for instance, the page in Wallich's catalogue with no. 1736 and no. 1737 was issued in 1829 [not "1828"], pages 193 to 576 of Walpers' Repertorium, volume 4, were issued in 1847 [not "1848"], and Miquel's Fl. Ind. Bat., volume 2, was issued in 1856 [not "1858"].

Material of *Sphenodesme involucrata* has been misidentified and distributed in some herbaria as *S. pentandra* Jack, *S. wallichiana* Schau., *Symphorema glabrum* Hassk., *Symphorema* sp., and *Petraevitex* sp. On the other hand, the *Rock 688 & 921*, *Squires 855*, and *Wang 36301*, distributed as *Sphenodesme involucrata*, are *S. ferruginea* (W. Griff.) Briq.

Citations: INDIA: Assam: *Hooker f. & Thomson s.n.* [Mont. Khasia, 3000 ped.] (M, Mu--1060, Pd, S, W--2497363); *Silva s.n.* [Wallich 1736] (Pd). West Bengal: *Helper 42* (Bz--23065, S, W--1668986), 121 (Mu). State undetermined: *Herb. Harvey s.n.* [Ind. orient. 1847] (Du--166526). BANGLADESH: *Griffith 6010* (Mu--1061, S). BURMA: Central Burma: *Kurz 1038* (Mu--1782). Tenasserim: *Falconer 496* (Bz--23066, Pd); *Helper 6010* (T). ANDAMAN ISLANDS: South: *Heinig s.n.* [Jany. 1897] (Br), *s.n.* [27-10-1897] (Bz--23068, Pd); *King's Collector s.n.* [25 Feb. 1893]. THAILAND: *Max-*

well 71-58 (Ac); Phengkhlai 574 (Cp); Phloenchit 479 [Herb. Roy. Forest Dept. 9045] (Z); Shimizu, Fukuoka, & Nalampoon T.7676 (Ac), 7711 (Ac); Suvarnakoses 1321 [Roy. Forest Dept. 17979] (Sm). VIETNAM: Annam: Clemens & Clemens 4143 (Ca--340471, E--955412, Gg-156309, Ln--70080, Mi, N, Ut--99317, W--1427865). MALAYA: Singapore: "Wallich 1836" (Pd). CHINESE COASTAL ISLANDS: Hainan: Chun & Tso 44281 (Bi, Go, N, S), 44669 (B, N, W--1675420); How 73729 (Bz--23069), 73733 (Bi, S); Katsumada 21982 (Ca--322574); Lau 3113 (Bi, S); Liang 36301 (N), 64243 (Go, N); McClure 1841 [Herb. Canton Chr. Coll. 8331 & 253.7203] (Bi, Gg--127993, N, Ph); Wang 36301 (Mu). GREATER SUNDA ISLANDS: Sabah: Bakar SAN.17325 (Z); Kodoh & Aban SAN.82030 (Sn--49241). CULTIVATED: India: Herb. Hort. Bot. Calcutt. s.n. (Bz--23067, Pd). Java: Bakhuizen s.n. [Herb. Hort. Bot. Bogor. XV.F.25] (Bz--23057); Herb. Bot. Bogor. 18412 (Bz--23058), X.F.26 (Bz--23059, Bz--23060, Bz--25626, Bz--25627), XII.B.206 (Bz--23486, Bz--23487), XII.B.206 en a (Bz--23061, Bz--23062, Bz--23063, Bz--25699), XV.F.33 (Bz--26349, Bz--26350, Bz--26565, Bz, N).

SPHENODESME INVOLUCRATA var. *PANICULATA* (C. B. Clarke) Munir, Gard. Bull. Singapore 21: 338. 1966.

Synonymy: *Congea paniculata* Wall., Numer. List [47], nos. 1739 & 1739B, hyponym. 1829. *Symphorema paniculata* Heyne ex D. Dietr., Syn. Pl. 3: 619, in syn. 1843. *Symphorema paniculatum* Heyne ex Schau. in A. DC., Prodr. 11: 623, in syn. 1847. *Sphenodesma paniculata* C. B. Clarke in Hook. f., Fl. Brit. India 4: 600. 1885. *Sphenodesme paniculata* C. B. Clarke apud Jacks. & Hook. f., Ind. Kew., imp. 1, 2: 961. 1895.

Bibliography: Wall., Numer. List [47], nos. 1739 & 1739B. 1829; D. Dietr., Syn. Pl. 3: 619. 1843; Schau. in A. DC., Prodr. 11: 621 & 623. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 110. 1858; C. B. Clarke in Hook. f., Fl. Brit. India 4: 600. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595 (1893) and imp. 1, 2: 961. 1895; Brandis, Indian Trees, imp. 1, 513. 1906; Gamble, Fl. Presid. Madras 2 (6): 1104--1105. 1924; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55 & 99. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595 (1946) and imp. 2, 2: 961. 1946; Razi, Journ. Mysore Univ. 7 (4): 64. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 128 & 174. 1949; Mold., Résumé 164 & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595 (1960) and imp. 3, 2: 961. 1960; Nair & Rehman, Bull. Bot. Gard. Lucknow 76: 22. 1962; Munir, Gard. Bull. Singapore 21: 319, 321, 325, 328, 337--340, 373, & 375--378, map 2, pl. 3. 1966; Mold., Résumé Suppl. 15: 9, 19, & 23. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Brandis, Indian Trees, imp. 2, 513. 1971; Mold., Fifth Summ. 1: 278, 284, & 468 (1971) and 2: 624 & 843. 1971; Mold., Phytologia 23: 424 (1972) and 45: 54 & 407. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: [339], pl. 3. 1966.

Razi (1946) refers to this plant as a chamaephyte in Raunkiaer's classification of life forms, and records it from Mysore, India.

Nair & Rehman (1962) describe its pollen as "3-zonicolporate, subprolate (34 x 26 mu; range 32--39 x 25--28 mu). Colpi ends acute, tenuimarginate. Apocolpium diameter 3.5 mu. Exine 1.4 mu thick. Ectine almost as thick as endine, granulate."

Jackson (1893) asserts that the *Congea paniculata* of Wallich (1829) is in part this taxon and in part *Symphorema involucreatum* Roxb. Although several authors ascribe the name, *Symphorema paniculata* Heyne, to Wallich's Numerical List (1829), the binomial does not actually occur there and seems to have first appeared in Dietrich's work (1843). In Wallich's work it is merely stated that Heyne considered the collection to represent an undescribed species of *Symphorema*.

Clarke (1885) cites only the Wallich type collection and an unnumbered Rottler collection from Kurg and a Johnstone collection from Cochin. He comments that the taxon is "Very near *S. microstylis* except as to the obtuse corolla-lobes". Munir (1966) cites Bourdillon 126, Heyne s.n. [Wallich 1739], Johnstone s.n., Rottler s.n., Wallich 1739B, and Wight 910 from India and Meebold 14407 from Tenasserim, Burma.

SPHENODESME INVOLUCRATA var. *PUBESCENS* Mold., Dansk Bot. Arkiv 23: 86. 1963.

Synonymy: *Congea tomentosa* var. *pubescens* Hocking, Excerpt. Bot. A.8: 227, sphalm. 1965.

Bibliography: Mold., Dansk Bot. Arkiv. 23: 86. 1963; Hansen, Excerpt. Bot. A.7: 607. 1964; Hocking, Excerpt. Bot. A.8: 227. 1965; Munir, Gard. Bull. Singapore 21: 325 & 334. 1966; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 298 (1971) and 2: 843. 1971; Mold., Phytologia 45: 54. 1980.

This variety differs from the typical form of the species in its decidedly pubescent entire lower leaf-surfaces.

Thus far, the variety is known only from the type collection which Munir (1966) reduces to synonymy under the typical form of the species. It has been found only in evergreen forests, at about 100 m. altitude, flowering in January.

Citations: THAILAND: Sorensen, Larsen, & Hansen 6629 (Z--type).

SPHENODESME MEKONGENSIS Dop, Bull. Soc. Bot. France 61: 318--319. [as *Sphenodesma*]. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921

Synonymy: *Sphenodesma mekongensis* Dop, Bull. Soc. Bot. France 61: 318. 1915.

Bibliography: Dop, Bull. Soc. Bot. France 61: 318--319. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921; Dop in Lecomte, Fl. Gén. Indo-chine 4: 899 & 901. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 407, 441, & 442. 1938; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 574. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59, 60, & 99 (1942) and ed. 2, 137, 138, & 174. 1949; Mold., Résumé 176, 178, & 439. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 248. 1960; Munir, Gard. Bull. Singapore 21: 316, 318, 319, 325, 330, 354, [355], 373, 376, & 378, pl. 10. 1966; Munir, Biol.

Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 298 & 302 (1971) and 2: 844. 1971; Mold., Phytologia 46: 47. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: [355], pl. 10. 1966.

This species is based on an unnumbered Thorel collection from Xang-Kay, by the Mekong River, in Laos, deposited in the Paris herbarium. Dop (1915) says that "Cette espèce, insuffisamment connue, se rapproche par le forme du calice du *Sph. Jackiana* Schauer; cependant la pubescence du calice, les cymes 3--5-flores, l'en éloignent nettement." Collectors have encountered the plant in moist and evergreen forests, at 100--900 m. altitude.

Dop (1936) cites unnumbered collections by Kerr, Poilane, and Thorel from Laos. Fletcher (1938) cites Kerr 8825 and Winit 1961 from Thailand. Munir (1966) cites Thorel s.n. from Laos and Kerr 8825 & 20720 and Winit 1961 from Thailand. Maxwell reports finding it in flower in March.

The original Dop description of this species is often cited as published in "1914", but does not appear actually to have been published until 1915.

Citations: LAOS: Maxwell 72-71 (Ac, Z).

SPHENODESME MOLLIS Craib, Kew Bull. Misc. Inf. 1912: 154 [as *Sphenodesma*]. 1912; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921.

Synonymy: *Sphenodesme annamitica* Dop, Bull. Soc. Hist. Nat. Toulouse 64: 573--574. 1932. *Sphenodesme smitinandi* Mold., Phytologia 8: 393. 1962. *Sphenodesma smitinandi* [Mold.] ex Hocking, Excerpt. Bot. A.6: 455. 1963. *Sphenodesme pierrei* var. *thailandica* Mold., Phytologia 14: 399. 1967. *Sphenodesme smitinandii* Mold. apud G. Taylor, Ind. Kew. Suppl. 14: 127. 1970.

Bibliography: Craib, Kew Bull. Misc. Inf. 1912: [Contrib. Fl. Siam Dicot.] 154 & 167. 1912; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 336. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921; Dop, Bull. Soc. Hist. Nat. Toulouse 64: 573--574. 1932; Dop in Lecomte, Fl. Gén. Indo-chine 4: 899, 904, & 907--908. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 441 & 443. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 265. 1938; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59, 60, & 99 (1942) and ed. 2, 137, 173, & 174. 1949; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14359. 1958; Mold., Résumé 176, 178, & 439. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 248. 1960; Mold., Phytologia 8: 393. 1962; Mold., Résumé Suppl. 4: 8 (1962) and 5: 6. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Mold., Biol. Abstr. 42: 1517. 1963; Mold., Résumé Suppl. 12: 12. 1965; Munir, Gard. Bull. Singapore 21: 318, 319, 325, 329, 345--347, 373, & 375--378, pl. 6. 1966; Hocking, Excerpt. Bot. A.12: 425. 1967; Mold., Phytologia 14: 399. 1967; Mold., Résumé Suppl. 15: 10, 15, 22, & 23. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Biol. Abstr. 49: 2290. 1968; Mold. in Menninger, Flow. Vines 330. 1970; G. Taylor, Ind. Kew. Suppl. 14: 127. 1970; Mold., Fifth Summ. 1: 290, 298, 302, & 368 (1971) and 2: 624 & 844. 1971; Mold., Phytologia 46: 47 & 54. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: [346], pl. 6. 1966.

This species is based on *Kerr 2075-K* from Sriracha, Thailand, deposited in the Edinburgh herbarium. Munir (1966) notes that it "is allied to *S. griffithiana* from which it is easily distinguished by its leaves being densely pubescent underneath, [the] calyx sericeous without and [the] corolla densely villous in the throat". *Sphenodesme smitinandi* Mold. is based on *Smitinand 4852*, also from Thailand, deposited in my personal herbarium. *Sphenodesme annamitica* Dop is based on *Poilane 5342 & 9637* from Annam, Vietnam.

Recent collectors describe *S. mollis* as a woody climber, climbing shrub, or vine, to 15 feet long, with "yellowish-brown involucre". The "flowers" [corollas?] are said to have been "ashy-gray" on *Sangkhachand 555*, "white" on *Hansen & al. 1191*, "yellowish" on *Bunkhrang 22*, and "bluish" on *Smitinand 4852*; the "fruit and bracts pale-green" on

Collectors have encountered the species in forests on granite hills, in scrub-jungle on riverbanks, in open sandy forests, deciduous forests on lateritic soil, and dry deciduous forests. It is reported to be "common" along roadsides and in evergreen forests and "very common" in dry scrub on limestone hills. *Bunkhrang*, however, found it "not common" in dry evergreen forests on hillsides and *Smitinand* reports it "scattered" in old clearings. Collectors have encountered it at near sealevel to 570 m. altitude, flowering in February, March, August, September, November, and December, fruiting from October to December.

Sphenodesme pierrei var. *thailandica* Mold. is based on *Larsen 8326* from in scrub at Tha Kilen, Thailand, collected on November 19, 1961, and deposited in my personal herbarium. The collector notes that it is "very common in scrub all over the district". It has also been encountered "in scrub vegetation on sandy soil near the sea", at 25 m. altitude, flowering in August.

Fletcher (1938) cites from Thailand: *Kerr 2075, 7971, 9117, 9688, 10966, 11035, 11063, & 13436, Marcan 552, 1590, 2227, & 2739, and Put 457 & 1107. Kerr 11035* represents cultivated material.

Dop (1936) cites only an unnumbered *Kerr* collection from Thailand. Munir (1966) cites the following collections: THAILAND: *Burkill 1260; Kerr 2075, 9117, 9688, 10107, 10966, 11063, & 13436; Larsen 8048, 8326, 8462, & 9051; Marcan 552, 1590, 2227, & 2739; Nielsen 644; Put 457 & 1107; Sangkhachand 555; Smitinand 4852. VIETNAM: Annam: Poilane 5342 & 9637. CHINA: Yunnan: A. Henry 13225. CULTIVATED: Thailand: Kerr 11035.*

Material of *S. mollis* has been misidentified and distributed in some herbaria as *S. ferruginea* Briq., *S. microstylis* Clarke, *S. pentandra* Jack, *S. robinsonii* Dop, *S. unguiculata* Schau, and *Symphorema* sp. On the other hand, the *Poilane 11598* and *Squires 855*, distributed as *S. mollis*, actually represent *S. ferruginea* (W. Griff.) Briq.

Citations: THAILAND: *Beusekom & Charoenpol 1901 (Ac); Bunkh-*

rang 22 [Herb. Roy. Forest Dept. 26221] (Z); Hansen, *Seidenfaden*, & *Smitinand* 11191 (Ac, Cp); K. Larsen 8048 (S), 8326 (Z), 8462 (Cp), 9051 (Cp); Larsen, *Smitinand*, & *Warncke* 1502(Ac), 1604 (Ac); Maxwell 72-98 (Ac), 73-700 (Ac); Rock 664 (W--1171415); Sangkha-chand 555 [Herb. Roy. Forest Dept. 16178] (Z); *Smitinand* 4852 (Z). CHINA: Yunnan: A. Henry 13225 (N, N).

SPHENODESME PENTANDRA Jack, Malay. Misc., imp. 1, 1: 19. 1820.

Synonymy: *Sphenoderme pentandra* Jack ex Wall., Numer. List [47], no. 1735, in syn. 1829. *Congea jackiana* Wall., Numer. List [47], no. 1735. 1829. *Sphaenodesma jackiana* (Wall.) Schau. in A. DC., Prodr. 11: 622. 1847. *Sphaenodesma pentandra* Jack apud Schau. in A. DC., Prodr. 11: 622, in syn. 1847. *Sphenodesme acuminata* Wight, Icon. Pl. Ind. Orient. 2: pl. 1476. 1849. *Sphenodesme pentandra* Wight, Icon. Pl. Ind. Orient. 4 (3): 14, in syn. 1849. *Sphenodesma pentandra* W. Griff., Notul. Pl. Asiat. 4: 181-182. 1854. *Sphaenodesme pentandra* Jack ex Miq., Fl. Ned. Ind. 2: 909, in syn. 1856; Corner & Watanabe, Illust. Guide Trop. Pl. 766. 1969. *Sphaenodesma jackiana* Schau. ex Miq., Fl. Ned. Ind. 2: 909. 1856. *Sphaenodesma acuminata* Wight ex Miq., Fl. Ned. Ind. 2: 910, in syn. 1856. *Symphorema jackianum* Kurz, Forest Fl. Brit. Burma 2: 255. 1877. *Sphenodesma acuminata* Wight apud C. B. Clarke in Hook. f., Fl. Brit. India 4: 602, in syn. 1885. *Sphenodesma jackiana* Schau. apud C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 602, in syn. 1885; J. Schmidt, Bot. Tidsskr. 26: 174. 1904. *Sphenodesma pentandra* Jack ex Kuntze, Rev. Gen. Pl. 2: 509. 1891. *Sphenodesma pentandra* Jacq. ex Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 180. 1895. *Sphenodesme pentandra* var. *calycina* Pierre ex Dop, Bull. Soc. Bot. France 61: 318. 1915. *Sphenodesme jackiana* Schau. ex H. J. Lam, Verbenac. Malay. Arch. 335, in syn. 1919. *Sphenodesme jackiana* DC. ex Mold., Résumé Suppl. 3: 35, in syn. 1962. *Gongea jackiana* Wall. apud Munir, Gard. Bull. Singapore 21: 357, in syn. 1966. *Sphenodesme pentandra* Griff. ex Mold., Résumé Suppl. 15: 23, in syn. 1967.

Bibliography: Roxb., Hort. Beng. 64. 1814; Jack, Malay. Misc., imp. 1, (1): 19--20 & opp. A. 1820; Wall., Numer. List [47], no. 1735. 1829; Hook., Bot. Misc. 1: 285--286. 1830; Roxb., Fl. Ind., ed. 2, imp. 1 [Carey], 3: 54--55. 1832; D. Dietr., Syn. Pl. 3: 619. 1843; Jack, Calcut. Journ. Nat. Hist. 4 (13): 43--44. 1843; Walp., Repert. Bot. Syst. 4: 117. 1845; Schau. in A. DC., Prodr. 11: 622 & 624. 1847; Wight, Icon. Pl. Ind. Orient. 4 (3): 14, pl. 1476. 1849; W. Griff., Notul. Pl. Asiat. 4: 181--182 & 762. 1854; Miq., Fl. Ned. Ind. 2: 909--910. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 110 & 443. 1858; Roxb., Fl. Ind., ed. 2, imp. 2 [Clarke], 476. 1874; Kurz, Forest Fl. Brit. Burma 2: 255. 1877; Gamble, Man. Indian Timb., ed. 1, 282 & 519. 1881; C. B. Clarke in Hook. f., Fl. Brit. India 4: 602. 1885; Forbes & Hemsl., Fl. Sin. 2 [Journ. Linn. Soc. Lond. Bot. 26]: 265. 1890; Kuntze, Rev. Gen. Pl. 2: 509. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595 (1893) and imp. 1, 2: 961 & 1021. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895; C. B. Clarke in J. Schmidt,

Bot. Tidsskr. 26 [Fl. Koh. Chang 8]: 174--175. 1904; F. N. Will., Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Brandis, Indian Trees, imp. 1, 513--514. 1906; King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 860 & 863--864. 1908; Craib, Kew Bull. Misc. Inf. 1911: 445. 1911; Craib, Contrib. Fl. Siam Dicot. 167. 1912; Dop, Bull. Soc. Bot. France 61: 318--320. 1915; H. J. Lam, Verbenac. Malay. Arch. 332, 335--336, & 368. 1919; Ridl., Journ. Fed. Malay States Mus. 10: 111. 1920; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: x. 1921; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 99 & xvi. 1921; E. D. Merr., Bibl. Enum. Born. Pl. 518. 1921; Ridl., Fl. Malay Penins. 2: 638--640, fig. 130. 1923; Wangerin, Justs Bot. Jahresber. 51 (1): 553. 1923; Gamble, Fl. Presid. Madras 6: 1104 & 1105. 1924; Stapf, Ind. Lond. 6: 181. 1931; Dop in Lecomte, Fl. Gén. Indo-chine 4: 899 & 904--906. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 405 & 441--443. 1938; Kanjilal & Das in De, Fl. Assam 496. 1939; Mold., Suppl. List Comm. Names [1], 2, 5, 13, & 16. 1940; Mold., Suppl. List Inv. Names 7. 1941; Worsdell, Ind. Lond. Suppl. 2: 404. 1941; Mold., Alph. List Inv. Names 22, 41, & 43. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 57--61, 65, & 99. 1942; Mold., Phytologia 2: 112. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595 (1946) and imp. 2, 2: 961 & 1021. 1946; H. N. & A. L. Mold., Pl. Life 2: 65. 1946; Mold., Alph. List Inv. Names Suppl. 1: 20. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 125, 128, 129, 132, 135, 137--140, 146, & 174. 1949; M. R. Henderson, Malay. Nat. Journ. 6: 381, fig. 352. 1950; Anon., Kew Bull. Gen. Index 274. 1959; Mold., Résumé 159, 164, 166, 171, 174, 176, 178, 180, 194, 222, 275, 343, 345, 350, 427, & 439. 1959; Mold., Résumé Suppl. 1: 12. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595 (1960) and imp. 3, 2: 961 & 1021. 1960; Deb, Bull. Bot. Surv. India 3: 315. 1961; Munir, Gard. Bull. Singapore 21: 315, 318, 319, 323, 325, 327, 330, 337, 354, 357--363, 373, & 375--378, map 4, pl. 12. 1966; Mold., Résumé Suppl. 3: 17, 20, & 75 (1962), 4: 8 (1962), and 15: 8--12, 15, 19, 22, & 23. 1962; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Résumé Suppl. 16: 13 & 27. 1968; Corner & Watanabe, Illustr. Guide Trop. Pl. 766. 1969; Mold. in Menninger, Flow. Vines 328. 1970; Brandis, Indian Trees, imp. 2, 513--514. 1971; M. A. Martin, Introd. Ethnobot. Camb. 142. 1971; Roxb., Fl. Ind., ed. 2, imp. 3, 476. 1971; Mold., Phytologia 23: 423 & 435 (1972), 26: 365 (1973), and 28: 446 & 451. 1974; Gibbs, Chemotax. Flow. Pl. 3: 1753 & 1754. 1974; M. R. Henderson, Malay. Wild Fls. Dicot., imp. 2, 381, fig. 352. 1974; Jack, Descr. Malay. Pl., imp. 2, 1: 19--20. 1977; Jack., Malay. Misc., imp. 2, 1 (1): 19--20 & opp. A. 1977; B. C. Stone, Henders. Malay. Wild Fls. Append. 16. 1977; Mold., Phytologia 36: 38 (1977), 42: 300 (1979), 45: 54, 214, 347, & 403 (1980), and 46: 47--49 & 57. 1980.

Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1476. 1849; Ridl., Fl. Malay Penins. 2: 639, fig. 130. 1923; M. R. Henderson, Malay Nat. Journ. 6: 381, fig. 352. 1950; Munir, Gard. Bull. Singapore 21: [358], pl. 12. 1966; Corner & Watanabe, Illust.

Guide Trop. Pl. 766. 1969; M. R. Henderson, Malay Wild Fls. Dicot. 381, fig. 352. 1974.

A scandent shrub, 3--10 m. tall, or woody liana, often high-climbing, sometimes erect; stems to 3 cm. in diameter at breast height; branchlets slender, obtusely subtetragonal, lenticellate, sometimes shallowly sulcate, varying from sparsely hairy or pubescent to pubescent-tomentose when young (denser near the nodes), soon glabrescent; twigs grayish-brown; nodes not annulate; principal internodes 5--11 cm. long; leaves decussate-opposite; petioles slender, about 5 mm. long, varying from densely pubescent or sparsely hairy to glabrate; leaf-blades chartaceous, rather uniformly green on both surfaces, brunnescent in drying, the uppermost ones elliptic or oblong-elliptic, the lower lanceolate-oblong, 6.5--17 cm. long, 3.3--9 cm. wide, apically acute or short-acuminate, marginally mostly entire, basally rounded or somewhat rounded, glabrous and very shiny above, glabrous or subglabrous beneath or often somewhat hairy on the midrib and barbellate in the axils of some of the secondaries beneath; midrib slender, flat or subimpressed above, sharply prominent beneath; secondaries very slender, 4 or 5 per side, obscure or indiscernible above, sharply prominent beneath, ascending, arcuate or rather straight; veinlet reticulation rather abundant, open, obscure or indiscernible above, the tertiaries often prominulous beneath; inflorescence paniculate, often large, terminal and in the axils of the upper leaves, its sympodia slender, 1.6--2.8 cm. long, sparsely pilose, the stipitate cymes capitate, 7-flowered, borne in racemiform fashion on rachids to 25 cm. long; peduncles slender, tetragonal, exactly similar to the adjacent branchlets and rachis, densely puberulent or glabrous; inflorescence-branches filiform, 1.2--2.5 cm. long, scattered-pilosulous or glabrous; involucre greenish or light-greenish, its bracts 6, in two groups of 3 each, oblong or narrowly oblong to lanceolate, apically obtuse or very slightly subacute to subacuminate, entire, basally abruptly acute, venose, glabrous and very shiny on both surfaces or very sparsely and obscurely scattered-pilose beneath, often more pubescent basally, the larger terminal one of each set of 3 up to 1.7 or 2 cm. long and 4--7 mm. wide (in fruit to 2.5--3 cm. long and 7--9 mm. wide), the smaller lateral ones 1.5--1.7 cm. long and 3--4 mm. wide (in fruit 2.2--2.5 cm. long and 5--7 mm. wide); flowers 7, sessile, fragrant; calyx herbaceous, light-greenish, tubular-campanulate, sparsely pubescent or subglabrate to glabrous, 10-ribbed, 4--6 mm. long, glandular, its tube about 5 mm. long, 5 mm. wide at the apex, its rim 5-toothed, the teeth broadly triangular or ovate, erect, often ciliate-margined, apically acute or acuminate, often with an additional, variable and irregular, horn-like, recurved or reflexed, linear or lanceolate, accessory tooth in each sinus and about as long as the ordinary teeth; corolla usually blue or bluish to purple, externally glabrous, densely villous in the throat, about 5 mm. long, the limb 5-lobed, the lobes oblong, the lower half often covered by the long hairs of the throat; stamens 5, inserted in

the throat of the corolla-tube; filaments rather stout, included; anthers exserted; style about 6 mm. long when mature; stigma shortly bifid; ovary densely villous, glandular; fruiting-calyx 7--8 mm. long; fruit green, drupaceous, 1-seeded.

The species occurs naturally from India, Bangladesh, and Burma, through Indochina, Thailand, and Malaya, to Borneo and north to southern China and Hainan island. It is based on an unnumbered Jack collection from Pulo Pinang [Penang], Malaya, deposited in the Edinburgh herbarium. The type collection is noteworthy in having rather densely short-pubescent or puberulent branchlets, petioles, peduncles, and rachids, scattered-pilosulous inflorescence-branches, and the involucre bracts sparsely scattered-pilose beneath. *Poilane s.n.* and *Pierre 1095* on the other hand, are completely glabrous throughout. It is possible that two taxa are involved here, and Pierre notes for his *S. pentandra* var. *calycina*: "ramulis puberulis nec tomentosus fere omnino glabris", implying, again, that the typical form of the species is the tomentose one, with the sparsely puberulent to glabrate form as distinct. This may be what will finally be considered the better disposition of these specimens.

The name, *Sphenodesme jackiana* Schau., has been reduced to synonymy under *S. pentandra* Jack by many authors, including Clarke (1885), King & Gamble (1905), and Lam (1919), while Wight, in his *Icon. Pl. Ind. Orient.* (1849), used the binomial in error for *S. pentandra* in Volume 4, part 3, page 14, and, also in error, for his own *S. griffithiana* on plate 1477 [as "*S. jackiana* Wight"] of the same work. On plate 1476 he calls the plant *S. acuminata* Wight.

Lam (1919) reduced *Congea azurea* Wall. to synonymy under *S. pentandra*, but I regard it better placed as a form of *C. tomentosa* Roxb.

Recent collectors have found *S. pentandra* growing in dry land along rivers and smaller streams, in sandy thickets, in coastal scrub and scrub-jungle, in the deep shade of mixed woods on limestone hills, at the edges of forests, in evergreen forests and in open disturbed areas in such forests, from near sealevel to 1330 m. altitude, in flower from January to April and in June, in fruit from January to March and in May.

The corollas are said to have been "blue" on *Chun 1090*, *Hansen & Smitinand 12157*, and *Lei 439*, "purple" on *Sangkhachand 581*, "green" on *Liang 61598*, and "greenish" on *Pholenchit 1543* and *Smitinand 2200*. Corner & Watanabe (1969) describe them as "bluish".

Sangkhachand reports the species "common" in evergreen forests in Thailand, while Smitinand found it "scattered" there and Pholenchit found it "scattered in deciduous forests". Henderson (1974) reports it "common in the lowlands on the edges of forests and on riverbanks" in Malaya. On Hainan Island Lei found it "fairly common on dry level land in sandy soil of thickets and village commons", but Lau reports it "rare in clay soil on dry gentle slopes". Griffith (1854) records it from Malacca, Kuntze (1891) from Cochinchina, Deb (1961) from Manipur [India], and Martin (1971) from Cambodia,

Laos, Vietnam, Thailand, Malaysia, India, and China.

Griffith (1854) describes the species as "An elegant shrub hair of faux stupose and fragrance very pleasant, upper 2 laciniae of corol. are outermost, 5th innermost, that of calyx open. Each branch of the style has its own canal. It is more Verbenaceous in its pistillum than in any other part. Considerable time elapses between the expansion of all the flowers, the central one is most precocious."

Jack (1843) comments that "There is always one leaflet less in the involucre than the number of flowers in the fascicle, the central flower having no fulcrum. This species was sent to Dr. Roxburgh from Sylhet [Bangladesh] and by him called *Roscoea* that name, however, being pre-occupied, a new one has become necessary. I have therefore given it that of *Sphenodesme* (fasciculus alatus)."

Clarke (1885) placed *Congea azurea* Wall., *C. pentandra* Wall., and *Roscoea pentandra* Roxb. in the synonymy of what he called "*P. [sic] pentandra* Jack" -- the last 2 of these names, however, belong to *Sphenodesme pentandra* var. *wallichiana* (Schau.) Munir and the first is a form of *Congea tomentosa* Roxb. *Sphenodesme wallichiana* Schau. has also been placed in the synonymy of typical *S. pentandra* Jack, but actually belongs in that of var. *wallichiana*. Dietrich (1843) accepted *Congea jackiana* Wall. as the name for what we now call *Sphenodesme pentandra*, with *Roscoea pentandra* Roxb. and *Sphenodesme pentandra* Jack as synonyms.

Clarke (1885) comments that "In unexpanded flowers the calyx-limb appears obtusely 5-toothed; after flowering the teeth are sometimes triangular abbreviated, sometimes lanceolate-subulate, and 5 linear teeth are developed in the sinuses. Wallich declares (in Hook. Bot. Misc. 1: 286) that Jack mistook his Malacca plant for Roxburgh's Silhet one, and accordingly Wight and Schauer call the Malayan plant *S. Jackiana* or *acuminata*; but the calyx-teeth are so little longer, and other points so exactly accord, that the species have to be united."

Dop (1915) maintains *S. jackiana* Schau. as distinct from *S. pentandra* Jack and separates them as follows:

1. Calice à 10 dents même avant l'épanouissement de la fleur --
Sphenodesme jackiana;
- 1a. Calice jeune presque tronqué, à 5 dents courtes, dents accessoires courtes n'apparaissant qu'après la floraison --
Sphenodesme pentandra.

As synonyms of *S. jackiana* Schau. he lists *S. pentandra* "Jack, Mal. Misc., I, p. 19 et in Hook. Bot. Misc., VI, p. 285 (pro parte); C.-B. Clarke in Hook. f. Fl. Br. Ind., IV, p. 602 (pro parte)," *Congea jackiana* Wall, and *S. pentandra* var. *calycina* Pierre. As synonyms of *S. pentandra* Jack he lists "Jack, loc. cit. (pro parte); Wight, Ic., pl. 1475; C.-B. Clarke in Hook. f., Fl. Br. Ind., IV, p. 602 (pro parte)," *S. wallichiana* Wight, *S. acuminata* Wight, *Symphorema jackianum* Kurz, *Roscoea pentandra* Roxb., *Congea pentandra* Wall., and *C. azurea* "Wall. (pro parte)".

Kurz (1877) asserts that *Sphenodesme pentandra* is found naturally in the "Jungles of South Tenasserim", Burma.

Vernacular and common names reported for *Sphenodesme pentandra* are "akar kĕtu-kĕtu", "akar lintang ruas", "akar subang", "akar tanak rimau", "bunga kĕrtas", "car-stud climber", "lentang ruas", "paper flower", "pe re lan san", "sang samul", "shan pak tang", and "vɔ:r khsuħ".

Gibbs (1974) reports cytogenesis absent from the leaves, syringin absent from the stems, and the results of an HCl/methanol test negative.

It should be noted that a number of citations in the bibliography of this species (above) are misdated by some recent authors; e.g., Wallich (1829) as "1828", Wight (1850) as "1849", Miquel (1856) as "1858", Briquet (1895) as "1897", King & Gamble (1908) as "1909", and Walpers (1845) as "1848".-- of the last-named work page 1--192 of volume 4 were issued in 1845, pages 193--576 in 1847. For purposes of establishing priority in nomenclature, and for other reasons, it is important that the correct publication dates of cited works are ascertained.

Clarke (1885) cites no collections for this species, noting merely that it is "frequent" from Assam and the Khasia Mountains to Malacca. King & Gamble (1908) cite Curtis 2522 from Langkawi, Ridley 8320 from Kedah, Curtis 269 and Wallich 1735/1 from Penang, Ridley 9391 from Wellesley, King's Collector [Kunstler] 3100, 4532, 7691, and 10642, and Scortechini 519 from Perak, Cuming 2388, Derry 40, Griffith s.n., and Maingay 1195 from Malacca, Ridley 2160 from Pahang, and Ridley 11122 from Johore, as well as Curtis s.n. from "Junkseylon or Tongka".

Fletcher (1938) cites Annandale s.n., Collins 1388, 1416, & 1969, Curtiss 2522 & s.n., Haniff 15478, Haniff & Nur 7070, KamLa s.n. [Herb. Kerr 16535], Kerr 11603, 11816, 12583, 13825, 14070, 15396, & 16376, Kloss 6707 & 7038, Marcan 1590, Ridley 14937, Ridley & Curtis 8320, and Vanpruk 848, all from Thailand. Kerr 11035 came from cultivated material.

Dop (1936) cites the following collections from Indochina: Annam: Poilane s.n. Cambodia: Chevalier s.n., Geoffray s.n., Harmand s.n., Pierre s.n., and Poilane s.n. Cochinchina: Germain s.n. Harmand s.n., Lefèvre s.n., Pierre s.n., and Poilane s.n. Laos: Harmand s.n. and Poilane s.n., and from Thailand: Kerr s.n. Schmidt s.n.

Lam (1919) cites Griffith 6009 and Maingay 1159 from Malaya, Forbes s.n. and Hemsley s.n. from Hainan, Williams s.n. from Thailand, Gamble s.n. and King s.n. from Burma.

Munir (1966) cites the following: THAILAND: Annandale s.n.; Collector undetermined 607; Collins 495, 632, 1388, 1416, & 1969; Curtis 2522 & s.n.; Feilberg s.n.; Keith 655; Kerr 5849, 9832, 11603, 11816, 12583, 13828, 14070, 15396, 16376, & 16535; Marcan 1204; Pierce s.n.; Sangkhachand 581; Schmidt 863; Seidenfaden 2129, 2182, & 2670; Smitinand 2200. KOTT NAM KA ISLAND: Vaughan 306. MALAYA: Johore: Ridley 11122; Sinclair 40690. Kedah: Curtis 2522; Dolman 21493; Fox s.n.; Haniff 15478; Haniff & Nur 7070; Ridley & Curtis 8320. Malacca: Alvins 2138; Derry 40; Griffith s.n.; Holmberg 825; Maguire 1195. Negri Sembilan: Alvins 3304. Pahang: Kalong 20325. [to be continued]

BOOK REVIEWS

Alma L. Moldenke

"THE IDENTIFICATION OF FLOWERING PLANT FAMILIES Including a Key . to Those Native and Cultivated in North Temperate Regions" by P. H. Davis & J. Cullen, Second Edition, x & 113 pp., 8 b/w fig. & 2 tab. Cambridge University Press, Cambridge CB2 1RP & New York, N. Y. 10022. 1979. \$3.95 paperback & \$14.95 hard cover.

This new edition, "revised with the students of botany in mind" has been finely honed from the first really good edition. It now follows Stebbins, Cronquist and Takhtajan rather than Benson for the more modern taxonomic system. The format of the readily workable keys is more efficient. The illustrated section on the Usage of Terms is even more helpful especially for such terms as 'superior and inferior' and 'hypo-, peri- and epigynous' in reference to floral parts. Glossary, literature references and index are all additionally helpful guides to the 272 plant families treated here. "A natural classification of plants and their correct identification (for which the families are an important step on the road) remain essential for the progress of biology on a broad front." A fine little book with much more than a little between its covers.

"FUNDAMENTAL TISSUE GEOMETRY FOR BIOLOGISTS" by K. J. Dormer, vi & 149 pp., illus. by 10 b/w plates, 48 fig. & 9 tab. Cambridge University Press, Cambridge CB2 1RP & New York, N. Y. 10022. 1980. \$32.50.

"The object of this book is to reduce to calculation the geometrical aspects of the growth and structure of living tissues... The existing 'theoretical' literature of cell shape appears as little more than a historical curiosity, of all the various ideas concerning tissue geometry which have circulated during the last half-century not one has been of a distinctly biological character, or originated by a biological author," salvaging only Kelvin. This will be 'news' to the many graduate students of the 30's, 40's, 50's and 60's who took courses with or participated in the cell shape research studies of Matzke of Columbia University's botany department. Dormer's logically and clearly explained "book is based on the axiom that there must exist a single universal set of structural parameters, such that the geometry of any living tissue, past, present or future, can be specified by giving those parameters the appropriate set of numerical values." He deals with contiguous cells, division of a surface and of space, the faces of cells, the geometry of differ-

entiation and structural analysis of complex tissues. Even though his criticisms of other works and workers is often astute, they are needlessly unkind in manner.

"ANNUAL REVIEW OF PHYTOPATHOLOGY" Volume 14 edited by Kenneth F. Baker with George A. Zentmyer & Ellis B. Cowling, vii & 511 pp., 16 fig. & 15 tab. as b/w illus. Annual Reviews, Inc., Palo Alto, California 94306. 1976. \$17.00 in the U.S.A. & \$17.50 foreign.

The prefatory chapter of four essays is the work of J. E. Vanderplank, the astute "grower of spuds" and much more from Pretoria, South Africa, who states that "My task has been to look at published data, assess them, and see how they fit together, often[coming] to conclusions different from the original author's!" The other 21 papers, carefully prepared and well worth the reading or study, consider such topics as: the history of plant pathology in Latin America, virus and virus-like diseases of cereals, control of phytopathogenic bacteria by bacteriophages and bacteriocins, acquired resistance to fungicides, fire and flame for plant disease control, and fossil fungi. Harlan has presented an outstanding paper on "Diseases As a Factor in Plant Evolution" wherein he follows Vanderplank's terminology re an endemic disease which is (1) always present, (2) has a high degree of horizontal resistance, (3) shows a low level of pathogen virulence and (4) "host and pathogen accommodate to each other in a dynamic balance not unlike a climax flora".

"ANNUAL REVIEW OF PHYTOPATHOLOGY" Volume 15 edited by Kenneth F. Baker with George A. Zentmyer & Ellis B. Cowling, vii & 499 pp., 20 b/w fig., 19 tab., 1 map, 4 photo. Annual Reviews Inc., Palo Alto, California 94306. 1977. \$17.00 in U.S.A. & \$17.50 foreign.

In this series the prefatory chapter so often offers a personal welcome to further worthwhile reading and/or study in following papers (in this case 22). Gregory, long with the famous Rothamsted Experimental Station, explains how his asthmatic condition triggered his interest in "Spores in Air" and his work on sooty bark disease of sycamore, farmers' lung, barley asthma, etc. Altman and Campbell on herbicides repeat an important quote: "Pests, diseases and weeds currently destroy on an average 25% of the crops in Europe and more than 40% in Africa and Asia..... [where] over 50% of the rice crops are lost annually...[and where] if losses.....could be reduced to the European level, yields would be increased by more than 15% without increasing cropland area." There is an interesting report from a visit to the People's Republic of China where many common diseases have been controlled by the use of rapid rotation sequences, heavy use of organic fertilizers, flooding of rice fields, selective disease-free plantings and breeding, strict quarantines, and careful roguing of diseased plants and weeds.

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1

CONTRIBUTION TO THE LICHEN FLORA OF URUGUAY XV.
ADDITIONAL RECORDS TO THE RIO URUGUAY LICHEN FLORA.

Héctor S. Osorio.

Departamento de Botánica, Museo Nacional de
Historia Natural. Montevideo URUGUAY.

The present paper is the second with reference to the lichen flora along the banks of Uruguay River in the Artigas and Salto Departments. Apart from the collection sites already mentioned in a former paper (Osorio 1978) materials collected from the following localities situated to the South of Salto Grande Dam are also included here:

"Arroyo San Antonio and Río Uruguay": marginal forests in the confluence of both streams, zone situated a few kms. to the North of Salto city.

"Salto Chico": locality on Uruguay River to the northernmost end of Salto city,

"Piedra Alta", "Monumento a H. Quiroga" and "La Caballada": all of them collection sites situated on the bank of Uruguay River in the urban area of Salto City.

Besides the materials collected by the author and preserved in his private herbarium (numbers between parenthesis), some specimens belonging to the Herbarium, Museo Nacional de Historia Natural, Montevideo (MVM) have been included.

Notwithstanding a small number of species have not been identified yet because they are little-known or critical groups. They will be the object of a third note including the general considerations on the lichen flora of the studied area.

Acarospora boliviana Magn.

Salto: Salto, Monumento a H. Quiroga, stones on the riverside (6672)
Anthracotheicum goniostomum Müll. Arg.

Artigas: Arroyo El Tigre and Río Uruguay, on shrubs (7279.a); Estancia El Tigre, trunk of Myrtaceae (7230).

Salto: Arroyo Itapeby and Río Uruguay, on Pouteria salicifolia (6756); Piroto, on shrubs (6739, 6743)

Bacidia alutacea (Kremp.) Zahlbr.

Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6696).

Buellia subisabellina Zahlbr.

Artigas: Arrocería Contí, on Peltophorum dubium (7434, 7436).

Calicium americanum R. Sant.

Salto: Salto Grande, Estancia Galvarini, on dry trunk of Melia azedarach (6715). Thanks are given to Dr. Leif Tibell who gently confirmed our identification.

Caloplaca cinnabarina (Ach.) Zahlbr.

Salto: Salto, Monumento a H. Quiroga, stones on the riverside (6673); Piedra Alta, stones on the riverside (6649).

- C. crocea (Kremp.) Half. & Poelt.
Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6667); Piro-
tto, on trees, vid. Hafellner (6738)
- C. erythrantha (Tuck.) Zahlbr.
Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6670).
- C. festiva (Fr.) Zw.
Salto: Salto, La Caballada, stones on a old wall (6645), Monumento
a H. Quiroga, on a old wall (6671); Piedra Alta, sandstone
on the riverside (6648).
- C. mülleri (Vain.) Zahlbr.
Salto: Salto Grande, Parador H. Quiroga, stones in a meadow (6696).
Candelaria concolor (Dicks.) Stein.
Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6668); Salto
Chico, on Melia azedarach (6659).
- C. fibrosa (Fr.) Müll. Arg.
Salto: Salto, Piedra Alta, on shrubs (6654).
Candelariella vitellina (Ehrh.) Müll. Arg.
Salto: Salto Grande, Parador H. Quiroga, on sandstone (6693). New
to Uruguay.
- Chiodecton quassiaecolum (Fée) Müll. Arg. var. plurisepta Räs.
Artigas: Estancia El Tigre, on trunk of Myrtaceae, with Arthonia sp.
(7232). Formerly known in Uruguay only from Montevideo
Department (Type locality, Räsänen 1942).
- Dermatocarpon corticolum Räs.
Artigas: Estancia El Tigre, en Erythrina crista-galli (7218), on
Ruprechtia salicifolia (7223).
Formerly known only from the type locality in the same
Department (Räsänen 1939).
- Diploschistes actinostomus (Pers.) Zahlbr.
Salto: Salto Grande, Parador H. Quiroga, stones in a meadow (6691,
6702).
- Dirinaria applanata (Fée) Awas.
Artigas: Arroyo El Tigre and Río Uruguay, on Ficus (7300); Estan-
cia El Tigre, on Melia azedarach (7216).
- Salto: Salto Grande, Estancia Galvarini, on Melia azedarach (6720);
Parador H. Quiroga, on trees (6713).
- D. confluens (Fr.) Awas.
Artigas: Arrocería Conti, on Pirus communis (7417).
Glyphis cicatricosa (Ach.) Vain. f. confluens (Zenk.) Zahlbr.
Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6664); Piro-
tto, on trees (6742).
- Graphis lineola Ach.
Artigas: Arrocería Conti, on Peltophorum dubium (7435)
G. l. var. marginata (Mey & Flot.) Zahlbr.
Salto: Arroyo Itapeby and Río Uruguay, on Pouteria salicifolia
(6758).
- Haematomma puniceum (Ach.) Mass. var. subinnatum Malme.
Salto: Salto Grande, Estancia Galvarini, on Melia azedarach (6725)
Heterodermia albicans (Pers.) Swinsc. & Krog.
Artigas: Arroyo El Tigre and Río Uruguay, on Erythrina crista-galli
(7290); Estancia El Tigre, on Ficus (7194), on mossy trunk
(7236).

- Salto: Salto Grande, Parador H. Quiroga, on trunks (6710).
H. diademata (Tayl.) Awas.
- Artigas: Arroyo El Tigre and Río Uruguay, on Erythrina crista-galli (7284, 7289), growing on laciniae of Ramalina celastri on Acacia caven (7286); Estancia El Tigre, on Prosopis nandubay (7189), on mossy trunks (7235).
- Salto: Salto, La Caballada, on shrubs (6641), Piedra Alta, on shrubs (6652); Salto Grande, Parador H. Quiroga, on trunk (6707).
H. flabellata (Fée) Awas.
- Salto: Salto Grande, Parador H. Quiroga, on trees (6712).
Lecanora fusca Müll. Arg.
- Salto: Salto, Piedra Alta, stones on the riverside (6650).
Lecidea montevidensis Müll. Arg.
- Salto: Salto, La Caballada, stones on an old wall (6644), Monumento a H. Quiroga, stones on the riverside (6674); Salto Grande, Parador H. Quiroga, stones in a meadow (6687).
L. oreinodes (Korb). Web. & Hertel
- Artigas: Estancia El Tigre, stone in a meadow (7174 a & b).
- Salto: Salto, Piedra Alta, stones on the riverside (6646); Salto Grande, Parador H. Quiroga, stones in a meadow (6692).
Leptogium austroamericanum (Malme) Dodge.
- Artigas: Arrocerá, Conti, on Ficus (7399); Arroyo El Tigre and Río Uruguay, on Erythrina cristagalli (7291); Estancia El Tigre, on Phytolacca dioica (7201).
- Salto: Piroto, on Erythrina crista-galli (6754).
L. cyanescens (Ach.) Körb.
- Artigas: Arroyo El Tigre and Río Uruguay, on trees (7277); Estancia El Tigre, on Ficus (7195).
L. marginellum (Sw.) S. Gray.
- Artigas: Estancia El Tigre, Arroyo Mandiyú, on Pouteria salicifolia Marchesi s.n. (MVM 17672). New to Uruguay.
L. tuckermani Dodge.
- Artigas: Estancia El Tigre, on mossy trunk (7226).
Ochrolechia pallescens (L.) Mass.
- Artigas: Arrocerá Conti, on Citrus aurantium (7414), on Pirus communis (7418).
- Salto: Piroto, on trees (6744).
Opegrapha bonplandi Fée var. *imitans* Redgr.
- Artigas: Arroyo El Tigre and Río Uruguay, on Peltophorum dubium (7265). New to Uruguay.
O. lichenoides Pers. var. *octomera* Redgr.
- Salto: Arroyo Itapeby and Río Uruguay, on Pouteria salicifolia (6757). New to Uruguay.
Parmelia borrerioides Nyl.
- Artigas: Estancia El Tigre, on mossy trunk (7234).
P. canaliculata Lynge
- Salto: Arroyo Itapeby and Río Uruguay, on shrubs (6763).
P. hypoleucites Nyl.
- Salto: Salto, Piedra Alta, on shrubs (6653).
P. microsticta Mull. Arg.

- Salto: Arroyo Itapeby and Río Uruguay, on shrubs (6764).
P. rudecta Ach.
- Artigas: Estancia El Tigre, on trunk of Myrtaceae (7329).
Parmelina consors (Nyl.) Hale
- Salto: Salto, Piedra Alta, on trees (6655).
Parmotrema austrosinense (Zahlbr.) Hale
- Salto: Salto, Piedra Alta, on shrubs (6656, 6657); Salto Grande, Estancia Galvarini, on *Melia azedarach* (6718).
P. cetratum (Ach.) Hale
- Salto; Salto, Piedra Alta, on shrubs (6658).
P. praesorediosum (Nyl.) Hale
- Artigas: Estancia El Tigre, on trees (7253).
P. subcaperatum (Kremp.) Hale
- Artigas: Arrocerá Conti, on wooden fence post (7402); Arroyo El Tigre and Río Uruguay, on *Ficus* (7301).
Peltula euploca (Ach.) Wetm.
- Salto: Salto Grande, Parador H. Quiroga, on basaltic stones in a meadow (6684).
Pertusaria megapotamica Magn.
- Artigas: Arrocerá Conti, on *Peltophorum dubium* (7431)
P. superans Müll. Arg.
- Artigas: Estancia El Tigre, on shrubs (7225).
Phaeographina arechavaletae Müll. Arg.
- Artigas: Arrocerá Conti, on *Pirus communis* (7419).
Physcia alba (Fée) Müll. Arg. var. *obsessa* (Mont.) Lyngé
- Artigas: Arrocerá Conti, on *Acacia farnesiana* (7447), on *Peltophorum dubium* (7440); Estancia El Tigre, on *Melia azedarach* (7206).
- Salto: Arroyo Itapeby and Río Uruguay, on shrubs (6765), Arroyo San Antonio and Río Uruguay, on shrubs (6663); Piroto, on *Erythrina crista-galli* (6752).
P. aipolia (Ehrh.) Hampe
- Artigas: Arroyo El Tigre and Río Uruguay, on *Erythrina crista-galli* (7292); Estancia El Tigre, on *Prosopis nandubay* (7190), on *Ficus* (7196, 7197), on *Parkinsonia aculeata* (7220), on mossy trunks (7228). New to Uruguay.
P. crispa Nyl.
- Salto: Salto Grande, Estancia Galvarini, on *Melia azedarach* (6716).
Physciopsis syncolla (Tuck.) Poelt
- Artigas: Río Uruguay, Isla Zapallo, on trees (7389).
- Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6666); Salto Chico, on *Melia azedarach* (6662); Salto Grande, Estancia Galvarini, on *Melia azedarach* (6723).
Porina subpungens Malme
- Artigas: Arroyo El Tigre and Río Uruguay, on *Scutia buxifolia* (7262) *Peltophorum dubium* (7264, 7276), on shrubs (7269); Estancia El Tigre, trunk of trees (7241); Río Uruguay, Isla Zapallo, on trees (7385). New to Uruguay.
Pseudoparmelia exornata (Zahlbr.) Hale
- Artigas: Arrocerá Conti, on *Citrus aurantium* (7411), on *Pirus communis* (7420). Both collections have been already published

erroneously identified as Pseudoparmelia rutidota (Osorio 1978).

Pyrenula brunnea Fée.

Artigas: Río Uruguay, Isla Zapallo, on trees (7390). New to Uruguay
P. commixta Malme.

Artigas: Arroyo El Tigre and Río Uruguay, on shrubs (7279.b), on
Myrtaceae (7275).

Pyxine cocoes (Sw.) Nyl.

Artigas: Estancia El Tigre, on Piptadenia rigida (7199), on Phyto-
lacca dioica (7200), on Melia azedarach (7207).

P. endoleuca (Müll. Arg.) Vain.

Artigas: Estancia El Tigre, on Parkinsonia aculeata (7221).

P. pringlei Imsh.

Artigas: Arrocería Conti, on wooden fence post (7405), Arroyo El Ti-
gre and Río Uruguay, on Ficus (7297); Estancia El Tigre,
on Prosopis nandubay (7177), on Piptadenia rigida (7198),
on Melia azedarach (7214), on Myrtaceae (7231).

Salto: Arroyo San Antonio and Río Uruguay, on shrubs (6665); Salto,
La Caballada, on Melia azedarach (6643); Salto Chico, on Me-
lia azedarach (6660); Salto Grande, Estancia Galvarini, on
Melia azedarach (6726); Piroto, on trees (6740).

P. subcinerea Stirt.

Artigas: Arroyo El Tigre and Río Uruguay, on Ficus (7296).

Salto: Piroto, on trees (6734).

Ramalina celsastris (Spreng.) Krog & Swinsc.

Artigas: Arrocería Conti, on Melia azedarach (7448), on Peltophorum
dubium (7432); Estancia El Tigre, on shrubs (7248).

Salto: Arroyo Itapeby and Río Uruguay, on shrubs (6755); Salto, Pie-
dra Alta, on shrubs (6651).

R. complanata (Sw.) Ach.

Artigas: Arrocería Conti, on Citrus aurantium (7409), on Pirus com-
munis (7425), on Peltophorum dubium (7433), on Melia aze-
darach (7449); Estancia El Tigre, on Prosopis nandubay
(7181, 7182), on Melia azedarach (7213), on shrubs (7256).

Salto: Arroyo Itapeby and Río Uruguay, on shrubs (6759); Piroto,
on Erythrina crista-galli (6732); Salto Grande, Estancia Gal-
varini, on Melia azedarach (6717).

R. prolifera Tayl.

Artigas: Estancia El Tigre, on Acacia farnesiana (7173).

Salto: Salto Grande, Parador H. Quiroga, on shrubs (6709).

Rinodina connectens Malme

Artigas: Arroyo El Tigre and Río Uruguay, on Scutia buxifolia (7266)

R. conspersa Müll. Arg.

Salto: Salto Grande, Parador H. Quiroga, stones in a meadow (6705).

R. intrusa (Kremp. ap. Nyl.) Malme

Artigas: Arrocería Conti, on Acacia farnesiana (7443).

R. megapotamica Malme

Artigas: Río Uruguay, Isla Zapallo, on tree (7391). New to Uruguay.

Sticta variabilis (Bory) Ach.

Artigas: Río Uruguay, Isla Zapallo, on tree trunk, Castiglioni s.n.
(MVM 17.909).

Strigula elegans (Fée) Müll. Arg.

Artigas: Arroyo El Tigre and Río Uruguay, leaves of Casearea (7273, 7274).

Xanthoparmelia congensis (Stizb.) Hale

Salto: Salto Grande, Parador H. Quiroga, on sandstone (6689, 6690)

SUMMARY

Seventy lichen species collected on the banks of the Uruguay River in the Artigas and Salto Departments are listed. The following species are added to the Uruguayan liche flora: Candelariella vite-llina, Leptogium marginellum, Opegrapha bonplandi var. imitans, O. lichenoides var. octomera, Physcia aipolia, Porina subpungens, Pyrenula brunnea and Rinodina megapotamica.

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- RÄSÄNEN, V. 1939. II Contribución a la flora liquenológica sudamericana. An Soc. Cient. Argentina 128: 133-147.
- . 1942. Beiträge zur Flechtenflora Südamerikas. II. Uruguaysche Flechten gesammelt von Dr. Phil. W. G. Herter. Mit Berücksichtigung einiger Funde aus Paraguay. Rev. Sudam. Bot. 7 (1): 12-16.

OXALIDACEAE EXTRA-SUDAMERICANAE II. OXALIS L. Sectio CORNICULATAE DC. (1)

Addenda et Corrigenda

Alicia Lourteig

Muséum National d'Histoire Naturelle, Paris.

- P. 65 Oxalis fontana: Add Depasse, Nat. Mos. 31: 125. 1978.
- P. 73 Japon, 5° line: Read Prov. Ugo, Yokote, Masuda-machi, leg. Yu-shun Kudo
- P. 87 Oxalis radicata: Add to synonymy O. corniculata L. var. radicata (A. Richard) Rot.-Mich., Webbia 32: 428 - 429, f. 2 B, C. 1978.
O. corniculata L. var. glabrocapsula Rot.-Mich., l.c. 429 - 430, f. 2 D, E. Type: Aethiopia, leg. Negri 185 FI.

As I pointed out in my paper l.c. (Advertencia p. 195) I had not seen the material corresponding to this new variety. Thanks to the kindness of the authorities of the Herbarium Florentinum I was able to examine all the collections named by G. Roti-Michelozzi.

All the specimens have suffered fungical attack, therefore the pubescence is modified (see Lourteig, l.c. p. 58-59). The holotype (Negri 185) does not bear fruits. The other two collections present capsules at different stages of development; in spite of the pubescence alteration, a few of the capsules show some hairs. The colour and the pubescence of the corolla are those of the species O. radicata A. Richard to which all the specimens belong.

Material examined.

Aethiopia.

Addis Abeba, Scioa, NO della città, 2450 m, leg. Negri 185 22 IV 1909 FI
Scioa, Pendio del colle di Nata Dalemi nella pianura de Olletta, 2650 m, leg. Negri 607 25 V 1909 FI. Vallone Cabanne, leg. Senni 554 9 V 1937 FI. Oletta, Bosco Marcos, 2800 m, leg. Giordano 1184 17 VII 1937 FI.

- P. 94 Indochina, 4° line: Read Poilane 3952
- P. 99 O. corniculata: Add Reid, Watsonia 10: 290 - 291. 1975.
- P. 100 Read: Estípulas (0,8 - 3 x 1 - 3 mm)
- P. 158 O. exilis. Add Reid, Watsonia 10: 290. 1975.
- P. 169 foot-note: delete last line and read: esta especie.

Additions to Bibliografía

- Depasse, S., Clé des Oxalis de la Flore Belge. Natura Mosana 31: 125 - 126. 1978.
- Hantz, J., Rodzaj Oxalis w Polsce. Fragm. Florist. Geobot. 25: 65- 112. 1979 (Not seen).
- (1) Phytologia 42: 57 - 198, f. 1 - 13. 1979.

- Reid, J. A., The distinction between Oxalis corniculata L. and O. exilis A. Cunn. Watsonia 10: 290 - 291. 1975.
- Roti Michelozzi Clavarino, G., Oxalidaceae in Adumbratio Florae Aethiopicae. 29. Webbia 32: 417 - 453, f. 1 - 7, maps 1 - 4. 1978
- Tseveler, N. W., Xanthoxalis in URSS. Novosti Syst. Rast. 14: 178 -182. 1977. (Not seen).

NOTAS SOBRE LA FLORA FANEROGAMICA
DE NUEVA GALICIA, I

Servando Carvajal Hernández
Departamento de Pulpa y Papel
Centro Regional de Enseñanza Técnica Industrial
Apartado 6-725
Guadalajara, Jalisco
MEXICO

A pesar de su reciente concepción, la idea de hacer una *Flora Novo-Galiciana*, propuesta por el Dr. Rogers McVaugh de la Universidad de Michigan, ha tenido grandes avances como lo demuestran los diversos trabajos publicados por el propio McVaugh y otros, desde 1961. Algunas partes de dicha flora se han concluido y en otras más se trabaja actualmente en colaboración con el Instituto de Botánica de la Universidad de Guadalajara.

Una intensa labor de recolección de plantas de diversos puntos del área conocida como Nueva Galicia (McVaugh, 1961), ha sido realizada por la Universidad de Michigan, el Instituto Politécnico Nacional y el Instituto de Biología de la Universidad Nacional Autónoma de México. Instituciones de Jalisco, como el Centro Regional de Enseñanza Técnica Industrial (CeRETI-Guadalajara) y el citado Instituto de Botánica se han unido a esa labor, lo que ha dado como resultado, el hallazgo de especies que no habían sido reportadas para esta región o de nuevas localidades para especies que habían sido encontradas en lugares exclusivos, o bien, mencionadas bajo otro nombre.

Los especímenes citados a continuación, se encuentran depositados en los Herbarios del Departamento de Pulpa y Papel (CREG) del citado Centro de Estudios y del Instituto de Botánica de la Universidad de Guadalajara (IBUG). Algunos duplicados han sido distribuidos a herbarios que se citan de acuerdo a las siglas registradas en el *Index Herbariorum* (Holmgren & Keuken, 1974).

GRAMINEAE

Arthraxon quartinianus (A. Rich.) Nash

Hitchcock (1936: 384) menciona a esta especie para Jamaica y las Islas Leeward como introducida del Viejo Mundo. Especímenes colectados por Reeder & Reeder y otros, observados en ENCB, confirman el reporte hecho por Beetle (1977: 227) para Chiapas.

MICHOACAN: Camino a Peribán, municipio de Los Reyes; alt. 1390-m; 14 Ene 1979; S. Carvajal H. 761, 765 (IBUG, MEXU, - ENCB, WIS, MICH, ARIZ). Maleza en campos de cultivo de *Fragaria*.

Hydrochloa caroliniensis Beauv.

Hitchcock (1951: 566) la menciona de Carolina del Norte a Florida y Louisiana. Recientemente Calderón (1974: 65) la reportó para el Valle de México. Ha sido localizada además, en los Estados de Jalisco, cerca de los límites con Aguascalientes - (McVaugh 17057, en 1958) y Aguascalientes (Rzedowski & McVaugh - 773, 823, en 1973).

JALISCO: Al Este de Lagos de Moreno; alt. 1890 m; 28 Jul 1978; R. Guzmán M. 1001 (IBUG, MEXU, ENCB, CHAPA, WIS, ARIZ, - MICH). Semiarrraigada en charcos permanentes y arroyos de curso lento, en campos de agostadero. Flores al ras del agua, escasas.

Entre Cuautla y Los Volcanes, sobre el camino a Talpa de Allende; 22 Ago 1979; R. Guzmán M. J.A. Pérez de la Rosa 31 (IBUG, NY, US). Planta acuática, abundante, arraigada en charcos permanentes poco profundos, a ambos lados de la carretera.

Valle de El Jacal, sobre la brecha a Ayutla; 22 Ago -- 1979; R. Guzmán M. & J.A. Pérez de la Rosa 66 (IBUG, NY, US, MICH). Planta acuática, abundante, de hojas flotantes en riachuelos de curso lento.

1 km antes del pueblo de Juanacatlán (103°41'W, 20° -- 01'N), municipio de Tapalpa; alt. 2400 m; 30 Sept 1979, flr-frt; S. Carvajal H. 2457 (CREG, IBUG, ENCB, MICH). - Aguas corrientes, permanentes, a la orilla de la carretera con *Ranunculus aquatilis*, *Nymphoides*, *Potamogeton*, *Pedicularis* y *Aster*.

Es interesante hacer notar que las poblaciones encontradas por Guzmán & Pérez de la Rosa 31, 66, presentan variaciones muy notables en comparación con las demás: como el tamaño de la espiga, longitud y anchura de las hojas y en general son plantas más robustas. Peter O' Connor (Carta a T. R. Soderstrom, 23 Oct 1979) menciona que tales diferencias pueden deberse a un caso de poliploidía (i.e. un aumento en el número de cromosomas) que hace que las plantas sean de mayor tamaño. Supone que estas variaciones pueden ser suficientes para reconocer una nueva variedad. Sin embargo, considera que es necesario estudiar más estas poblaciones.

Ichnanthus pallens (Swartz) Munro

Hitchcock (1936: 299) la reporta de las grandes Antillas a Trinidad. Beetle (1977: 358) la menciona para los Estados de San Luis Potosí, Puebla, Veracruz, Oaxaca, Chiapas, Tabasco y Quintana Roo.

JALISCO: Llano de Los Puercos, entre Casimiro Castillo y el -- Rancho Corral de Piedra; alt. 300 m; 29 Ene 1977; R. - Guzmán M. 635, 786 (IBUG, CREG, ENCB, ARIZ); L.M.V. de Puga 9889 (IBUG, ENCB, CHAPA). A la orilla de campos -- cultivados de *Saccharum*, en el bosque mesófilo de montaña.

Lithachne pauciflora (Swartz) Beauv.

Hitchcock (1936: 370) la cita de la República Dominicana, Puerto Rico, Islas Vírgenes e Islas Leeward. Algunos especímenes procedentes de Argentina y Honduras fueron observados en ENCB. Beetle (1977: 362) la reporta de San Luis Potosí, Veracruz y Chiapas.

JALISCO: Al Este de Casimiro Castillo; alt. 500 m; 14 Dic 1977; R. Guzmán M. 788 (IBUG, ENCB, ARIZ, MICH). En bosque mesófilo de montaña.

Paspalum urvillei Steud.

Hitchcock (1951: 615) menciona que esta especie ha sido introducida a los Estados Unidos de Norteamérica, procedente de América del Sur. No está reportada esta especie para México. Su presencia en la región que se cita a continuación, puede deberse al hecho de que las partes vegetativas que se utilizan para la siembra de la fresa, son importadas del sur de los Estados -

Unidos de Norteamérica.

MICHOACAN: 7 km al Norte de Los Reyes, en el Potrero La Isla. municipio de Los Reyes; alt. 1380 m; 19 Ago 1979, fl-frt; S. Carvajal H. 2381 (CREG, IBUG, ENCB, MICH). En los canales de riego, en campos cultivados con *Fragaria*. Con *Polygonum hydropiperoides*, *Cephalanthus salicifolius*, *Paspalum humboldtianum* y *Oenothera rosea*.

PIPERACEAE

Peperomia campylotrapa Hill

Esta especie fue citada por Rzedowski & McVaugh (1966) como *Peperomia umbilicata* Ruiz et Pavón. Sin embargo, Calderón (1969) en su estudio del género *Peperomia* en el Valle de México, aclara que el nombre de *P. umbilicata*, corresponde a la especie descrita por H.B.K. (non Ruiz et Pavón) del Perú y que la especie que se distribuye en México difiere en la sudamericana principalmente en la disposición de sus partes subterráneas. Calderón (1979) menciona que su distribución total parece restringirse a la Altiplanicie Mexicana. De los ejemplares depositados en CREG e IBUG, tomamos los siguientes datos:

JALISCO: Al Norte de Río Blanco, en el Cerro del Diente, municipio de Zapopan; alt. 1600-1750 m; 21 Jul 1977; S. Carvajal H. 138 (CREG). En las paredes rocosas del cerro, con *Pitcairnia* y *Notholaena*.

4 km al Norte de Tapalpa, por la brecha a Chiquilistlán (en Las Piedrotas), municipio de Tapalpa; 21 Ago - 1976, alt. 2000-2100 m; L.M.V. de Puga 8866 (IBUG). Zarcatal en un claro del bosque de pino y encino.

Ladera de exposición Norte del Cerro de Tequila; alt. 1350-1700 m; 8 Jul 1978; S. Carvajal H. 2653 (CREG, ENCB). Bosque de pino y encino.

RANUNCULACEAE

Ranunculus alismaefolius Geyer

Mason (1957: 511) la menciona del Estado de California,

en los condados de Humboldt y Mendocino y del Norte de Columbia Británica.

JALISCO: 1 km antes del Pueblo de Juanacatlán, municipio de - Tapalpa (103°41'W, 20°01'N); alt. 2400 m; 27 Oct 1979; S. Carvajal H. 2485 (CREG, ENCB, MICH). A la orilla de la carretera con *Ranunculus aquatilis*, *Pedicularis mexicana*, *Prunella vulgaris*, *Aster exilis* y *Mimulus glabratus*.

CRUCIFERAE

Rapistrum rugosum (L.) All.

Esta especie, nativa del Sur de Europa, se ha encontrado como maleza en otras partes del mundo. En los Estados Unidos de Norteamérica, se ha colectado en Texas, Pennsylvania, - Washington y otros Estados. Esta reportada de Australia (Rollins, com. pers.). Cabrera (1953) la cita de la Ciudad de Buenos Aires, Argentina y sus alrededores. No está reportado este género para México.

JALISCO: Avenida de Los Maestros y Calle Belem, Colonia Alcalde de Barranquitas, municipio de Guadalajara; alt. 1550 m; 13 Mar 1978, flr-frt; S. Carvajal H. 938 (CREG, - - IBUG, ENCB, GA, MICH). A la orilla de la banquetta con *Tithonia tubaeformis*, *Parthenium hysterophorus*, *Cynodon dactylon*, *Sida* y *Bidens*.

Un ejemplar colectado recientemente y observado en - - ENCB, parece corresponder a la misma especie:

DISTRITO FEDERAL: Lomas de Las Aguilas, delegación del Villa-Alvaro Obregón; 14 Oct 1979; alt. 2400 m; A. Victoria-H. 79 81 (ENCB, CREG). Barranca a un lado de la Avenida de las Aguilas.

Parece ser que esta planta es de hábitos urbanos.

EUPHORBIACEAE

Acalypha monostachya Cav.

McVaugh (1961) dice: "It is widespread in high arid regions from Oaxaca and Puebla through eastern and northern Mexico to - - - southeastern Chihuahua and southern and western Texas. It has not been found in the Jalisco region". La localidad citada a continuación se considera la primera para Jalisco.

JALISCO: Parcela de Darillito, 10 km al Oeste de Rancho Nuevo - - (102°33'W, 21°20'N), municipio de Teocaltiche; alt. 1700 m; 3 Jun 1979; S. Carvajal H. 2035 (CREG, MICH). Con *Juniperus monosperma* var. *gracilis*, *Acacia schaffnerii*, *A. pennatula*, *A. farnesiana*, *Ipomoea stans*, *Haplopappus* y *Dalea*.

UMBELLIFERAE

Donnellsmithia juncea (Humb. & Bonpl.) Math. & Const.

Donnellsmithia peucedanoides (H.B.K.) Math. & Const.

Mathias y Constance (1941a) propusieron, basados en el nombre de *Cnidium peucedanoides* H.B.K., el de *Donnellsmithia peucedanoides*, que fue utilizado por varios autores, entre ellos Rzedowski y McVaugh (1966). A raíz de las revisiones hechas para preparar las Umbelíferas de *North American Flora*, Mathias & Constance (1973) encontraron que el nombre de *Peucedanum junceum* Humb. & Bonpl. es más antiguo que el de *Cn. peucedanoides*. De hecho, ambas son la misma especie, pues el material utilizado para su descripción procede de la misma colección (Mathias & Constance, *op.cit.*). Con esa base los citados autores proponen la nueva combinación: *Donnellsmithia juncea* (Humb. & Bonpl.) Math. & Const.

Eryngium bonplandii Delar.

Esta especie ha sido colectada en los Estados de México, -- Morelos, Hidalgo y Distrito Federal, según datos de los ejemplares observados en ENCB. McVaugh (com. pers.) considera muy escasa su distribución en Jalisco y Michoacán.

JALISCO: 3 km de Juanacatlán por la brecha a Atemajac de Bri-zuela (103°40'W, 20°04'N), municipio de Tapalpa; alt.-2500 m; 27 Oct 1979; S. Carvajal H. 2516 (CREG). Bos--que de pino y matorral de *Quercus crassipes* con *Senecio*, *Halenia*, *Salvia*, *Pteridium*, *Astranthium* y *Calea*.

SCROPHULARIACEAE

Pedicularis mexicana Zuccar.

McVaugh & Mellichamp (1975: 60) mencionan que esta especie ha sido colectada en Durango, Michoacán, Hidalgo, Puebla, Tlaxcala y el Estado de México. McVaugh (com. pers.) considera que la localidad que se cita a continuación, es la primera en Jalisco en donde se colecta.

JALISCO: 1 km antes del pueblo de Juanacatlán, (103°41'W, 20°-01'N) municipio de Tapalpa; alt. 2400 m; 27 Oct 1979; -S. Carvajal H. 2480 (CREG, IBUG, ENCB, MEXU, MICH). - Aguas corrientes, permanentes, a la orilla de la carre--tera, con *Ranunculus*, *Potamogeton*, *Hydrochloa*, *Prune--lla* y *Mimulus*.

COMPOSITAE

Jaegeria sterilis McVaugh

Al hacer su descripción, McVaugh (1972) manifiesta des--conocer otra localidad para esta especie. El ejemplar citado, fue colectado dentro del mismo complejo montañoso, aproximada--mente 30 km de la localidad tipo.

JALISCO: Camino a la Barranca del Carbonero, municipio de Ve--nustiano Carranza; alt. 1720 m; 6 Dic 1978; S. Martí--nez E. 567 (CREG). Bosque de pino y encino.

Vernonia salicifolia (DC.) Sch. Bip. var. *baadii* McVaugh

McVaugh (1972) en la descripción de la variedad cita -ejemplares examinados procedentes de Talpa de Allende (Jalisco) y de Coalcoman (Michoacán). La localidad que se cita a conti--nuación se sitúa aproximadamente al centro de Nueva Galicia.

JALISCO: 1 km al Norte de El Molino, en el Cerro de La Lima, -- municipio de Jocotepec; alt. 1530-1680 m; 27 Feb 1977, -- L.M.V. de Puga 10027 (IBUG, CREG, MICH, ENCB). Suelos -- perturbados por cultivos, con escasa vegetación arborea. 28 Feb 1978; S. Carvajal H. 915 (IBUG, CREG, ENCB, MICH, MEXU, WIS). Vegetación secundaria en bosque de *Quercus-resinosa* degradado. Suelos pedregosos.

Un ejemplar depositado en ENCB como *V. pallens* Sch. Bip. (J. Chavelas P. ES=2877) colectado en Guerrero parece -- corresponder a esta variedad.

Agradecimientos:

El autor expresa su más sincero agradecimiento al Dr. - Rogers McVaugh de la Universidad de Michigan y a la Profesora -- Luz María Villarreal de Puga, por la revisión crítica del manuscrito, sugerencias y comunicaciones. Al Dr. Reed C. Rollins de la Universidad de Harvard por la Identificación del ejemplar del género *Rapistrum* y los datos de distribución. Al Ing. Rafael Guzmán Mejía, del Instituto de Botánica de la Universidad de Guadalajara, por la resolución de algunos problemas presentados en la familia GRAMINEAE.

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- Chavelas P., J. ES= 2867.
- Guzmán M., R. 635, 786, 788, 1001.
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- Puga, L.M.V. de. 8866, 9889, 10027.
- Rzedowski J. y R. McVaugh, 773, 823.
- Victoria H., A. 79 81.

VARIATIONS OF REYNOLDSIA (ARALIACEAE) IN THE HAWAIIAN IS.
HAWAIIAN PLANT STUDIES 100

Harold St. John
Bishop Museum, Box 19000A, Honolulu, Hawaii, 96819, USA.

In the genus Reynoldsia (Araliaceae) the shape of its leaflet apex, base, and tothing show slight fluctuations, but the same extremes can be seen on different leaflets of a single leaf. The differences stated by Sherff (1952) in length of inflorescence, rhachis, and pedicels overlap, and are also not diagnostic.

Sherff accepted 8 species and 5 varieties, all but one of which he published as new. For only three of them did he have flowers, fruit, and herbage. As in various others of his taxonomic monographs, his key is unworkable. After making a new key, then reviewing the apparent differences, the writer found no positive foliage differences, and the slight differences in length of rhachis and pedicels seem to be fluctuations, rather than characters of taxonomic significance. This investigation was made with all of the collections and the types in the Bishop Museum.

In conclusion, the writer finds himself forced to reject all of Sherff's new species and varieties of Reynoldsia, and to agree with the view of both Hillebrand and Rock, that there is but a single species of the genus here, R. sandwicensis Gray, occurring in the dry lowland of all the principal islands of the Hawaiian group.

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NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXIX

Harold N. Moldenke

SYNGONANTHUS HUMBOLDTII var. *GLABRESCENS* Mold., var. nov.

Haec varietas a forma typica speciei vaginis glabris vel glabrescentibus recedit.

This variety differs from the typical form of the species in having its sheaths, as well as the rest of the plant, glabrous or at least glabrescent.

The variety is based on *J. Cuatrecasas* 7693 from granitic soil on the savanna at San José del Guaviare, at 270 m. altitude, Vaupés, Colombia, collected on November 12, 1979, and deposited in my personal herbarium.

SYNGONANTHUS LANATUS var. *GLABRESCENS* Mold., var. nov.

Haec varietas a forma typica speciei foliis glabris glabrescentibusve recedit.

This variety differs from the typical form of the species in having its leaves completely glabrous or becoming practically so at time of anthesis.

The variety is based on *Murça Pires & Santos* 16392 from "dentro do patano, sob floresta (catinga) pantanosa inundada, Sararé, RADAMBRASIL folha SO 21-YC, ponto 29, 58°55' W., 13°50' S.", Mato Grosso, Brazil, collected on August 4, 1978, and deposited in the Britton Herbarium at the New York Botanical Garden.

SYNGONANTHUS REFLEXUS var. *LONGIFOLIUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis usque ad 30 cm. longis recedit.

This variety differs from the typical form of the species in its regularly much longer leaves, which may be up to 30 cm. long. It appears to be a more southern form of the species.

The variety is based on *Murça Pires, Black, Wurdack, & Silva* 6462 from a wet savanna at Serra do Cachimbo, at 425 m. altitude, Pará, Brazil, deposited in the Britton Herbarium at the New York Botanical Garden.

VERBENA MENTHAEFOLIA var. *COMONDUENSIS* (Mold.) Mold., stat. nov.

Verbena comoduensis Mold., *Phytologia* 18: 343--344. 1969.

ADDITIONAL NOTES ON THE GENUS *SPHENODESME*. II

Harold N. Moldenke

SPHENODESME Jack

Additional bibliography: A. L. Juss. in Orbigny, Dict. Univ. Hist. Nat. 13: 185. 1849; Pfeiffer, Nom. Bot. 2 (2): 1569 & 1593. 1874; Mold., Phytologia 46: 121--134. 1980.

SPHENODESME PENTANDRA Jack

Additional bibliography: Mold., Phytologia 46: 124 & 127--134. 1980.

Munir (1966) cites also the following collections: MALAYA: Pahang: Ridley 2160; Seimund 14, 275; Walker 23324. Penang: Curtis 269; Jack s.n.; Wallich 1735, 1735/1. Perak: Burkill & Haniff 12524; Kunstler 4532. Singapore: Hullett 520; Ridley 2793, 14187. Trengganu: Corner s.n. Wellesley: Ridley 9391. VIETNAM: Annam: Alleizette s.n.; Harmand s.n.; Poilane 5630. Cochinchina: Pierre 70, 1095; Thorel 649. Laos: Poilane 16264, s.n. GREATER SUNDA ISLANDS: Sabah: Cuadra 152. Kalimantan: Kostermans 13542.

Material of *S. pentandra* has been misidentified and distributed in some herbaria as *S. wallichiana* Schau., *Analectis* sp., *Congea pentandra* Wall., *Roscoea* sp., *Peronema* sp., *Petraea* sp., and even *Hiptage* sp. (in the *Malpighiaceae*). On the other hand, the *Chun* 984 & 1090, *Collector undetermined* 420, *DeSilva* s.n., *Griffith* 6009, *Herb Lingnan Univ.* 17057, *Herb. Univ. Nanking* 4609 & 6469, *King's Collector* s.n. [Dimapur, 23 March 1896], *Lau* 1213 & 3439, *Lei* 438 & 439, *Liang* 61598 & 65082, *Symington & Kiah* 28773, *Tak* 308, *Tsang* 308, *Voigt* s.n., *Wallich* 1734, and *Wight* s.n., distributed as typical *S. pentandra*, are var. *wallichiana* (Schau.) Munir, while *Henry* 13225 is *S. mollis* Craib and *Puasa* s.n. [D. D. Wood 1935] is *S. triflora* Wight.

Citations: INDIA: Assam: *Koelz* 29769 (Mi). THAILAND: *Collins* 358 (W--1700524), 1388 (W--1701188), 1415 (W--17012009), 1969 (W--1701595); *Hansen & Smitinand* 12157 (Cp, Ld); *Larsen* 33287 (Ac, Ld); *Maxwell* 71-217 (Ac), 74-10 (Ac), 76-26 (Ac); *Pholenchit* 1543 [Herb. Roy. Forest Dept. 22990] (Mi); *Sangkha Chand* 581 [Herb. Roy. Forest Dept. 14391] (Z); *Smitinand* 2200 [Herb. Roy. Forest Dept. 17309] (Sm). VIETNAM: Cochinchina: *Lefevre* 116 (B); *Pierre* 70 (B, Ca--53729, S, S), 1095 (N, N, W--1757957, W--2602520); *Thorel* 649 (Ca--54676). Laos: *Poilane* s.n. [Arboretum de Trongleom, 1923] (N). MALAYA: Malacca: *Griffith* s.n. [Malacca, 1845] (Br, Bz--23042, F--photo, N, N--photo, Pd, Si--photo, Z--photo). Penang: *Collector undetermined* s.n. [Pulau Penang] (Bz--23044); *C. Curtis* 269 (Pd); *W. Fox* s.n. (Bz--23043); *Guard* 2 (Bz--23045); *Wallich* 1735 (M, Mu-1454, Pd), 1735/1 (Pd). Singapore: *Goodenough* s.n. [Changi, July 27th, 1889] (Ca--267601). CULTIVATED: India: *Herb. Drake* s.n. [hort. bot. Calcut.] (W--2497158); *Herb. Hort. Bot. Calcut.* s.n. (Bz--23047, Bz--23048).

SPHENODESME PENTANDRA var. *WALLICHIANA* (Schau.) Munir, Gard. Bull. Singapore 21: 360. 1966.

Synonymy: *Roscoea pentandra* Roxb., Cat. Hort. Beng. 46, nom. nud. 1814; Fl. Ind., ed. 2, imp. 1, 3: 54. 1832. *Congea pentandra* Wall., Numer. List [47], no. 1734. 1829; Voigt, Hort. Suburb. Calc. 469. 1845. *Congea pentandra* (Roxb.) Wall., Numer. List [47], no. 1734. 1829; Walp., Repert. Bot. Syst. 4: 117. 1848. *Congea jackiana* var. *attenuata* Wall., Numer. List [47], no. 1735/2, hyponym. 1829. *Sphaenodesma wallichiana* Schau. in A. DC., Prodr. 11: 622. 1847. *Sphenodesma pentandra* (Roxb.) W. Griff., Notul. Pl. Asiat. 4: 176. 1854. *Sphenodesme wallichiana* Schau. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 961, in syn. 1895. *Sphenodesma wallichiana* Schau. apud H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 99 & xvi. 1921. *Sphenodesme pentandra* var. *oblonga* Kuntze ex Mold., Résumé Suppl. 3: 17, nom. nud. 1962. *Sphenodesme pentandra* (Roxb.) W. Griff. apud Munir, Gard. Bull. Singapore 21: 360, in syn. [not *S. pentandra* Jack, 1820]. *Sphenodesme pentandra* "Jack sensu Clarke" apud Munir, Gard. Bull. Singapore 21: 360, in syn. 1966. *Sphenodesme griffithiana* Schau., in herb. [not *S. griffithiana* Wight, 1849].

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Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1475. 1849; Munir, Gard. Bull. Singapore 21: [361], pl. 13. 1966.

A scandent shrub; branches dark-brown, obscurely tetragonal, puberulous when young, finally glabrous, lenticellate; petioles 5--15 mm. long, pubescent when young, longitudinally canaliculate above, curved; leaf-blades chartaceous or subcoriaceous, elliptic-oblong to lanceolate-oblong, 5--18 cm. long, 3--7 cm. wide, apically acuminate-acute and often mucronulate, basally cuneate or subrotund, glabrous and shiny above, dull beneath and glabrous except for the somewhat hairy midrib and the axils of the 4--6 pairs of secondary veins; inflorescence axillary and terminal, puberulous, the panicles 16--37.5 cm. long, the rachis pubescent when young, later glabrous except for the ciliate nodes; cymes 7-flowered; peduncles 1.5--3 cm. long; involucre bracts oblong-spatulate, 1.5--2.8 cm. long, 5--10 mm. wide, apically obtuse, glabrous; calyx very shortly and obscurely 5-lobed or subtruncate, glabrous on both surfaces, the 5 accessory teeth minute even after anthesis; corolla 5-lobed, tubular or infundicular, the tube 5 mm. long, externally glabrous, internally densely villous on the upper third, glabrous below, the lobes somewhat rounded apically, patent, glabrous; stamens 5, exserted; filaments slender; style about 5 mm. long, slender, exserted; stigma shortly bifid; fruit globular, about 4 mm. long and wide, setose.

This variety is native from Assam to Bangladesh, Burma, the Nicobar Islands, Malaya, and Indochina, north to Hainan island and southern China; cultivated in India, Pakistan, Sri Lanka, and probably elsewhere. It is based on *Wallich 1734* from Silhet, Bangladesh, deposited in the DeCandolle Herbarium at Geneva, Switzerland. *Sphenodesme pentandra* var. *oblonga* is based on *Kuntze s.n.*, collected in "Hinter Indien" in March, 1875, and deposited in the Britton Herbarium at the New York Botanical Garden. Thus far, I have been unable to find where, if ever, Kuntze published this trinomial, but the type specimen's label is inscribed in his hand: "bracteae oblongae obtusae".

Recent collectors describe *S. pentandra* var. *wallichiana* as a woody climber or scandent vine, climbing into tall trees, or erect, 3 m. long, the stems 3 cm. in diameter, the leaves light-green above and pale-green beneath, the flowers fragrant, and the fruit green and winged. They have encountered it on dry land, in the dense shade of mixed woods, and on the margins of streams, at 400--500 feet altitude, in flower in March and April, and in fruit in February and May. The "flowers" [=corollas? bracts?] are described as "blue" on *Lei 439* and "green" on *Liang 61598*. *Lei* reports the plant "fairly common" in sandy soil of thickets on dry level land of village commons on Hainan island, but "rare" on dry gentle slopes. *Voigt* (1845) reports it cultivated in Calcutta.

Vernacular names reported for the variety are "arkeng-ke-et", "baking-rap-rikang", and "tukha-karaizig".

Griffith (1854) listed *Roscoea pentandra* Roxb. as a synonym of his *Decadontia coerulescens* W. Griff., which, however, is now regarded as a synonym of *Sphenodesme griffithiana* Wight.

Munir (1966) cites the following collections: INDIA: Assam: *Alleizette* 5722; *Griffith* 6009; *McLelland s.n.*; *Watt* 6731, 11811. NICOBAR ISLANDS: *Kamphoevener* 2020, 2025. BANGLADESH: *Collector undetermined s.n.*; *DeSilva s.n.* [Wallich 1734]; *Gower s.n.*; *Roxburgh* 1823; *Wight s.n.* BURMA: *Cubitt* 354; *Lace* 5165; *MacGregor* 700, 2516; *Mya* 2297. CHINA: Hunan: *Forrest* 9837, 13617. CHINESE COASTAL ISLANDS: Hainan: *Ford* 420; *Lau* 1213, 3439, 5416; *Lei* 439; *Liang* 61598, 65082; *Tsang* 308. MALAYA: Pahang: *Symington & Kiah* 28773. VIETNAM: Annam: *Pierre* 116; *Poilane* 1209. Laos: *Poilane* 13680. CULTIVATED: India: *Voigt* 1674, 2115, 2911, *s.n.*; *Wallich* 1735/2.

Material of *Sphenodesme pentandra* var. *wallichiana* has been misidentified and distributed in some herbaria as *S. acuminata* Wight, *S. griffithiana* Schau., *S. jackiana* Schau., *S. pentandra* Jack, and *Congea* sp.

Citations: INDIA: Assam: *W. Griffith* 6009 (Mu--1055, Mu--1056, Pd, S); *King's Collector s.n.* [Dimapur, 23 March 1896] (W--325402); *Kuntze s.n.* [Hinter Indien, III.75] (N). BANGLADESH: *De Silva s.n.* [Wallich 1734] (M, Mu--1455, S); *Helper* 120 (Mu--120). CHINESE COASTAL ISLANDS: Hainan: *Chun* 984 [Herb. Univ. Nanking 6406] (Ca--239919, W--1346088), 1090 [Herb. Univ. Nanking 6469] (Ca--239977, W--1346089); *Ford* 420 (Ph); *Lau* 1213 (N), 3439 (Bi, S); *Lei* 439 (B, Ba, Bz--23049, Ca--611353, N, W--1754095); *Liang* 61598 (B, N, W--1669696), 65082 (N, S); *Tsang* 308 [Herb. Lingnan Univ. 17057] (B, Bz--23050, Ca--13861, Ca--356901, N, W--1659660, Z). BURMA: Tenasserim: *Helper* 6008 (Mu--1057). VIETNAM: Annam: *Poilane* 1209 (B). MALAYA: Pahang: *Symington & Kiah* 28773 (Bz--23041, N). CULTIVATED: India: *Herb. Hort. Bot. Calcutt. s.n.* (Mu--1062, Mu--1170, Mu--1456, Pd); *Voigt* 1674 (Cp, N--photo, Z--photo). Sri Lanka: *Collector undetermined s.n.* [R. B. G., Dec. 1859] (Pd). LOCALITY OF COLLECTION UNDETERMINED: *Collector undetermined s.n.* (Pd).

SPHENODESME PIERREI Dop, Bull. Soc. Bot. France 61: 317--318 [as "*Sphenodesma*"]. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921.

Synonymy: *Sphenodesma pierreii* Dop, Bull. Soc. Bot. France 61: 317. 1915.

Literature: Dop, Bull. Soc. Bot. France 61: 317--318. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921; Dop in Lecomte, Fl. Gén. Indo-chine 4: 899 & 906. 1936; Fedde & Schust, Justs Bot. Jahresber. 60 (2): 574. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59 & 99. 1942; H. N. & A. L. Mold., Pl. Life 2: 76. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 137 & 174. 1949; Mold., Résumé 176 & 439. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 218. 1960; Munir, Gard. Bull. Singapore 21: 318, 325, 330, 354, [356], 357, & 373, pl. 11. 1966; Hocking, Excerpt. Bot. A.12: 425. 1967; Mold., Résumé Suppl. 15: 10. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 302 (1971) and 2: 844. 1971; Mold., Phytologia 46: 47. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: [356], pl. 11. 1966.

This species was based by Dop on an unnumbered Pierre collection from Monts-Ba, Tin-tinh, in Cochinchina [Vietnam] and *Harmand 1098* from Sè-Kè-moun in Laos, but Munir (1966) has designated "*Pierre s.n. & No.70-P*" as the holotype.

Dop (1915) says that "Cette espèce est voisine du *Sphenodesma Griffithiana* Wight; elle s'en distingue nettement par la forme des bractées de l'involucre". Munir (1966) says that "This species is closely allied to *S. pentandra* but is easily distinguished by its leaves being fewer-nerved (2--3 each side), peduncle and calyx densely hirsute and involucre bracts broadly elliptic-obovate, ciliate towards the base". He cites only *Pierre s.n.* from Cochinchina.

SPHENODESME RACEMOSA (Presl) Mold., *Revisit. Sudam. Bot.* 10: 230. 1956.

Synonymy: *Congea barbata* Wall., *Numer. List* [47], no. 1735, hyponym. 1829. *Viticastrum racemosum* Presl, *Bot. Bemerk.* 148. 1844. *Viticastrum ramosum* Presl apud Schau. in A. DC., *Prodr.* 11: 623, in syn. 1847. *Sphaenodesma barbata* (Wall.) Schau. in A. DC., *Prodr.* 11: 623. 1847. *Sphenodesme ferruginea* Wight, *Icon. Pl. Ind. Orient.* 4: 13, pl. 1474, in syn. 1850. *Sphaenodesma barbata* Schau. apud Miq., *Fl. Ned. Ind.* 2: 910. 1856. *Sphenodesma barbata* Schau. apud C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 601. 1885. *Sphenodesma ferrugineum* Wight apud C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 601, in syn. 1885. *Sphenodesme barbata* Schau. apud Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 961. 1895; *Sphenodesme borneensis* Merr., *Journ. Straits Br. Roy. Asiat. Soc.* 76: 114--115. 1917. *Sphenodesme winkleri* H. Hallier, *Meded. Rijks Herb. Leid.* 37: 86. 1918. *Sphenodesma ferruginea* Wight apud H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 99. 1921. *Sphenodesma winkleri* H. Hallier apud H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 99. 1921. *Sphenodesme borneensis* Merr. apud A. W. Hill, *Ind. Kew. Suppl.* 6: 198. 1926. *Sphenodesma borneensis* Merr. ex Mold., *Suppl. List Inv. Names* 7, in syn. 1941. *Sphenodesme racemosa* var. *racemosa* [(Presl) Mold.] Munir, *Gard. Bull. Singapore* 21: 349. 1966.

Bibliography: Wall., *Numer. List* [47], no. 1738. 1829; D. Dietr., *Syn. Pl.* 3: 619. 1843; Presl, *Bot. Bemerk.* 148. 1844; Walp., *Repert. Bot. Syst.* 4: 117. 1845; Schau. in A. DC., *Prodr.* 11: 623 & 624. 1847; Walp., *Repert. Bot. Syst.* 6: 697. 1847; Wight, *Icon. Pl. Ind. Orient.* 4 (3): 13--14, pl. 1474. 1849; Wight, *Illustr. Ind. Bot.* 217, pl. 173 bis. 1850; Miq., *Fl. Ned. Ind.* 2: 910. 1856; Buek, *Gen. Spec. Syn. Candoll.* 3: 110, 443, & 502. 1858; C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 601--602. 1885; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 1: 595 (1893) and imp. 1, 2: 961. 1895; Briq. in *Engl. & Prantl, Nat. Pflanzenfam.*, ed. 1, 4 (3a): 181. 1895; King & Gamble, *Journ. Roy. Asiat. Soc. Beng.* 74 (2 extra): 860 & 862--863. 1908; Dop, *Bull. Soc. Bot. France* 61: 317. 1915; E. D. Merr., *Journ. Str. Settl. Br. Roy. Asiat. Soc.* 76: 114--115. 1917; H. Hallier, *Meded. Rijks Herb. Leid.* 37: 86. 1918; H. J. Lam, *Verbenac. Malay. Arch.* 333--334 & 368. 1919; Bakh. in Lam & Bakh., *Bull. Jard. Bot.*

Buitenz., ser. 3, 3: x. 1921; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 99 & xvi. 1921; E. D. Merr., Bibl. Enum. Born. Pl. 518. 1921; Ridl., Fl. Malay. Penins. 638--639. 1923; A. W. Hill, Ind. Kew. Suppl. 6: 198. 1926; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1929; E. D. Merr., Univ. Calif. Publ. Bot. 15: 266. 1929; Stapf, Ind. Lond. 6: 180. 1931; Mold., Suppl. List Comm. Names [1], 7, 9, & 13. 1940; Mold., Suppl. List Inv. Names 7. 1941; Mold., Alph. List Inv. Names 22 & 41. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 61, 65, & 99. 1942; Mold., Phytologia 26: 111--112. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595 (1946) and imp. 2, 2: 961. 1946; Mold., Alph. List Inv. Names Suppl. 1: 20. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 139, 140, 145, 146, 173, & 174. 1949; Mold., Résumé 164, 181, 187, 192--194, 345, 391, & 439. 1959; Mold., Revist. Sudam. Bot. 10: 229--230. 1956; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595 (1960) and imp. 3, 2: 961. 1960; Munir, Gard. Bull. Singapore 21: 318, 319, 325, 330, 347, 349--[353], 373, & 375--378, pl. 8. 1966; G. Taylor, Ind. Kew. Suppl. 13: 129. 1966; Mold., Résumé Suppl. 15: 11, 12, & 22. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold. in Menninger, Flow. Vines 328. 1970; Farnsworth, Pharmacog. Titles 5: Cum. Gen. Index. 1971; Mold., Fifth Summ. 1: 278, 306, 327, & 468 (1971) and 2: 623--625, 731, & 844. 1971; Mold., Phytologia 23: 435 (1972), 45: 53 (1980), and 46: 47, 49, & 57. 1980.

Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1474. 1849; Munir, Gard. Bull. Singapore 21: [350], pl. 8. 1966.

Scandent woody vine or climbing shrub, to 8 m. tall; branches and branchlets slender, terete or somewhat tetragonal, lenticellate, reddish-brown, the younger branchlets densely ferruginous-pubescent with simple and somewhat appressed hairs, the older branches soon becoming quite glabrous; petioles 5--7 mm. long, not twisted, densely ferruginous-pubescent with simple hairs when young, glabrescent in age; leaf-blades chartaceous or coriaceous, olivaceous when dry, about the same color on both surfaces or slightly paler beneath, oblong or ovate, 4--14 cm. long, 1.8--5.5 cm. wide, shiny, apically conspicuously apiculate-acuminate or subobtusely acuminate, marginally entire, basally rounded or cuneate, glabrous or subglabrous above with a few long hairs, often more densely hairy on the veins, more or less densely ferruginous-tomentose beneath or more sparingly pubescent and soon glabrescent, often glandular and more densely tomentose on the venation; secondaries 3--7 per side, 2 larger pairs basal, 1 large pair at about the middle of the midrib, and 2--4 apical pairs, the basal pair usually leaving the midrib in the lower 2 cm., very prominent, curvate-ascending, anastomosing; veinlet reticulation prominent; inflorescence terminal, 10--15 cm. long, ferruginous-pubescent with simple hairs, the heads arranged in a simple raceme, sometimes supplied with reduced leaves or in a large panicle, all parts more or less ferruginous-pubescent; peduncles slender, 1--3 cm. long, shorter toward the tips of the branchlets; bracts 6, elliptic or spatulate-obovoid, accrescent, apically rounded, more

or less pubescent on both surfaces (especially on the venation and near the base), with a prominent midrib, the middle one of each set of three 1.9--2.2 cm. long and 8--10 mm. wide, the lateral ones 1.5--1.7 cm. long and 4--5 mm. wide; heads 5--7-flowered; calyx narrowly infundibular, about 4 mm. long, 10-ribbed, externally densely and conspicuously ferruginous-pubescent or -hirsute with long, spreading, glandular hairs, minutely pubescent on the inner surface, its rim 5-toothed, the teeth or lobes 1.5--2 mm. long, with 5 accessory episepalous teeth on the inner surface extending only slightly above the rim but opposite the elongated teeth, no intersepalous teeth present; corolla greenish-white or greenish-yellow, about 5 mm. long, the tube about as long as the calyx, externally glabrous, sparsely long-pilose in the throat, the 5 lobes oblong, about 2 mm. long, apically obtuse, externally pubescent, glabrous within; stamens 5, inserted in the corollathroat, glabrous, exerted; mature style slender, slightly exerted, as long as the stamens; stigmas shortly bifid; ovary glabrous on the lower portion, glandular-villous on the upper portion; fruit small, drupaceous, embedded in the enlarged fruiting-calyx, ferruginous-villous, with a crustaceous exocarp, 1-seeded.

This species occurs naturally from Malaya to the Riouw and Lingga Archipelagos and Indonesia. *Sphenodesme borneensis* is said by Merrill to be recognized easily by its few-veined leaf-blades, its 5-flowered heads, its elliptic accrescent bracts, and its cleft calyx-teeth, but Munir (1966) feels that these characters do not distinguish it from typical *S. racemosa*.

Recent collectors refer to *S. racemosa* as a climber, forming "tough rigid tangled masses", the bark on the branches gray and smooth, the leaves "recurved", sublucid above, much paler beneath, brown-hairy, the "flowers" brown-hairy, and the fruit pale yellow-green. They have found it growing on forested ridges, at 50--100 m. altitude, in flower in June and October. The "flowers" [corollas?] are said to have been "yellowish-green" on *Elmer 20838* and "greenish-yellow" on *Foxworthy 450*.

Farnsworth, in a letter to me dated March 1, 1971, reports that "Phytochemical screening indicated the presence of saponins, but triterpenes, sterols and alkaloids were absent" in this species. Merrill (1929) found the plant "Scandent on large trees in dense forests" in Penang, citing *Elmer 20838*. Munir (1966) has designated *Griffith s.n.*, from Malacca, deposited in the British Museum herbarium, as the holotype of *S. racemosa*.

Sphenodesme winkleri H. Hallier is based on *Winkler 2314* from Hayup in southeastern Borneo.

It is worth noting that Munir (1966) incorrectly cites the Wight (1849) reference to *S. racemosa* as "1850", the Briquet (1895) reference as "1897", the Miquel (1856) reference as "1858", the King & Gamble (1908) reference as "1909", the Wallich (1829) reference as "1828", and the Walpers (1845) reference as "1844--48". The Dop (1915) reference is sometimes cited as "1914".

Common and vernacular names listed for the species include

"aga lumut", "akar chabana lima", "akar lumut", "akar mēruan", "five-points climber", "hulat", "lembu-lembu", "lilimbo", "sumpin", and "sumpīn".

Clarke (1885) cites only *Wallich s.n.* from Penang and *Griffith 6009* (in part) and *Maingay 1194* from Malacca. He notes that "Schauer.....doubtfully reduces here *Viticastrum racemosum*, Preslbut the description does not fit in several points, inter alia in the 5-celled ovary". King & Gamble (1908) cite *Curtis s.n.*, *Phillips s.n.*, & *Wallich 1738* from Penang and *Griffith 6009 /2*, *Hervey s.n.*, and *Maingay 1194* from Malacca.

Lam (1919) cites only *Winkler 2314* from Borneo. Munir (1966) cites the following collections: MALAYA: Johore: *Curtis s.n.*, *Holttum 9410*, *Ridley s.n.* Kelantan: *Sow & Motan 94509*. Malacca: *Burkill 531*, *Derry 179*, *Harvey s.n.* Negri Sembilan: *Alvins 957*, *1745*, *2010*, *Burkill 3221*, *Nur s.n.* Pahang: *Abu 69625*, *Burkill & Haniff 16922*, *Kostermans 78672*, *Ridley 2159*, *Symington & Kiah 28777*. Penang: *Curtis s.n.*, *Porter s.n.* [Wallich 1738]. Wellesley: *Ridley s.n.* GREATER SUNDA ISLANDS: Borneo: *Winkler 2314*. Kalimantan: *Kostermans 7239*. Radja: *Bunnemeijer 7634*. Sarawak: *Beccari 1601*, *Foxworthy 450*, *Herb. Philip. Bur. Sci. 1847*.

The *Clemens & Clemens s.n.* [Aug. 1931], distributed as *S. racemosa*, actually is the type collection of *S. triflora* var. *montana* Munir, while *Clemens & Clemens s.n.* [Tenompok] is *S. triflora* Wight, *Elmer 20838* is the type collection of *S. racemosa* var. *sabahensis* Munir, and *Helfer 43* is *S. griffithiana* Wight.

Citations: MALAYA: Johore: *Ahmad S.294* (K1--13070); *Holttum 9410* (Bz--23037). Malacca: *W. Griffith s.n.* [Malacca, 1845] (Br, F--photo, N--photo, Si--photo, Z--photo). Negri Sembilan: *Nur s.n.* [Tampui, August 1915] (Bz--23040). Pahang: *Poore 894* (K1, K1). Penang: *Porter s.n.* [Wallich 1738] (Pd). GREATER SUNDA ISLANDS: Bakong: *Bunnemeijer 7609* (Bz--23032, Bz--23033, Bz--23034). Borneo: *Winkler 2314* (Bz--23031, N). Radjai: *Bunnemeijer 7634* (Bz--23035, Bz--23036, N). Sarawak: *Foxworthy 450* (Ph); *Native collector 4847* (N--photo, Ph, Z--photo).

SPHENODESME RACEMOSA var. *SABAHENSIS* Munir, *Gard. Bull. Singapore* 21: 352--[353], pl. 9. 1966.

Bibliography: Munir, *Gard. Bull. Singapore* 21: 319, 325, 330, 352--[353], & 373, pl. 9. 1966; *Mold., Rĕsumĕ Suppl.* 15: 12. 1967; *Munir, Biol. Abstr.* 48: 4097. 1967; *Mold., Fifth Summ.* 1: 327 (1971) and 2: 844. 1971.

Illustrations: Munir, *Gard. Bull. Singapore* 21: [353], pl. 9. 1966.

This variety differs from the typical form of the species in its calyx being densely appressed-pilose on both surfaces and the corolla having a much narrower villous ring in the throat.

The variety is based on *Elmer 20838* from Sabah, deposited in the Singapore herbarium. It is the only collection cited by Munir (1966).

Recent collectors refer to the plant as a climber, 10 feet tall, with greenish-yellow "flowers", and have encountered it in flat-

land logging areas, flowering in August. Material has been misidentified and distributed in some herbaria as *S. barbata* Schau.

Citations: GREATER SUNDA ISLANDS: Sabah: *Elmer 20838* (Bi-isotype, Br-isotype, Ca--312131-isotype, Du--165045-isotype, Mu-isotype, N-isotype, S-isotype, Ut--84712-isotype, W--2605681-isotype, Z-isotype); *Krispinus SAN.87306* (Sn--55106).

SPHENODESME SARAWAKENSIS Mold., *Revist. Sudam. Bot.* 10: 230--231. 1956.

Bibliography: Mold., *Revist. Sudam. Bot.* 10: 230--231. 1956; Mold., *Résumé* 193 & 439. 1959; Munir, *Gard. Bull. Singapore* 21: 316, 318, 319, 325, 330, 347--349, 373, & 377, pl. 7. 1966; G. Taylor, *Ind. Kew. Suppl.* 13: 129. 1966; Munir, *Biol. Abstr.* 48: 4097. 1967; Mold., *Fifth Summ.* 1: 327 (1971) and 2: 844. 1971; Mold., *Phytologia* 46: 47. 1980.

Illustrations: Munir, *Gard. Bull. Singapore* 21: [348], pl. 7. 1966.

This species is based on *Native Collector 5227* from Sampadi Hill, Sarawak, deposited in the Britton Herbarium at the New York Botanical Garden. Munir (1966) notes that the species is "Akin to *S. racemosa* in having [a] 10-ribbed calyx with deeply 2-fid and inflexed lobes and well developed aristate accessory teeth, but differs in its branchlets, leaves, and involucre bracts being always glabrous, cymes 5-flowered, calyx obscurely pubescent without, accessory teeth alternating with the calyx lobes and ovary setulose all over". He cites only *Native Collector 5111* & *5191* from Sarawak.

Recent collectors refer to the species as a climber, 3--10 m. tall, with green "flowers", and have encountered it in old jungles, at 155--750 m. altitude. Material has been misidentified and distributed in some herbaria as *S. stellata* Merr.

Citations: GREATER SUNDA ISLANDS: Sarawak: *Native Collector 5111* (Ca--357592, N), *5191* (Ca--357206, N), *5227* (Ca--357650--isotype, N--type).

SPHENODESME STELLATA Merr., *Univ. Calif. Publ. Bot.* 15: 266--267. 1929.

Bibliography: E. D. Merr., *Univ. Calif. Publ. Bot.* 15: 266--267. 1929; A. W. Hill, *Ind. Kew. Suppl.* 8: 227. 1933; Fedde & Schust., *Justs Bot. Jahresber.* 59 (2): 417. 1939; A. W. Hill, *Ind. Kew. Suppl.* 8: 227. 1933; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 65 & 99 (1942) and ed. 2, 145, 146, & 174. 1949; Mold., *Résumé* 192 & 439. 1959; Munir, *Gard. Bull. Singapore* 21: 319, 325, 329, 367, [368], 373, 375, & 377, pl. 15. 1966; Munir, *Biol. Abstr.* 48: 4097. 1967; Mold., *Fifth Summ.* 1: 327 (1971) and 2: 844. 1971; Mold., *Phytologia* 46: 47. 1980.

Illustrations: Munir, *Gard. Bull. Singapore* 21: [368], pl. 15. 1966.

A scandent shrub or liana, forming tangled masses, loosely branched; branches terete, pale, glabrous; branchlets very slender, obscurely tetragonal, 2--2.5 mm. in diameter, lenticellate, more

or less plumose- or stellate-pubescent; petioles about 1 cm. long, canaliculate above, stellate-pubescent; leaf-blades chartaceous or subcoriaceous, elliptic or subelliptic, 9--14 cm. long, 5.5--8 cm. wide, abruptly and obtusely short-acuminate at the apex, marginally entire, basally acute, glabrous and shiny above and castaneous-olivaceous in drying, scarcely glandulose beneath, more or less stellate- or plumose-tomentose along the midrib and larger veins beneath and brunneous in drying; secondaries slender, 5 or 6 per side, distinct, curvate, arcuate-anastomosing; veinlet reticulation slender and distinct; inflorescence erect or ascending, sulphur-yellow throughout, axillary and terminal, densely stellate-pubescent throughout, the indument subferruginous with more or less plumose hairs; rachids few, elongate, 15--20 cm. long, the branches short, 1--1.5 cm. long; cauline bracts opposite, obovate or obovate-elliptic, 5--8 cm. long, short-stipitate, apically acute to rounded, pubescent; involucre bracts 6, oblanceolate to oblong-oblancheolate, about 2.2 cm. long and 8 mm. wide, apically narrowed, basally cuneate, 3-veined, when young very densely stellate-pubescent on both surfaces; heads 7-flowered; flowers sessile; calyx about 4 mm. long during anthesis, scarcely costate, very densely stellate-pubescent on the outside with in-canous hairs, appressed-villous on the inner surface, its rim equally 5-toothed, not bilabiate, the teeth ovate, about 1.5 mm. long, apically acute, without accessory teeth in the sinuses; fruit ovoid, about 4 mm. long, glabrous.

This endemic Sabah species is based on *Elmer 21631* from Tawao and is deposited in the Philippine National Herbarium in Manila, now probably destroyed. Merrill (1929) comments that "In the specimen examined the corollas have all fallen", but he judged the species to be allied to "*Sphenodesme microstylis* Clarke (*S. ferruginea* Briq., non Wight), this judgement being based on Gamble's ample description of the latter. The Bornean specimen differs in its leaves being entirely glabrous on the upper surface; in its different venation; in its apparently shorter inflorescences and peduncles; and in the equally lobed, not 2-lipped calyces". Munir (1966), however, was able to study a young flower on an isotype and says that "It is obvious that this species cannot be placed near *S. ferruginea* (Griff.) Briq. of the *Brachynema* section which is characterized by included stamens and style; which are exert in *S. stellata*". He cites only *Elmer 21631* and *Puasa 4749* from Sabah.

Collectors describe the plant as a climbing shrub, 8--10 feet tall, or as a liana or woody climber, 6.5--26 m. long, "girth 2 1/2 feet", bark pale-brown, inner bark soft, pinkish, sapwood white to pale-yellow, branchlets rather lax, gray, smooth, forming tangled masses, leaves flat, "descending", yellowish-green, sub-lucid above, a trifle paler beneath, glabrous, inflorescence ascending or erect, "sulphur-yellow throughout", fruit greenish. They have found it growing in silty, reddish-brown, probably ultrabasic soil, brown sandy soil, red-brown or dark red-brown soil of roadsides, in low undulating country, on hillsides and hilltops

in otherwise flat land, in primary forests, along small streams in dense damp forests, in recent cuts through primary forests, and in logged-over areas on flat land, at altitudes of 25--700 feet, in flower in December, April, June, and July, in fruit in August.

The "flowers" [corollas?] are said to have been "white" on *Sadau* 50493, "pale-gray" on *Sinanggul* 54643, "green" on *Ampuria* 40828, "yellow-green" on *Dewol & Karim* 77818, "yellowish-green" on *Krispinus* 87215, "greenish to purplish" on *Dewol & al.* 71186, and "pale-gray to pale-red" on *Sinanggul* 56989.

Material of *S. stellata* has been misidentified and distributed in some herbaria as *Petraeovitex* sp. On the other hand, the *Bakar* SAN.17325, distributed as *S. stellata*, actually is *S. involuocrata* (Presl) B. L. Robinson, while *Gibot* SAN.54849 and *Talip* SAN.54925 & SAN.68320 are *S. triflora* var. *montana* Munir.

Citations: GREATER SUNDA ISLANDS: Sabah: *Ampuria* SAN.40828 (N); *Dewol & Karim* SAN.77818 (Sn--42137); *Dewol, Leopold, & Shea* SAN.71186 (Ld); *Elmer* 21631 (Ca--312139-isotype, Du--161052-isotype, Mu--isotype, N--isotype, N--photo of isotype, Z--isotype, Z--photo of isotype); *Krispinus* SAN.87215 (Sn--54605); *Momin* SAN.80141 (Sn--41683); *Sadau* SAN.50493 (Sn--40720); *Sinanggul* SAN.54643 (Ld), SAN.56989 (Z); *Singh & Abanag* SAN.30095 (Z).

SPHENODESME THORELII Dop, Bull. Soc. Bot. France 61: [316]--317 (as "*Sphenodesma*"). 1915.

Synonymy: *Sphenodesma thorellii* Dop, Bull. Soc. Bot. France 61: [316]. 1915. *Sphenodesme thorelli* Munir, Biol. Abstr. 48: 4097, sphalm. 1967. *Sphenodesme thorelli* Dop ex Mold., Résumé Suppl. 16: 26, in syn. 1968.

Bibliography: Dop, Bull. Soc. Bot. France 61: [316]--317. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 248. 1921; Dop in Lecomte, Fl. Gén. Indo-chine 4: 897, 899, 902--903, & 909, fig. 93 (6--8) & 94 (1 & 2). 1936; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 574. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59, 65, & 99. 1942; H. N. & A. L. Mold., Pl. Life 2: 86. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 137 & 174. 1949; Mold., Résumé 177 & 439. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 248. 1960; Munir, Gard. Bull. Singapore 21: 319, 325, 329, 364--[365], 373, & 378, pl. 14. 1966; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Résumé Suppl. 15: 10, 11, & 23 (1967) and 16: 26. 1968; Mold., Fifth Summ. 1: 302 (1971) and 2: 624 & 844. 1971; Mold., Phytologia 46: 47. 1980.

Illustrations: Dop in Lecomte, Fl. Gén. Indo-chine 4: 897 & 909, fig. 93 (6--8) & 94 (1 & 2). 1936; Munir, Gard. Bull. Singapore 21: [365]. 1966.

Dop (1915) cites *Pierre s.n.*, *Talmy s.n.*, and *Thorel 1385* from Cochinchina [Vietnam] and Munir (1966) has designated *Thorel 1385* as the holotype. He also regards Dop's var. *cordifolia* as not worth maintaining, in which I disagree. He comments that "Of the three taxa with 5-flowered cymes, *S. thorellii* is readily distinguished by its panicles being congested and hirsute, leaves more or less cordulate at the base, calyx hirsute and mid corolla-lobe

slightly longer and villous towards base". He cites only *Thorel* 1385.

SPHENODESME THORELII var. *CORDIFOLIA* Dop, Bull. Soc. Bot. France 61: 317 (as "*Sphenodesma*"). 1915; Munir, Gard. Bull. Singapore 21: 364. 1966.

Synonymy: *Sphenodesma thorelii* var. *cordifolia* Dop, Bull. Soc. Bot. France 61: 317. 1915. *Sphenodesme thorelii* var. *cordata* Dop ex Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59 & 99, sphalm. 1942.

Bibliography: Dop, Bull. Soc. Bot. France 61: 317. 1915; Dop in Lecomte, Fl. Gén. Indo-chine 4: 903. 1936; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 574. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59 & 99 (1942) and ed. 2, 137 & 174. 1949; Mold., Résumé 177 & 439. 1959; Munir, Gard. Bull. Singapore 21: 325 & 364. 1966; Mold., Résumé Suppl. 15: 10, 11, & 23. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 302 (1971) and 2: 624 & 844. 1971.

This variety is said by Dop (1915) to differ from the typical form of the species in "Folia subcordata vel cordata, apice obtusa, 5 cm longa et 3,5 cm lata" and bases it on *Talmy s.n.* from Cochinchina [Vietnam]. Munir (1966), apparently without seeing the type collection arbitrarily reduces it to typical *S. thorelii* in whose description Dop has apparently included the varietal characters, as is, unfortunately, the all-too-common practice today.

SPHENODESME TRIFLORA Wight, Icon. Pl. Ind. Orient. 4 (3): 14, pl. 1478. 1849.

Synonymy: *Congea jackiana* Wall., Numer. List [47], no. 1735 (in part). 1829. *Sphenodesma triflora* W. Griff., Notul. Pl. Asiatic. 4: 182--183. 1854. *Sphaenodesma triflora* Wight apud Miq., Fl. Ned. Ind. 2: 910. 1856. *Sphenodesma triflora* Wight ex Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895. *Sphenodesme triflora* var. *triflora* [Wight] Munir, Gard. Bull. Singapore 21: 367. 1966. *Sphenodesme triflora* Griff. apud Munir, Gard. Bull. Singapore 21: 367, in syn. 1966. *Sphenodesma triflora* Wall., in herb.

Bibliography: Wall., Numer. List [47], no. 1735. 1829; Wight, Icon. Pl. Ind. Orient. 4 (3): 14, pl. 1478. 1849; W. Griff., Notul. Pl. Asiatic. 4: 182--183. 1854; Miq., Fl. Ind. Bat. 2: 910--911. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 110. 1858; C. B. Clarke in Hook. f., Fl. Brit. India 4: 601. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595 (1893) and imp. 1, 2: 961. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895; King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 860--862. 1908; H. J. Lam, Verbenac. Malay. Arch. 332--333 & 368. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: x. 1921; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 99 & xvi. 1921; Ridl., Fl. Malay Penins. 638. 1923; S. Moore, Journ. Bot. Lond. 63: Suppl. 81--82. 1925; Stapf, Ind.

Lond. 6: 181. 1931; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 407, 441, & 442. 1938; Mold., Suppl. List Comm. Names [1] & 2. 1940; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 60, 61, 63, 65, & 99. 1942; Mold., Phytologia 2: 112. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595 (1946) and imp. 2, 2: 961. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129, 138--140, 143, 146, & 174. 1947; Mold., Résumé 166, 178, 181, 188, 192--194, 345, & 439. 1959; G. Taylor, Ind. Kew. Suppl. 12: 134. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595 (1960) and imp. 3, 2: 961. 1960; Munir, Gard. Bull. Singapore 21: 316, 319, 324, 325, 329, 367, [369]--373, & 375--378, map 5, pl. 16. 1966; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Résumé Suppl. 15: 11, 12, 19, 22, & 23 (1967) and 16: 26. 1968; Anon., Torrey Bot. Club Ind. Am. Bot. Lit. 3: 309. 1969; Farnsworth, Pharmacog. Titles 5: Cum. Gen. Ind. 1971; Mold., Fifth Summ. 1: 284, 298, 306, 327, & 468 (1971) and 2: 623, 624, & 844. 1971; Mold., Phytologia 45: 54 & 469 (1980) and 46: 47 & 49. 1980.

Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1478. 1849; Munir, Gard. Bull. Singapore 21: [369], pl. 16. 1966.

A climbing, sometimes erect shrub or liana; branchlets minutely brownish-pubescent; petioles about 1 cm. long, brownish-pubescent; leaf-blades chartaceous, lanceolate or lanceolate-oblong, 7--13 cm. long, 2.8--5 cm. wide, apically acuminate, basally cuneate or subtruncate, glabrous on both surfaces; secondaries 4 per side; panicles very long, gray-pubescent, the lower branches in the axils of ordinary leaves, the upper ones in the axils of gradually smaller leaves or foliose bracts; cymes capitate, opposite, pedunculate; involucre bracts 2, each deeply 3-lobed, varying from purple or dull-purple to dull-red, 5--7 mm. long, 1--1.5 mm. wide, stipitate, 3-venose, in fruit 1.2--1.8 cm. long and 3.5--7.5 mm. wide; flowers 3 per head, one terminal and not subtended by a bract, the other 2 subtended by the involucre bracts; calyx dull-red, 4--5 mm. long, 2--2.5 mm. wide, externally densely gray-pubescent, inside with long antrorse hairs, its rim shortly 5-toothed, the teeth deltoid; corolla dark-purple, the tube 6 mm. long, externally glabrous, with a narrow ring of hairs at the throat within, the lobes 5, apically rounded, puberulous; stamens 5, inserted in the throat of the corolla-tube, exserted; filaments slender; style slender; stigma bifid; ovary glabrous; drupe pseudo-capsular, included in the enlarged, accrescent, ribbed fruiting-calyx, the exocarp leathery.

This species is based on *Griffith 6009/1* and *s.n.* from Verupha, Malacca, Malaysia, collected in 1845 and deposited in the Hooker Herbarium at the Royal Botanic Gardens, Kew. Munir (1966) includes *S. clemensorum* Mold. in the synonymy of the typical form of *S. triflora* Wight, but it is my belief that its differences from the type warrant at least varietal status. Griffith (1854) comments that "Although the involucre is generally small, yet the lower ones of some panicles here and there are as large as ordinarily happens, in all, the flowers here are 3 only, and this is the only species in which there is no correspondence between the flowers and the involucre leaves, those being to these in all others equal plus one. The in-

florescence in this species is freely cymose, the lateral flowers in each of the dichotomes being wanting, we may hence expect 1-flowered pluri-involucrate inflorescences."

The species is distributed naturally in forests from Upper Burma and Thailand, through Malaya to Sumatra and Borneo.

Common and vernacular names reported for this species are "akar", "akar bisa", "akar bisar", "akar katup-katup", "akar mēmalī", "akar pinang gusi", "akar risa", "akar sambu", "akar sēmpuleh", "aloor gagah", and "lipai".

It is perhaps noting here that some recent authors have misdated the Wight (1849) reference to this species as "1850", the Miquel (1856) reference as "1858", the Briquet (1895) reference as "1897", and the King & Gamble (1908) reference as "1909". According to Munir (1966) the *Griffith 6009/1* and *s.n.* collections cited below are actually one and the same collection, the type collection of the species.

Some authors cite the Moore (1925) reference to this species as having been authored by "Rendle" or by "S. Moore in Rendle", but according to the table of contents of the work in question the article was authored by Moore alone.

Recent collectors describe *Sphenodesme triflora* as a scrambler or as a twisting, twining, woody climber, 15--30 feet long, the stems 1/2 inch in girth, the bark black-brown, the "bracts etc." pale-green, and the fruit yellowish. They report finding it growing in primary forests, primary dipterocarp forests, logged-over areas on hillsides, low undulating country, and in loamy-sandy soil on ridges, at 200--350 feet altitude, in flower from May to August and in October and November, in fruit in August and September. Beusekom & Smitinand refer to it as "common" in Thailand. The "flowers" [corollas?] are said to have been "blue" on Beusekom & Smitinand 2037, "bluish-purple" on Enggoh 7312, "dark-purple" on Poore 691, "yellowish-red" on Tarodop 83610, and "pale-green" on Lantoh 82390.

Farnsworth, in a letter to me dated March 1, 1971, reports that phytochemical screening indicated the presence of triterpenes and sterols and the absence of saponins and alkaloids in this species.

Clarke (1885) cites *Griffith 6009* (in part) and *Maingay 1196* from Malacca and *Wallich s.n.* from Penang. King & Gamble (1908) cite *Ridley 11347* from Johore, *Derry 585*, *Griffith 6009/1*, and *Maingay 1196* from Malacca, *Curtis 210* from Penang, *King's Collector [Kunstler] 160, 1098, 1623, & 2474*, *Ridley 7598*, *Scortechini 1119*, and *Wray 683, 1383, & 1752* from Perak, *Ridley 12086 & 12088* from Selangor, *Deschamps s.n.* from Singapore, and *Forbes 3083* from Sumatra. Lam (1919) cites only *Forbes 3083* and *Herb. Lugd.-Bat. 908.141-21* from Java. Fletcher (1938) cites only *Fox s.n.* and *Kerr 7681* from Thailand, but noting that the species also occurs in Malacca and Sumatra.

Munir (1966) cites the following collections: THAILAND: *Kerr 7681*. MALAYA: Johore: *Holttum 9301, 19911*; *Ridley 11347, s.n.*; *Vesterdal 265*. Malacca: *Alvins 1719*; *Burkill 1156*; *Derry 35, 585*;

Griffith 6009/1, s.n.; Holmberg 817, 832; Maingay 1196; Ridley s.n. Negri Sembilan: R.R.I.K. 16. Pahang: Abu 69628; Smith 93379. Penang: Curtis 210, s.n. Perak: Haniff 1257, 1264; Ridley 7598; Scortechini s.n.; Wray 1383. Selangor: Burkill 2546; Curtis s.n.; Jaamat 13809; Jaamat & Awang 18233; Jaamat & Osman 18235; Molesworth-Allen s.n.; Ridley 12086, 12088, 13371; Symington 21064, 23056; Umbai KL.1525; Watson 15366. BRUNEI: Jacob 39260. SABAH: Ampuria 40828; Enggoh 7312; Meijer 38796; Singh 39260. SARAWAK: Beccari 3885; Clemens & Clemens 5651; Haviland s.n.; Herb. Philip. Bur. Sci. 21781.

Material of *S. triflora* has been misidentified and distributed in some herbaria as *S. pentandra* Jack, *S. stellata* Merr., *Clerodendron* sp., and *Petraeovitex* sp. On the other hand, the Clemens & Clemens 5651 [Herb. Philip. Bur. Sci. 21781], regarded as typical *S. triflora* by Munir, is the type collection of var. *clemensorum* Mold.

Citations: KOH CHANG ISLAND: Beusekom & Smitinand 2037 (Ac). MALAYA: Johore: Holttum 9301 (Bz--23054). Malacca: Burkill 1156 (Bz--23056); W. Griffith 6009/1 (Mu--1059-isotype, Pd-isotype, S-isotype, T-isotype, Ut--32086-isotype, V-isotype), s.n. [Malacca, 1845] (Br-isotype, Br-isotype, Bz--23038-isotype, Bz--23039-isotype, F--photo of isotype, Mu--1058-isotype, Mu--1171-isotype, N-isotype, N-photo of isotype, Pd-isotype, Si-photo of isotype, W--2497342-isotype, Z-isotype, Z-photo of isotype). Penang: C. Curtis 210 (W--206478, W--206479). Perak: Haniff 1264 (Bz--23055). Selangor: Poore 691 (Kl--691). Trengganu: Corner 30084 (Bz--23053). GREATER SUNDA ISLANDS: Sabah: Clemens & Clemens 26154 (Bz--23028); Enggoh 7312 (W--2188658); Indar SAN.53319 (Z); Lantoh SAN.82390 (Sn--49741); Leopold, Gary, & DeWol SAN.74322 (Sn--40957); Meijer SAN.38796 (Ld); J. Singh SAN.39260 (Z). SAN.53416 (Sn--40732); Ta-rodop SAN.83610 (Sn--51492); D. D. Wood 1935 (Bz--23052). Sumatra: Buwalda 7142 (Bz--72611); Kostermans 12058 (N).

SPHENODESME TRIFLORA var. *CLEMENSORUM* (Mold.) Mold., Phytologia 45: 469. 1980.

Synonymy: *Sphenodesme clemensorum* Mold., Phytologia 4: 368. 1953.

Bibliography: Mold., Phytologia 4: 368. 1953; Mold., Résumé 193 & 439. 1959; G. Taylor, Ind. Kew. Suppl. 12: 134. 1959; Munir, Gard. Bull. Singapore 21: 325 & 370. 1966; Mold., Fifth Summ. 2: 624. 1971; Mold., Phytologia 45: 469. 1980.

This variety differs from the typical form of the species chiefly in its leaf-blades being densely appressed-tomentose and whitish beneath.

Munir (1966) reduces this taxon to synonymy under the typical form of the species, but I feel that its leaf characters are sufficient to warrant varietal status. It is thus far known only from the type collection.

Citations: GREATER SUNDA ISLANDS: Sarawak: Clemens & Clemens 21781 (Bz--isotype, N--type).

SPHENODESME TRIFLORA var. *MONTANA* Munir, Gard. Bull. Singapore 21: 373--[374], pl. 18. 1966.

Bibliography: Munir, Gard. Bull. Singapore 21: 316, 319, 325, 329, 367, & 373--375, pl. 18. 1966; Mold., Résumé Suppl. 15: 12. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 327 (1971) and 2: 844. 1971.

Illustrations: Munir, Gard. Bull. Singapore 21: [374], pl. 18. 1966.

This variety differs from the typical form of the species in the stems being ashy-brown and puberulous, the leaves thicker, subcoriaceous, and puberulous on the venation beneath, and the cymes 7-flowered.

The variety is based on *Clemens & Clemens s.n.* from Tenombok, Mt. Kinabalu, Sabah, collected in August, 1931, and deposited in the Singapore Botanical Garden herbarium.

Recent collectors describe the plant as a small climber, to 55 feet long, the stems 1--3 inches in diameter, the "flowers hairy". They have encountered it in yellowish sandy soil on low undulating land, in secondary forests on hillsides, and in reddish soil in logged-over hillside forests, at altitudes of 5000 feet. The "flowers" [corollas? bracts?] are said to have been "dull" on *Clemens & Clemens s.n.*, "yellowish-green" on *Elleh 37442*, "pinkish" on *Talip 54925*, "purplish" on *Talip 68320*, and "red-purple" on *Gibot 54849*. It has been found in flower from May to August and in fruit in July. The only recorded vernacular name for it is "akar", a name applied also to other taxa in this genus:

Material has been misidentified and distributed in some herbaria as *S. barbata* Schau., *S. pentandra* Jack, *S. stellata* Merr., typical *S. triflora* Wight, *Petraeovitex ternata* Hall. f., and *Petraeovitex* sp.

Citations: GREATER SUNDA ISLANDS: Sabah: *Clemens & Clemens s.n.* [Tenompok, Aug. 1931] (B--isotype, Bz--23029-isotype, Ca--54961-isotype, Mu-isotype, N-isotype, Ur-isotype, Z-isotype); *Elleh SAN. 37448* (Z); *Puasa s.n.* [D. D. Wood 1935] (Ca--268702); *Talip SAN. 54925* (Z), *SAN.68320* (Sn--40734). Sakal: *Gibot SAN.54849* (Z).

SPHENODESME TRIFLORA var. *RIPARIA* Munir, Gard. Bull. Singapore 21: 371--373, pl. 17. 1966.

Bibliography: Munir, Gard. Bull. Singapore 21: 316, 319, 325, 329, 371--373, 376, & 377, pl. 17. 1966; Mold., Résumé Suppl. 15: 12. 1967; Munir, Biol. Abstr. 48: 4097. 1967; Mold., Fifth Summ. 1: 327 (1971) and 2: 844. 1971.

Illustrations: Munir, Gard. Bull. Singapore 21: [372], pl. 17. 1966.

This variety, based on *Hose 419* from the side of Entoyut River, Baram district, Sarawak, deposited in the British Museum herbarium in London, "is hardly distinguishable from the type form except that it has 5-flowered cymes and elenticellate twigs".

Munir (1966) cites from Sarawak *Haron S.21392* and *Hose 419* and from Sabah *Chai SAN.25582*. He comments that the Haron collection "differs from the holotype by its leaves being sub-coriaceous and

thickly grey-puberulent beneath; bracts and peduncles puberulent and comparatively thicker; branchlets puberulent. What is easily noticed in this specimen is the greyish colour of the leaves below, which is found in none of the other specimens of this or other varieties of this species." I feel that it should be compared carefully with var. *clemensorum* (Mold.) Mold., which also has the leaf-blades grayish beneath.

NOTES ON THE GENUS *NASHIA*

Harold N. Moldenke

Originally it was my plan to publish a detailed monograph of this genus, as of all the other genera in this family, but lack of time now renders this plan impractical. Yet it is probably worthwhile to place on record the miscellaneous bibliographic and herbarium notes assembled by my wife and myself over the past fifty years. This is the 52nd genus now so treated in this series of papers in *Phytologia* and elsewhere (*Brittonia*, *Feddes Repert. Spec. Nov.*, *Revisit. Sudam. Bot.*, etc.). Herbarium acronyms employed hereinafter are the same as used in all my previous papers since 1932 and are fully explained in my "Fifth Summary of the *Verbenaceae*...." (1971), volume 2, pages 195 to 801.

NASHIA Millsp., *Field Columb. Mus. Publ. Bot.* 2: 176. 1906.

Bibliography: Griseb., *Cat. Pl. Cub.* 215. 1866; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 95. 1894; Millsp., *Field Columb. Mus. Publ. Bot.* 2: 176--177. 1906; Millsp., *Feddes Repert. Spec. Nov.* 7: 283--284. 1909; Urb., *Symb. Antill.* 7: 353. 1912; Prain, *Ind. Kew. Suppl.* 4, imp. 1, 160. 1913; Fedde & Schust., *Justs Bot. Jahresber.* 40 (2): 335. 1915; Britton & Millsp., *Bahama Fl.* 371. 1920; Prain, *Ind. Kew. Suppl.* 5, imp. 1, 173. 1921; Mold., *Phytologia* 18: 194. 1922; Urb., *Feddes Repert. Spec. Nov.* 18: 194--195 (1922) and 20: 344--345. 1924; J. C. Willis, *Dict. Flow. Pl.*, ed. 5, 443. 1925; A. W. Hill, *Ind. Kew. Suppl.* 7: 139. 1929; Fedde & Schust., *Justs Bot. Jahresber.* 53 (1): 1074. 1932; Junell, *Symb. Bot. Upsal.* 1 (4): 34 & 36, fig. 65. 1934; Mold., *Suppl. List Comm. Vern. Names* 15. 1940; Mold., *Phytologia* 2: 53--54. 1941; Mold., *Suppl. List Inv. Names* 5. 1941; Mold., *Alph. List Inv. Names* 13. 1942; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 24--26 & 96. 1942; Mold., *Phytologia* 2: 107. 1944; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 95. 1946; Mold., *Alph. List Cit.* 1: 188. 1946; Mold., *Alph. List Inv. Names Suppl.* 1: 13--16. 1947; Mold., *Phytologia* 2: 384 (1947) and 2: 509. 1948; H. N. & A. L. Mold., *Pl. Life* 2: 30 & 73. 1948; Mold., *Alph. List Cit.* 3: 928 (1949) and 4: 1144, 1257, & 1258. 1949; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 42, 44, 48, 162, & 191. 1949; J. C. Willis, *Dict. Flow. Pl.*, ed. 6, 443. 1951; E. J. Salisb., *Ind. Kew. Suppl.* 11: 164. 1953;

Angely, Cat. Estat. Gen. Bot. Fan. 17: 5. 1956; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 280 & 289--291, fig. 125. 1957; Prain, Ind. Kew. Suppl. 4, imp. 2, 160. 1958; Mold., Résumé 52, 310, 311, 315, 317, 318, & 463. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 95. 1960; Prain, Ind. Kew. Suppl. 5, imp. 2, 173. 1960; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 188. 1965; Mold., Phytologia 12: 20, 27, 28, 37, & 39. 1965; J. Jiménez, Supl. Cat. Fl. Doming. 1: 217. 1966; Rouleau, Guide Ind. Kew. 127 & 352. 1970; Mold., Fifth Summ. 1: 93, 97, 103, 366, & 476 (1971) and 2: 551, 552, 557, 560, 566, 568, 753, & 895. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 778. 1973; Alain in León & Alain, Fl. Cuba, imp. 2, 2: 280 & 289--291, fig. 125. 1974; Mukherjee & Chanda, Trans. Rose Res. Inst. 41: 41 & 47. 1978; Mold., Phytologia 45: 339 & 508. 1980.

Pubescent shrubs, mostly spiny or becoming spiny, aromatic; stems tetragonal; branches mostly grayish; leaves decussate-opposite or fasciculate, exstipulate, simple, mostly glandular-punctate beneath; inflorescence small, capitate; peduncles grayish; flowers hypogynous, complete; calyx short, annulate and subtruncate or shortly 2-lobulate, rarely with 2 apparently free sepals; corolla white, only very obscurely zygomorphic, tubular or campanulate, small, the limb 4-lobulate, the lobes subequal, valvate in bud; stamens 4, didynamous, subequal, inserted in the corolla-tube; ovary superior, 2-locular; fruit small, drupaceous, the pyrenes bony, coherent.

A small Antillean genus of 7 species, native to the Bahamas, Cuba, and Hispaniola, closely related to *Lippia* Hout. Junell (1934) illustrates a cross-section of the ovary. Urban (1912) comments that the "Genus a cl. Millspaugh propositum cum *Lippia* conjugendum est; nam in speciminibus laudatis ullum discrimen a genere ulteriore frustra quaesivi. Calyx non in anulum reductus est, sed e sepalis 2 liberis sublinearibus transversim positis more aliarum *Lippiae* specierum constat et corollae aestivatio more *Verbenacearum* imbricativa (nec valvata) est." In spite of these observations, however, I still feel that this small group of extremely closely related taxa are so manifestly distinct from those of the very large and variable genus *Lippia* that they deserve generic rank. The "2 free sepals", fleshy attractively colored fruit, and spinose habit certainly are not seen in *Lippia*.

An artificial key to the accepted species:

1. Branches conspicuously spinose.
 2. Native to Cuba only.
 3. Leaf-blades glandular beneath.....*N. myrtifolia*.
 - 3a. Leaf-blades pilosulous and not glandular beneath.....
N. armata.
 - 2a. Native to Hispaniola only.....*N. spinifera*.
 - 1a. Branches unarmed.
 4. Native to Cuba only.
 5. Heads few-flowered, hemispheric or oblong-ovoid; leaf-blades 1--4-dentate.
 6. Leaf-blades with whitish scales on the upper surface;

- bractlets apically acute.....*N. nipensis*.
 6a. Leaf-blades short-pilose on the upper surface; bract-
 lets apically rounded or obtuse.....*N. variifolia*.
 5a. Heads many-flowered, oblong-cylindric; leaf-blades en-
 tire-margined.....*N. cayensis*.
 4a. Native to the Bahama Islands only.....*N. inaguensis*.

NASHIA ARMATA (Urb.) Mold., Phytologia 2: 53. 1941.

Synonymy: *Lippia armata* Urb., Feddes Repert. Spec Nov. 18: 194. 1922.

Bibliography: Urb., Feddes Repert. Spec. Nov. 18: 194. 1922; A. W. Hill, Ind. Kew. Suppl. 7: 139. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1074. 1932; Mold., Phytologia 2: 53. 1941; Mold., Alph. List Inv. Names Suppl. 1: 13. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 25 & 96 (1942) and ed. 2, 44 & 191. 1949; Mold., Alph. List Cit. 4: 1257. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 164. 1953; Alain in León & Alain, Fl. Cuba, imp. 1, 289 & 290. 1957; Mold., Résumé 52, 310, & 463. 1959; Mold., Fifth Summ. 1: 97 (1971) and 2: 551 & 895. 1971; Alain in León & Alain, Fl. Cuba, imp. 2, 2: 289 & 290. 1974.

A shrub; branches rigid, straight, tetragonal, densely pilose with very short, antrorsely curved, finally nigrescent hairs; branchlets ending in spines; leaves sessile or on petioles only 0.5 mm. long; leaf-blades rather thick, very rigid, oblong or narrowly obovate, 3--8 mm. long, 1.5--4 mm. wide, apically obtuse or rounded, basally obtuse, marginally entire and tightly revolute, shiny and scabrous above, pilose with very short hairs that are basally incrassate, nigrescent in drying, pilosulous beneath with minute gray hairs; midrib deeply impressed above; secondaries 1 or 2 per side, impressed above, prominulent or flat and obscure beneath; inflorescence axillary, capitate, sessile, small, few-flowered; bracts suborbicular, apically shortly or very shortly acuminate, very shortly appressed-pilose on the back; on young flowers the calyx reduced to a very short annulus, without lobes, the corolla-tube externally glabrous, the 4 lobes dorsally minutely pilosulous; stigma ovate, oblique.

This rare endemic species is based on *Ekman 9220* from calcareous hillsides on the coast of Aguadores, Santiago, in Oriente, Cuba, collected on June 14, 1918, and deposited in the Stockholm herbarium. The species is known thus far only from the original collection.

Urban (1922) compares *N. armata* with *N. cayensis* and notes that the latter differs in its slender, pendent, unarmed branches, its ovate to elliptic, apically obtuse or acute leaves which are 15 mm. long and 5--9 mm. wide, its many-flowered heads, and two narrowly spatulate sepals. "Multo magis affinis est *Lippia inaguensis* (Millsp.) Urb. ex ins. Baham., quae ramis raro vix spinescentibus breviter et molliter villosulis, nervis foliorum lateralibus utroque latere 3--5, bracteis obovato-spatulatis, calycis lobis 2 evolutis (an etiam corollas caracteribus?) recedit."

Citations: CUBA: Oriente: *Ekman 9220* (F--photo of type, N--iso-

type, N--photo of type, S--type, S--isotype, Si--photo of type, Z--photo of type).

NASHIA CAYENSIS Britton, Bull. Torrey Bot. Club 42: 517. 1915.

Synonymy: *Lippia cayensis* (Britton) Urb., Feddes Repert. Spec. Nov. 18: 195. 1922. *Lippia cayensis* Urb. apud A. W. Hill, Ind. Kew. Suppl. 7: 139. 1929.

Bibliography: N. L. Britton, Bull. Torrey Bot. Club 42: 517. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 173. 1921; Urb., Feddes Repert. Spec. Nov. 18: 195. 1922; A. W. Hill, Ind. Kew. Suppl. 7: 139. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1074. 1932; Junell, Symb. Bot. Upsal. 1 (4): 34 & 36, fig. 65. 1934; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 25 & 96 (1942) and ed. 2, 44 & 191. 1949; Mold., Alph. List Cit. 3: 928. 1949; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 289--291, fig. 125. 1957; Mold., Résumé 52, 311, & 463. 1959; Mold., Fifth Summ. 1: 97 (1971) and 2: 552 & 895. 1971; Alain in León & Alain, Fl. Cuba, imp. 2, 2: 289--291, fig. 125. 1974.

Illustrations: Junell, Symb. Bot. Upsal. 1 (4): fig. 65. 1934; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 290, fig. 125 (1957) and imp. 2: 290, fig. 125. 1974.

A densely branched aromatic shrub; branches slender, pendent, finely rough-pubescent; petioles about 1 mm. long; leaf-blades ovate to elliptic, 15 mm. long or less, 5--9 mm. wide, apically obtuse or acutish, basally mostly rounded, scabrous above, pubescent and glandulose beneath, strongly few-veined, the venation impressed above, prominent beneath; heads solitary in the leaf-axils, subsessile, globular and about 5 mm. in diameter when in anthesis, oblong-cylindric and 10--15 mm. long in fruit, densely many-flowered; bracts broadly ovate to obovate, about 3 mm. long, pubescent, marginally ciliate; calyx of 2 narrowly spatulate sepals nearly as long as the corolla; corolla greenish, scarcely longer than the bracts, the somewhat irregular limb about as long as the campanulate tube; filaments very short; fruit orange-red, about 2 mm. in diameter.

This endemic species is based on *Shafer 2450* from near Pueblo Romano, Cayo Romano, Camagüey, Cuba, collected on October 8 or 9, 1908, and deposited in the Britton Herbarium at the New York Botanical Garden.

Britton (1915) notes "Similar to *Lippia myrtifolia* Griseb., and clearly congeneric with the generic type, *N[ashia] inaguensis* Millsp." Junell (1934) provides an illustration of a cross-section of the ovary.

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

Citations: CUBA: Camagüey: *Shafer 2450* (N--type).

NASHIA INAGUENSIS Millsp., Field Columb. Mus. Publ. Bot. 2: 177. 1906.

Synonymy: *Lippia inaguensis* (Millsp.) Urb., Symb. Antill. 7: 353. 1912. *Lippia inaguensis* Urb. apud Prain, Ind. Kew. Suppl. 5,

imp. 1, 153. 1921. *Nashia inagensis* Riser, in litt.

Bibliography: Millsp., Field Columb. Mus. Bot. 2: 177. 1906; Millsp., Feddes Repert. Spec. Nov. 7: 283--284. 1909; Urb., Symb. Antill. 7: 353. 1912; Prain, Ind. Kew. Suppl. 4, imp. 1, 160. 1913; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 335. 1915; Britton & Millsp., Bahama Fl. 371. 1920; Urb., Feddes Repert. Spec. Nov. 18: 195. 1922; Mold., Suppl. List Comm. Vern. Names 15. 1940; Mold., Suppl. List Inv. Names 5. 1941; Mold., Alph. List Inv. Names 31. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 24 & 96. 1942; Mold., Phytologia 2: 107. 1944; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 42, 162, & 191. 1949; Prain, Ind. Kew. Suppl. 4, imp. 2, 160. 1958; Mold., Rĕsumĕ 50, 220, & 463. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 153. 1960; Mold., Fifth Summ. 1: 93 & 366 (1971) and 2: 557 & 895. 1971.

An unarmed shrub or stout straggling bush, 1.5--2 m. tall, with the odor of citronella; branches stout, opposite, strong, terete to tetragonal, issuing at right angles; trunk 4--5 dm. tall, 3--4 cm. in diameter; bark rosy-gray, exfoliating longitudinally; leaves very short-petiolate on the branchlets, "baculatum et lanatum in fasciculi dispositis", the leaf-blades ovate or obovate to spatulate or lingulate, 5--8 mm. long, 3--5 mm. wide, apically obtuse, basally attenuate, conspicuously reticulate-rugose and strigose above, strigose-tomentose beneath, marginally entire and revolute in drying; inflorescence sessile, borne on the median portion of the branchlets; flowers 6--8; corolla white, the tube orange-yellow; bracts rutelliform, longer than the flowers, about 2.5 mm. long and 2 mm. wide, apically apiculate, marginally ciliate; calyx minute, annular, dentate, ciliate, persistent on the rachis; corolla campanulate, the lobes equal, the 2 exterior ones large, apically emarginate, basally auriculate, the 2 inner ones entire; stigma peltate, sagittate after anthesis; style included; filaments abbreviated, inserted at about one-third the length of the corolla-tube; drupe pyriform, fleshy, 3 mm. long, 4 mm. wide, the nutlets hard, smooth, 2.5 mm. long, 3.5 mm. wide.

Millspaugh (1906) based this endemic species on *Nash & Taylor 1006* from the scrublands back of Matthew Town, Inagua, Bahama Islands, collected on October 13, 1904, and deposited in the Britton Herbarium at the New York Botanical Garden. He cites also *Nash & Taylor 1454* from the same locality (topotype) and notes "A sheet also found in the Hitchcock collection marked '*Lantana* sp. from Inagua Dec. 3, 1890'. Mr. Brace sends a small specimen of the species from a garden in Nassau 'where it was planted from Inagua'. It is well known to the natives, who use the leaves in decoction as a febrifuge known as 'Mountain Tea'."

Collectors describe this species as a shrub, 1--2 m. tall, resinously aromatic, the branches spreading-arching, and the fruit orange or brown-orange in color, translucent, and have found the plant growing in scrub and coppices and along rock walls, in flower in March and November, in fruit in August. The corollas are said to have been "white" on *Gillis 7510 & 13097*. A wood sample accompanies *Nash & Taylor 1454*.

Vernacular names reported for *N. inaguensis* are "Mougean tea", "moujean tea", "mountain tea", and "tea-bush".

Gilles asserts that this plant "would make a good hedge plant". His no. 7510, collected in Florida, was grown there from seed imported from Great Exuma in the Bahama Islands.

Fedde & Schuster (1915) cite only *Rothrock* 383 from the Bahamas. Christopher Riser, in a letter to me dated July 27, 1970, says "I have observed *N. inagensis* around Mathewtown, Long Island, Bahamas, where it is endemic", but in a later undated letter to my wife he says "I did not find *N. inaguensis* on Long Island and am sorry that my carelessness allowed me to send that statement. I did look for it on Long Island but was unsuccessful [in finding it]."

Citations: BAHAMA ISLANDS: Great Inagua: *D. S. Correll* 41660 (N), 46036 (N). Inagua: *Gillis* 13097 (Ld); *Nash & Taylor* 1454 (N, N). CULTIVATED: Bahama Islands: *Brace s.n.* [Nov. 14, 1904] (N). Florida: *Gillis* 7510 (Ba, Ft--2473).

NASHIA MYRTIFOLIA (Griseb.) Mold., *Phytologia* 2: 53. 1941.

Synonymy: *Lippia myrtifolia* Griseb., *Cat. Pl. Cub.* 215. 1866.

Bibliography: Griseb., *Cat. Pl. Cub.* 215. 1866; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 95. 1894; Mold., *Phytologia* 2: 53. 1941; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 25 & 96. 1942; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 95. 1946; Mold., *Alph. List Cit.* 4: 1144. 1949; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 49 & 191. 1949; E. J. Salisb., *Ind. Kew. Suppl.* 11: 164. 1953; Alain in León & Alain, *Fl. Cuba*, imp. 1, 4: 389--290. 1957; Mold., *Résumé* 52 & 463. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 95. 1960; Mold., *Fifth Summ.* 1: 97 (1971) and 2: 560 & 895. 1971; Alain in León & Alain, *Fl. Cuba*, imp. 2, 2: 289--290. 1974.

A shrub; branches rufescent-puberulent, with axillary spines; leaves ovate-oblong, 1--2 cm. long, apically obtuse to subacute, marginally entire, basally rounded, somewhat scabrous above with scaly-based hairs, glandulose and smooth beneath; heads globose, 4--6 mm. in diameter, short-pedunculate; bractlets concave-subrotund, apically acute and recurved; sepals 2, lanceolate, apically obtuse, hispidulous; corolla about 2--3 mm. long, apically 4-lobulate.

This rare endemic eastern Cuban species is based on *Charles Wright* 3160, collected in Oriente between 1860 and 1864 and probably deposited in the Göttingen herbarium. Grisebach (1866) proposed a new Section, *Diphyllocalyx* Griseb., in the genus *Lippia* to accommodate this taxon. Wright comments "leaves glabrous, acute". Thus far, the taxon is known to me only from the original collection.

Citations: CUBA: Oriente: *C. Wright* 3160 [Herb. Sauvalle 1759] (F--photo of isotype, Hv--isotype, Hv--isotype, N--isotype, N--photo of isotype, Si--photo of isotype, Z--photo of isotype).

NASHIA NIPENSIS (Urb.) Mold., *Phytologia* 2: 54. 1941.

Synonymy: *Lippia nipensis* Urb., *Feddes Repert. Spec. Nov.* 20:

344--345. 1924.

Bibliography: Urb., Feddes Repert. Spec. Nov. 20: 344--345. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 139. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1074. 1932; Mold., Phytologia 2: 54 (1941) and 2: 384. 1947; Mold., Alph. List Inv. Names Suppl. 1: 14. 1947; Mold., Alph. List Cit. 4: 1258. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 44 & 191. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 164. 1953; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 289 & 290. 1957; Mold., RĚsumĚ 52, 315, & 463. 1959; Mold., Fifth Summ. 1: 97 (1971) and 2: 566 & 895. 1971; Alain in León & Alain, Fl. Cuba, imp. 2, 2: 289 & 290. 1974.

An unarmed shrub or the branchlets occasionally spinescent; branches straight, tetragonal; youngest branchlets of the current year pilose with minute upwardly curvate hairs; leaves subsessile or with petioles scarcely 0.5 mm. long; leaf-blades rigidly coriaceous, ovate, 7--10 mm. long, 4.5--7 mm. wide, apically obtuse, basally rounded or very slightly emarginate, the midrib impressed above and the few secondaries more or less impressed or not conspicuous, the secondaries slightly prominulent beneath and united in a reticulum of veinlets, marginally entire or with a single, unilateral, recurved, and revolute tooth, the upper surface covered with small white orbs which often bear a very short hair at their center, otherwise glabrous and shiny, the lower surface minutely punctate and sparsely pilosulous along the venation; peduncles about 3 mm. long; heads semiglobose, to 5 mm. in diameter, about 12-flowered, globular or shortly ovate and to 8 mm. long and 6 mm. wide in fruit; basal bracts shortly obovate or obovate-rhomboid, about 3 mm. long, apically acute, recurved; sepals 2, free, oblanceolate-linear, almost 2 mm. long; corolla yellow, 3 mm. long, apically pilose, the tube cylindric, 0.3 mm. in diameter. apically ampliate, the limb 3-lobed, the lobes semiorbicular, 1/4 as long as the tube, the rear one suborbicular; stamens inserted in the corolla-tube; anthers subsessile, included; style 0.8 mm. long; stigma oblique; fruit spherical, 2 mm. long, 2.8 mm. wide, shiny, not splitting into separate pyrenes on maturity.

This rare endemic eastern Cuban species is based on *Ekman 15044* from pinewoods, at about 300 m. altitude, near Rio Piloto, Sierra de Nipe, Oriente, Cuba, collected in anthesis and fruit in September. Urban (1924) comments: "Fortasse affinis *L[ippia] inaguensis* (Millsp.) Urb. quae pube. foliis oblongis, nervis numerosioribus, orbiculis supra nullis (an etiam floribus frustibusque, mihi non visis?) recedit. *L. cayensis* (Britton) Urb. foliis usque 15 mm. longis 6--9 mm. latis supra scabridis, capitulis fructiferis oblongo-cylindricis 10--15 mm. longis ex descriptione diversa est. *L. myrtifolia* Griseb. spinis axillaribus, foliis usque 2 mm. longe petiolatis, pluries majoribus, nervis numerosioribus subtus bene prominentibus discrepat". *Nashia nipensis* is known thus far only from the original collection.

Citations: CUBA: Oriente: *Ekman 15044* (F--photo of type, N--isotype, N--photo of type, S--type, S--isotype, Si--photo of type, W--2113437--isotype, Z--photo of type).

NASHIA SPINIFERA (Urb.) Mold., *Phytologia* 2: 54. 1941.

Synonymy: *Lippia spinifera* Urb., Feddes Repert. Spec. Nov. 18: 195. 1922.

Bibliography: Urb., Feddes Repert. Spec. Nov. 18: 195. 1922; A. W. Hill, Ind. Kew. Suppl. 7: 139. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1074. 1932; Mold., *Phytologia* 2: 54. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 26 & 96. 1942; Mold., Alph. List Cit. 1: 188. 1946; Mold., Alph. List Inv. Names Suppl. 1: 15. 1947; Mold., Alph. List Cit. 4: 1258. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 48 & 191. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 164. 1953; Mold., *Résumé* 57, 317, & 463. 1959; J. Jiménez, Cat. Fl. Doming. Supl. 1: 217. 1966; Mold., Fifth Summ. 1: 103 (1971) and 2: 566 & 895. 1971.

A shrub, 2--3 m. tall; branches straight, obtusely tetragonal, the younger parts covered with minute upwardly curvate hairs; branchlets often converted into spines, 5--10 mm. long, paired at the base of the leaves, often bearing 1 or 2 pairs of scales apically; leaves subsessile or on a petiole 0.5 mm. long, obovate to ovate or elliptic, 3--7 mm. long, 2--3 mm. wide, apically obtuse or rounded, basally obtuse, the midrib impressed to the apex above, prominent beneath, the secondaries absent, the blades smooth or minutely scabridulous and shiny above, nigrescent in drying, oliveaceous beneath, very shortly appressed-pilose or scabrous on the midrib, rigid, rather thick-textured, marginally recurved or revolute; inflorescence axillary, sessile, capitate, few-flowered, 2--2.5 mm. in diameter; bracts broadly orbicular, apically rounded or subtruncate or sometimes very shortly apiculate, 1.3--1.8 mm. wide; calyx subcampanulate, 2 mm. long, glabrous, the lobes 2, hardly semilunate, apically depressed-rounded, the rim sparsely and very shortly pilose; corolla white, glabrous, scarcely 3 mm. long, the tube cylindrical, apically scarcely ampliate, the lobes of the limb 4, orbicular, half as long as the tube; stamens inserted at the middle of the corolla-tube; filaments very short; anthers ovate; style 1 mm. long; stigma depressed-capitate, sub-bilateral; fruit globular, shiny, 2--2.5 mm. in diameter.

This rare endemic Haitian species is based on *Buch* 1994 from sunny thickets, at 1800 m. altitude, Morne Tranchant, Haiti, collected in flower and fruit in September, deposited in the Berlin herbarium, now probably destroyed. Ekman encountered it in thickets on eruptive slopes, at 1700--1920 m. altitude, flowering in July. Urban (1922) comments: "A praecedente [*N. armata*] habitu simili spinis brevibus, foliis evenosis laevibus vel raro minute scabriusculis, calyce bene evoluto, corolla glabra optime diversa".

Citations: HISPANIOLA: Haiti: *Ekman H.1166* (Ld), *H.1166a* (S), *H.1166b* (N, S).

NASHIA VARIIFOLIA (Urb.) Mold., *Phytologia* 2: 54. 1941.

Synonymy: *Lippia variifolia* Urb., Feddes Repert. Spec. Nov. 20: 344. 1924.

Bibliography: Urb., Feddes Repert. Spec. Nov. 20: 344. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 139. 1929; Fedde & Schust., Justs

Bot. Jahresber. 53 (1): 1074. 1932; Mold., Phytologia 2: 54. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 25 & 96. 1942; Mold., Alph. List Inv. Names Suppl. 1: 16. 1947; Mold., Alph. List Cit. 4: 1258. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 44 & 191. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 164. 1953; Alain in León & Alain, Fl. Cuba, imp. 1, 289--291. 1957; Mold., Rĕsumĕ 52, 318, & 463. 1959; Mold., Fifth Summ. 1: 97 (1971) and 2: 568 & 895. 1971; Alain in León & Alain, Fl. Cuba, imp. 2, 2: 289--291. 1974.

A small shrub; branches tetragonal, the younger ones pilose with very short slightly curvate hairs; branchlets often transformed into spines or with the apex spinose; petioles 0.5--1 mm. long; leaf-blades subcoriaceous, rigid, very variable on each branch or branchlet, varying from orbicular, ovate, obovate, or elliptic to narrowly oblong, 4--12 mm. long, 2--6 mm. wide, apically rounded to obtuse or subobtuse, basally acute to obtuse, marginally with 1 or 2 teeth per side, scabrous above with short basally-inflated hairs, pilose along the venation beneath or subglabrous, the midrib and 2--4 secondaries sulcate-impressed above, prominent beneath, not reticulate-joined; peduncles to 3 mm. long in anthesis; heads semiglobose, to 6 mm. wide; basal bracts semi-oval or triangular, about 2.5 mm. wide, apically obtuse or rounded, marginally recurved; sepals 2, free, oblanceolate or oblanceolate-linear, about 1.5 mm. long, dorsally pilose; corolla 3 mm. long, apically pilosulous, the tube infundibular, the anterior 3 lobes of the limb semiorbicular, the posterior lobe twice as long and ovate-triangular, apically truncate; stamens inserted in the corolla-tube; anthers subsessile, included; style 1 mm. long; stigma unilateral.

This rare endemic Cuban species is based on *Ekman 15542* from among limestone rocks near Pastelillo, Camagüey, Cuba, collected in anthesis in December, deposited in the Stockholm herbarium. The species is known thus far only from the original collection.

Citations: CUBA: Camagüey: *Ekman 15542* (F--photo of type, N--isotype, N--photo of type, S--type, S--isotype, Si--photo of type, Z--photo of type).

NOTES ON THE GENUS *KALAHARIA*

Harold N. Moldenke

Although our original intention was to prepare a complete and detailed monograph of this genus, as of all the other genera in this large and complex family, lack of available time now has rendered this plan untenable. It has seemed worthwhile, however, to place on record the miscellaneous notes, chiefly bibliographic and herbarium-derived, assembled on this genus by my wife and myself over the past fifty years, this being the 53rd genus so treated. The herbarium acronyms employed hereinafter are the same as those used by

me in all previous installments of these notes since 1932 and are fully explained in my "Fifth Summary of the *Verbenaceae*...." (1971) volume 2, pages 795 to 801.

KALAHARIA Baill., *Hist. Pl.* 11: 110--111. 1892.

Synonymy: *Kalacharia* Dinter, *Feddes Repert. Beih.* 2: 72. 1918.

Bibliography: Peters, *Naturwiss. Reise Mossamb.* 6 [Bot.]: 262. 1861; Oliv., *Journ. Linn. Soc. Lond. Bot.* 15: 96. 1876; Hook., *Icon.* 13: pl. 1221. 1877; Schinz, *Verhandl. Bot. Ver. Brand.* 31: 205--207. 1889; Baill., *Hist. Pl.* 11: 110--111. 1892; Gürke, *Engl. Bot. Jahrb.* 18: 180--181. 1893; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 1: 679. 1893; Gürke in Engl., *Pflanzenw. Ost-Afr. C.* 340. 1895; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 169 & 172 (1895) and ed. 1, 4 (3a): 382. 1897; Henriques, *Bolet. Soc. Brot.* 16: 69. 1899; J. G. Baker in *Thiselt.-Dyer, Fl. Trop. Afr.* 5: 295 & 313. 1900; H. H. W. Pearson in *Thiselt.-Dyer, Fl. Cap.* 5: 221--222. 1901; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 1, 101 & 102 (1901) and imp. 1, 232. 1903; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 1, 433. 1904; DeWild., *Ann. Mus. Congo*, ser. 5, 3: 136. 1909; DeWild., *Comp. Kasai* 402--403. 1910; R. E. Fries, *Wissen. Ergebn. Schwed. Rhod.-Kong. Exped. Bot.* 1 (2): 273--275. 1916; Dinter, *Feddes Repert. Beih.* 2: 72. 1918; J. C. Willis, *Dict. Flow. Pl.*, ed. 5, 352. 1925; Wangerin, *Justs Bot. Jahresber.* 46 (1): 717. 1926; DeWild., *Etud. Fl. Bas Moy.-Congo* 1: 72 & 310. 1930; Junell, *Symb. Bot. Upsal.* 1 (4): 103 & 106--107, fig. 160. 1934; Range, *Feddes Repert. Spec. Nov.* 38: 256. 1935; Thomas, *Engl. Bot. Jahrb.* 18: [Gatt. Clerod.] 89--90 & 95. 1936; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 2, 232. 1941; Mold., *Alph. List Inv. Names* 21. 1942; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 49--52 & 93. 1942; J. Hutchins., *Botanist South. Afr.* 476 & 511. 1946; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 1: 679. 1946; Mold., *Alph. List Inv. Names Suppl.* 1: 7. 1947; H. N. & A. L. Mold., *Pl. Life* 2: 34. 1948; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 115, 117--121, & 187. 1949; J. C. Willis, *Dict. Flow. Pl.*, ed. 6, 352. 1951; Goossens, *Suid-Akrik. Blompl.* 188. 1953; Wild, *Vict. Falls Handb.* 158. 1953; Brenan, *Mem. N. Y. Bot. Gard.* 9 (1): 37. 1954; Wild, *South. Rhodes. Bot. Dict.* 96. 1954; Mold., *Phytologia* 5: 132. 1955; Angely, *Cat. Estat. Gen. Bot. Fan.* 17: 4. 1956; Anon., *Assoc. Etud. Tax. Fl. Afr. Trop. Index* 1955: 63. 1956; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 232. 1959; Mold., *Résumé* 142, 144, 147--149, 151, 152, 219, 269, 271, 274, 276, 301, 302, 427, & 458. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 76. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 1: 679. 1960; Watt & Breyer-Brandwijk, *Med. Poison. Pl. S. East. Afr.*, ed. 2, 1048, 1372, & 1406. 1962; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 2, 433. 1963; H. P. Riley, *Fam. Flow. Pl. S. Afr.* 129. 1963; Mold., *Resume Suppl.* 3: 16 (1962) and 12: 6. 1965; F. A. Barkley, *List Ord. Fam. Anthoph.* 76 & 177. 1965; Airy Shaw in J. C. Willis, *Dict. Flow. Pl.*, ed. 7, 595. 1966; C. A. Sm., *Common Names S. Afr. Pl.* 600 & 601. 1966; Friedrich-Holzhammer, Meeuse, & Meikle in *Merx-*

müller, Prodr. Fl. Südw. Afr. 13 (122): 4--6. 1967; Bouquet, Med. Trop. 28: 49--58. 1968; Richards & Morony, Check List Fl. Mbala 237. 1969; Rouleau, Guide Ind. Kew. 100 & 352. 1970; Farnsworth, Pharmacog. Titles 5 (10): vii & item 11360 (1970, 5 (11): v & item 15121 (1970), and 5: Cumul. Gen. Ind. 1971; Mold., Fifth Summ. 1: 230, 237, 243, 246, 248, 249, 254, 363, 456, 459, 466, & 477 (1971) and 2: 533, 760, 883, & 972. 1971; Anon., Biol. Abstr. 54 (4): B.A.S.I.C. S.143. 1972; Mold., Biol. Abstr. 54: 1725. 1972; Mold., Phytologia 23: 210, 421, & 508 (1972) and 25: 220, 231, 237, 240, & 508 (1973), and 26: 364, 371, 373, & 505. 1973; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 610. 1973; Anon., Biol. Abstr. 56 (1): B.A.S.I.C. S.141. 1973; D'Arcy & Keating, Brittonia 25: 223 & 224. 1973; Hocking, Excerpt. Bot. A.23: 290 & 292. 1974; Mold., Phytologia 28: 458 & 509 (1974) and 34: 262 & 505. 1976; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 13: 126 & 328. 1976; Mold., Phytologia 36: 37 & 506. 1977; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40, 44, & 47. 1978.

More or less pubescent spinose shrubs, the spines supra-axillary; leaves rather small, decussate-opposite, subsessile or short-petiolate, deciduous, simple, exstipulate; flowers large, solitary, axillary, hypogynous, perfect, zygomorphic; calyx gamosepalous, inferior, campanulate, 5-fid; corolla yellow or red, gamopetalous, distinctly zygomorphic, plainly bilabiate, the tube cylindrical, curvate, swollen, the limb spreading, eventually reflexed, the lobes imbricate in bud, the frontal lobe innermost; stamens inserted in the corolla-tube, of 2 lengths, exerted during anthesis; filaments filiform; anthers 2-celled, the thecae basally free; pistil superior, 2-carpellary, single, with 2 subequal awn-shaped branches; ovary 1-celled, the placentae 4, bisected, arranged in 2 lateral pairs, with a central eventually rhomboid cavity; fruit drupaceous, not splitting into 4 separate pyrenes when mature.

A monotypic genus of tropical and southern Africa closely related to *Cyclonema* Hochst. Briquet (1895), Angely (1956), and Dalla Torre & Harms (1963) claim 2 species for the genus, but in my view there is only a single species with several subspecific taxa. Gürke (1895) recognized only one species, but Willis (1925, 1951) actually recognized four; Airy Shaw (1973) recognizes only one. Meeuse, in a letter to me dated December 9, 1953, says: "I see that you maintain [*Kalaharia*].....as a monotypic genus, although several authors have sunk it under *Clerodendrum*. I cannot see why it should be retained: spines occur in several *Clerodendrum* species (although perhaps not always of the same type) and the characters of flower and fruit seem to be well within the enormous range of variation in this genus." Actually, the supra-axillary spines of *Kalaharia* are morphologically very distinct from the always petiolar spines of *Clerodendrum* and the floral characters are those of *Cyclonema*, as are also the fruit characters; *Cyclonema* being a group certainly deserving of generic rank distinct from *Clerodendrum*. Junell (1934) says of *Kalaharia*: "Diese afrikanische Gattung,

welche nur die angeführte Art umfasst, wurde von Briquet in die Subtribus *Viticeae* eingereiht. Briquet verdankte jedoch seine Kenntnis der Gattung nur der unvollständigen und hinsichtlich des Fruchtknotens verhältnismässig unklaren Beschreibung von Baillon..... Baker.....reicht die Gattung in die Sektion *Cyclonema* der Gattung *Clerodendron* ein. Die Notwendigkeit der Einreihung dieser Pflanze in diese Subtribus ergibt sich unmittelbar beim Studium des Gynäceums. In Fig. 160 ist ein Querschnitt des Fruchtknotens in der Höhe der Insertionsflächen der Samenanlagen wiedergegeben. Die Plazenten sind bis zur Fruchtwand gespalten, d.h. die beiden Fruchtblätter sind nur ganz wenig miteinander verwachsen, und die Fruchtblattmitten sind nur ganz schwach verdickt. Im obersten Teil des Fruchtknotens sind die Fruchtblattränder mit den mittleren Partien der Fruchtblätter verwachsen. Die vier Fruchtknotenflächen sind daher im oberen Teil des Fruchtknotens voneinander getrennt. Im unteren Teil des Fruchtknotens ist die Fruchtwandung innen in der Medianlinie verhältnismässig stark ausgebaucht. Die Fruchtblattränder sind wie gewöhnlich mit leitendem Gewebe ausgerüstet. Fig. 161 stellt einen Längsschnitt durch einen sehr jungen Fruchtknoten dar. Unterhalb der Mikropyle sieht man leitendes Gewebe. Ähnliche Bilder erhält man auch bei *Clerodendron trichotomum*. Bei *C. ugandense* und *C. myricoides* (Sekt. *Cyclonema*) hingegen reicht der Fruchtblattrand nicht unter die Mikropyle hinab (vgl. Fig. 158). Der Gynäceumbau stützt meines Erachtens nicht die Auffassung, dass *Kalaharia* zur Sektion *Cyclonema* von *Clerodendron* gehört. Eine grössere Ähnlichkeit hinsichtlich des Fruchtknotenbaus scheint mit der Sektion *Euclerodendron* vorzuliegen."

Some authors cite the Gürke work in Engler's Botanischer Jahrbücher as "1894", but actually pages 1 to 208 of this volume were issued in 1893 and only pages 209 to the end were issued in 1894.

KALAHARIA UNCINATA (Schinz) Mold., *Phytologia* 5: 132. 1955.

Synonymy: *Cyclonema spinescens* Oliv., *Journ. Linn. Soc. Lond. Bot.* 15: 96. 1876 [not *C. spinescens* Klotzsch, 1861]. *Clerodendron uncinatum* Schinz, *Verhandl. Bot. Ver. Brand.* 31: 206--207. 1890. *Kalaharia spinipes* Baill., *Hist. Pl.* 11: 111. 1892. *Clerodendron spinescens* (Oliv.) Gürke, *Engl. Bot. Jahrb.* 18: 180--181. 1893. *Clerodendron spinescens* Gürke in *Engl., Pflanzenw. Ost-Afr. C:* 340, in syn. 1895. *Kalaharia spinescens* (Oliv.) Gürke in *Engl., Pflanzenw. Ost-Afr. C:* 340. 1895. *Kalaharia spinescens* Gürke apud J. B. Baker in *Thiselt.-Dyer, Fl. Trop. Afr.* 5: 313, in syn. 1900. *Kalaharia spinescens* Dinter, *Feddes Repert. Spec. Nov. Beih.* 2: 72. 1918. *Clerodendron spinescens* (Oliv.) Gürke apud Thomas, *Engl. Bot. Jahrb.* 18: 89. 1936. *Clerodendron uncinatum* Schinz apud G. Taylor, *Ind. Kew. Suppl.* 12: 76. 1959. *Clerodendron spinescens* Gürke ex Watt & Breyer-Brandwijk, *Med. Poison. Pl. S. East. Afr.*, ed. 2, 1372, in syn. 1962. *Kalaharia uncinata* Mold. ex Watt & Breyer-Brandwijk, *Med. Poison. Pl. S. East. Afr.*, ed. 2, 1406, in syn. 1962. *Clerodendron uncinatum* Schinz ex Mold., *Fifth Summ.* 1: 459, in syn. 1971. *Clerodendron uncinatum* Schinz & Mold. ex Mold., *Fifth*

Summ. 1: 466, in syn. 1971. *Kalaharia uncinata* D'Arcy & Keating, *Brittonia* 25: 224. 1973.

Bibliography: See bibliography of the genus as a whole.

Illustrations: Hook., *Icon.* 13: pl. 1221. 1877; Junell, *Symb. Bot. Upsal.* 1 (4): 103, fig. 160 & 161. 1934.

A perennial upright or decumbent subshrub or shrub, with pyramidal branching when erect and to 0.5 m. tall; branches gray-green, woody, angular or terete, densely pubescent with sharp-pointed basally weak hairs, flattened and widened at the nodes, mostly armed with small hooked or straight axillary or slightly supra-axillary pubescent spines to 6 mm. long at the lower nodes and shorter than the subtending leaves, the straight spines normally larger than the hooked ones; principal internodes usually about 2 cm. long; leaves decussate-opposite; petioles 0.6--5 cm. long; leaf-blades elliptic or ovate or suborbicular or subobovate, subcoriaceous, 1.5--4.7 cm. long, 7--15 mm. wide, apically rounded and minutely apiculate, marginally entire, basally narrowed, densely pubescent on both surfaces, sometimes with a silky sheen; secondaries 3--5 per side, spreading, obscure above, distinct beneath; inflorescence axillary, pedunculate, replacing the spines in the upper leaf-axils, usually opposite but occasionally with one inflorescence and one ca. 12 mm. long spine opposite each other at a node, cymose but usually reduced to a single flower; peduncles about 12 mm. long, densely pubescent, ampliate basally, 2-bracteate above the middle; bracts linear, 4--6 mm. long, pubescent; prophylla 2, awl-shaped, 1.5--2 mm. long, more or less long-pilose, situated directly beneath the shortly glandular-pubescent flower; calyx campanulate or infundibular, 6--12 mm. long, externally densely hirsute or pubescent both externally and within, glandular, the rim 5-toothed, the teeth ovate, rather shorter than the tube, unequal, apically acute; corolla golden-yellow, pure yellow, or very slightly pinkish, pubescent, the tube upwardly curvate, somewhat ampliate, twice as long as the calyx, usually about 1.3 cm. long and 2 mm. wide, puberulous within, the limb 5-lobed, the lobes unequal, the lower one obovate-cuneate, concave, about 1.8 cm. long, apically rounded or subtruncate, surpassing the upper, basally about 3 mm. wide, apically abruptly ampliate to 8 mm., the remaining upper 4 lobes oblong or obovate, shorter and somewhat narrower, apically obtuse or subacute, 7--12 mm. long, 5--7 mm. wide; stamens about 2.5 cm. long; filaments inserted in the corolla-tube, inwardly rolled in bud, puberulous, basally ampliate, 1.2--2.5 cm. long, during anthesis exerted about 1.4 cm. from the corolla-mouth; anthers 3--4 mm. long, separated half way from the base; pistil barely surpassing the stamens, somewhat dilated basally, 1.2--2.5 cm. long, apically shortly bifid; ovary barrel-shaped, 3--4 mm. long, glabrous, incompletely or completely 4-celled, usually with at least a partial central cavity.

Schinz (1890) comments that "Obwohl ich diese höchst interessante Pflanze einstweilen der Gattung *Clerodendron* untergeordnet habe, so bin ich mir doch wohl bewusst, dass sie an dieser Stelle

sur Zeit noch recht isolirt ist, denn sie oben erwähnte Centralhöhle im Fruchtknoten deutet doch entschieden darauf hin, dass die Frucht als aus 4 Nüsschen bestehend gedacht werden muss. Bei *Clerodendron* ist das Ovarium nach Bentham und Hooker unvollständig 4-fächerig, bei meiner Pflanze dagegen vollständig gefächert und die Möglichkeit ist daher keineswegs ausgeschlossen, dass dieselbe noch einer besondern Gattung erhoben wird. Schliesslich sei noch auf die eigenartige Bewaffnung des *C. uncinatum* aufmerksam gemacht, die an jene von *C. aculeatum* erinnert, indessen sind es dort die Blatt-, hier aber die Blütenstiele, also die Achselproducte der Blätter, die sich zu Dornen umwandeln."

Cyclonema spinescens Oliv. is based on *Cameron s.n.* from "Lake Tanganyika or region round about", deposited in the Kew herbarium.

Recent collectors describe *Kalaharia uncinata* as a small shrub, subligneous rampant subshrub, or small shrubby bush, or even as a "many-headed perennial" (Gossweiler), "long prostrate herb", or "jährlich austreibendes Kraut" (Giess), deep-rooted, "evergreen", 0.6--3 m. tall (or long), usually found in open sunny exposure and blooming in the dry season; the stems and branches usually prostrate, radiating from the base, with small spines; petioles to 3 cm. long; leaf-blades obovate or spatulate, 12--26.5 cm. long, 4--8 cm. wide, basally long-attenuate into the petiole; fruit globular, edible, sweet. They have encountered it growing on savannas, in dry sandy open areas, on red sandy soil, and near old cultivations, at 300--1300 m. altitude, in flower from June to September and in December and February, in fruit from July to September. *Geiss* 9774, *Rodin* 9391, and *Story* 6258 are said to represent a juvenile form with "soft leaves and spines". Wild also refers to the plant as "herbaceous" and Robyns speaks of it as a "plante herbeuse rampante". *Story* reports it "uncommon in sandy open woodlands" in Namibia, but Gossweiler found it frequent in the Kalahari sands in what he calls "hemifruticeta" and "rhizomato-fruticeta" of the sandy, consolidated, alluvial dunes. He notes concerning it: "arbusto sempre verde, caules prostados, planta tipica da Chana de borracha Rhizomato-fruticeta". Almost unbelievably, *Peters* claims to have found it in the rainforest at Victoria Falls! *Louis* refers to the "aiguillons crochus stipulaires", but no other author or collectors to my knowledge has regarded the spines as stipular in origin!

The corollas of the type collection are described as having been pinkish-golden-yellow [orange?]. They are said to have been "yellowish" on *Gossweiler* 13577, "bright-yellow" on *Gossweiler* 14054 & 14054a, and "yellow" on *Allen* 402, *Cabra & Michel* 11, *Carlier* 71, *Germain* 2586, *Gossweiler* 13577, *Lebrun* 6189, *Liben* 3114, and *Louis* 63. Collections on whose accompanying labels no mention is made of corolla color are cited by me here as probably representing the typical or "normal" and commonest form of the species -- as has been my policy throughout this series of papers.

The species is based on a Schinz collection from Gorekas, "about 90 miles north of the Tropic" in the northwest Kalahari Desert of Namibia. *Pearson* (1901) notes that "The range of the species in South Africa will therefore probably be extended to the Western Ka-

lahari and Namaqualand". He cites only *Holub s.n.* from Botswana.

Vernacular names recorded for the species are "kakölu-hashii", "kikosa", "kilubre", "kinhosa-kiluba", "lukato", "namuteketa", "nquanquabulana", "osiosita" [=thorn-snake], "papha", "root-wag-n-bietjie" [applied also to *Acacia gillettae*], "talala", "tsakutsende", "uquanquabulana", and "zalata".

Baker (1900) cites *Hens 57* from "Lower Congo", *Johnston s.n.* and *Marques 342* from Angola, *Descamps s.n.* and *Pogge 547* from Zaire, *Bohm & Reichardt 161* and *Cameron s.n.* from Tanzania, *Carson s.n.* & *Nutt s.n.* from Uganda, and *Baines s.n.*, *Fleck 230*, *Kirk s.n.*, *Nels 30*, and *Schinz 456* from Nyasaland. *Range (1935)* cites *Range 766 & 1459*. *Wild (1953)* cites *Allen 402*, *Hutchinson 3426*, and *Rogers 5329 & 7537* from Victoria Falls. *Friedrich-Holzhammer* and his associates (1967) cite *Dinter 7662*, *Leistner 1813*, *Merxmüller & Giess 1225*, *Seydel 3674*, and *Story 5260* from Namibia. *Gürke (1893)* cites *Bohm & Reichardt 161*, *Cameron s.n.*, *Fleck 230*, *Nels 30*, *Pogge 547*, *Schinz 456*, & *Stuhlmann 438*.

Thomas (1936) cites the following collections: TANZANIA: *Goetze 1088*, *Holst 2798*, *Prittwitz 191*, *Stuhlmann 438*. NYASALAND: *Buchanan 391*, *Carson s.n.*, *Rowes 95*, *Scott Elliot 8360*. ZAIRE: *Pogge 661*, *662*, *663*, *664*, *665*, *Schlechter 12589*. ANGOLA: *Antunes A.21*, *Baum 63*, *Johnston s.n.*, *Pogge 547*. NAMIBIA: *Dinter 2277 & 2654*, *Fleck 230*, *Range 1459*, *Schinz 456*, *Seiner 30*, *101*, & *322*, *Throta 19a*. ZAMBIA: *Seiner s.n.*

A specimen in the Brussels herbarium bears an annotation to the effect that the plant is used as a "remède contre les maux de tête; traitement par la vapeur de la concoction de racine; la tête est placée au dessus du récipient bouillant, couverte par un linge, sudation abondante. Une séance par jour jusqu'à amelioration des douleurs." De Saeger reports that "la decoction de la racine est utilisée comme vomitif violent contre les piqûres de serpents". *Riley (1963)* says that the plant is used to treat bilharzia. *Wild (1954)* asserts that it is reputed to be poisonous in Zimbabwe. *De Wildeman (1910)* notes that "Les feuilles sechées et pilées avec du sel sont employées pour guerir les rhumes de poitrine."

Watt & Breyer-Brandwijk (1962) tell us that "A pint of cold infusion of the root.....is drunk twice a month by a woman of the Bemba and related tribes as a contraceptive. These tribes also use a decoction of the root as a gargle in sore throat. The plant has been reported as having been the cause of poisoning in cattle..... but no details are available."

It should be noted that the *Pearson (1901)* reference to this species in the bibliography (above) is sometimes cited as "1912", but pages 1--222 of the work in question were actually issued in 1901. The *Gürke (1895)* reference is sometimes given as "p. 320", but this appears to be an error for p. 340. This same author's 1893 work is sometimes incorrectly cited as "1894" (the titlepage date), but pages 1--208 actually appeared in 1893. Similarly, the *Schinz (1890)* reference is sometimes erroneously cited as "1889". *Farnsworth (1970)* erroneously cites the reference to *Kalaharia uncinata* as "item 15105 -- actually it occurs only in item 15121.

Material of this species has been misidentified and distributed

in some herbaria as *Clerodendrum kentrocaule* Bak., *Stachytarpheta* sp., *Zizyphus* sp., and even "Capparidaceae". On the other hand, the Carnochan 71 and Gates 213, distributed as typical *K. uncinatum*, actually represent var. *hirsuta* (Mold.) Mold. and Brass 16881, Quarré 3434 & 4217, and Seydel 3674 represent f. *rubra* Mold., while Mullenders 610 is something in the Apocynaceae.

Citations: ZAIRE: Achten 100a (Br, Br, Br), 100b (Br); Becquet 919 (Br); Bequaert 24 (Br), 32 (Br, W--1659340), 78 (Br), 7140 (Br); Bredo 3023 (Br), 3211 (Br), 4105 (Br); Cabra & Michel 11 (Br); Callens 4079 (N); Callewaert s.n. [17 Mai 1911] (Br); Carlier 71 (Mu); Collector undetermined 253 (Br); Couteaux 1040 (Br, Br, Br, Br, N); DeSaeger 80 (Br); Descamps s.n. [Katanga] (Br); Dubois 1247 (Br, Br); Flamigni 183a (Br); Gentil s.n. [Juil. 1902] (Br); Germain 2586 (Br); Gillet 691 (Br), s.n. [1900] (Br, N), s.n. [1903] (Br), s.n. [1909] (Br); Hens B.57 (Br); Herb. Jard. Bot. Brux. s.n. [Ankoro, 8 avril 1937] (Br), s.n. (Br, Br); Hock s.n. [juin 1910] (Br), s.n. [septembre 1911] (Br); Laurent 485 (Br); Laurent & Laurent s.n. [19/11/05] (Br); Lebrun 6189 (Br, Br); Liben 3114 (Mu); Louis 63 (Br); Luxen 58 (Br, Br), F.77 (Br); Mortelmeux 13 (Br); Quarré 3456 (Br, Br, Br, Br), 3263 (Br, Br), 5185 (Br); W. Robyns 288 (Br); F. A. Rogers 10270 (Br); RRPP.Salesiens S.290 (Br), S.486 (Br); Sapin s.n. [1906] (Br), s.n. (Br, Br); R. Schlechter 12589 (Br); Sparano 64 (Br); Triébaud 653 (Mu); Vanderyst 1907 (Br), 9919 (Br), 17215 (Br), 20400 (Br, Br), 21071 (Br), 21116 (Br), 21438 (Br), 22246 (Br), 23089 (Br, Br), 23789 (Br), 24015 (Br, Br), 29002 (Br, Br), 29869 (Br), 29885 (Br), 30002 (Br), 30003 (Br), 32167 (Br, Br), 32596 (Br, Br, Br), 32606 (Br, Br), 32667 (Br, Br, Br), 33325 (Br, Br, N), 34042 (Br), 34305 (Br), s.n. [Kisantu, Sept. 1908] (Br), s.n. [aôut 1908] (Br); Verdick 24 (Br), 268 (Br), 587 (Br). ANGOLA: Lunda: Gossweiler 86 (Ul), 13445 (Ld, Ul), 13577 (B, Ul, W--2074072), 13577b (Ul), 14054 (Ul, W--2074423), 14054a (B). ZAMBIA: Borle 319 (S); Bredo 4002 (Br, N); Pole-Evans 2767 [24] (Rh); E. A. Robinson 3926 (Mu-3926); F. A. Rogers 26112 (S). ZIMBABWE: C. E. F. Allen 402 (Rh); Dinter 7662 (S); Peter 30816 [V.27] (B), 51070 [S.62] (B); Wild 357 [Herb. Govt. S. Rhodes. 13823] (N). NAMIBIA: Baum 63 (Mu--3917); Bradfield 181 (Z); Dinter 7662 (Mu); Finke 3674 (Mu); Giess 9774 (Mu); Peter 47384 (B); Rehm s.n. [Grootfontein, 17.11.39] (Mu); Rodin 9391 (Mu); Seydel 3674 (N); Story 6258 (Mu). BOTSWANA: Van Son s.n. [Herb. Transv. Mus. 29035; Natal Herb. 27106] (N, N--photo, Na, S--photo, Z--photo). CULTIVATED: Zaire: Vanderyst 24620 (Br).

KALAHARIA UNCINATA var. *HIRSUTA* (Mold.) Mold., Phytologia 5: 132. 1955.

Synonymy: *Kalaharia spinescens* var. *hirsuta* Mold., Phytologia 3: 418. 1951.

Bibliography: Mold., Phytologia 3: 418 (1951) and 5: 132. 1955; Anon., Assoc. Étud. Tax. Afr. Trop. Index 1955: 63. 1956; Mold., Résumé Suppl. 3: 16 (1962) and 12: 6. 1965; Mold., Fifth Summ. 1: 230, 237, 243, 248, & 254 (1971) and 2: 533 & 883. 1971; Mold.,

Phytologia 36: 37. 1977.

This variety differs from the typical form of the species in having the stems, branches, branchlets, spines, leaves, peduncles, and calyxes densely spreading-hirsute, and the corollas red or scarlet.

The variety is based on *Burttt 3806* from Kazikazi, Tanzania, at 4200 feet altitude, collected on July 14, 1932, and deposited in the Brussels herbarium.

Collectors have described this plant as a small, spreading or straggling, shrubby herb or low bushy or climbing shrub, 0.3--1.5 m. tall, the stems often prostrate, the spines recurved, and the corolla-lobed reflexed. They have found it growing in sandy soil with full exposure to the sun, along roadsides, in grass on dry ground in woodland, in low grass on village greens. on flat sandy open-forest plains, and in open bush-veld with *Acacia*, *Zizyphus*, *Grewia*, and other low trees, at altitudes of 800--2300 m., in flower from June to August and in December. Lovemore asserts that it is common in the Kalahari sand-veld woodlands of Zimbabwe, while Bullock says that it is a common ruderal plant in black soil up to 7000 feet altitude in Tanzania. The only vernacular names recorded for it are "mukotakipwa" and "osijoseuta".

The corollas are said to have been "red" on *Bullock 3007*, *Lovemore s.n.*, and *Rodin 2710*, "orange-red" on *Pritchard 300*, "bright-red" on *Gates 213*, "scarlet" on *Richards 25850*, and "flame" or "coral-flame" on *Leach & Bayliss 13036*. The pubescence is shorter than normal for the variety on *Dinter 7662*.

Citations: ZAIRE: *Bredo 3262* (Br), *3303* (Br). TANZANIA: *Burttt 3333* (Br, Br, N), *3806* (Br--type, N--photo of type, Z--photo of type); *Bullock 3007* (B, S); *Carnochan 71* (S, W--2091737); *Goetze 1098* (Br); *Peter 34419* [V.118] (B), *34654* [V.122] (B), *35200* [V.130] (B), *35298* [V.132] (B); *Richards 25850* (Mu, N). ANGOLA: *Huila: Pritchard 300* (E--1674076, Ul). ZAMBIA: *B. E. Gates 213* (N). ZIMBABWE: *Lovemore s.n.* [12/8/56] (S); *M. N. Mason s.n.* [Victoria Falls, Aug. 1911] (Br). NAMIBIA: *Dinter 7662* (B); *Leach & Bayliss 13036* (Mu, N); *Loeb & Koch 12* (Ca--958701), *304* (Ca--958702); *Rodin 2710* (Ca--802976). BOTSWANA: *Sow s.n.* [Herb. Transv. Mus. 29035] (S).

KALAHARIA UNCINATA var. *PARVIFLORA* (Schinz) Mold., *Phytologia* 28: 458. 1974.

Synonymy: *Clerodendron spinescens* var. *parviflora* (Schinz) Gürke, *Engl. Bot. Jahrb.* 18: 181. 1893. *Kalaharia spinescens* var. *parviflora* (Schinz) R. E. Fries, *Wiss. Ergebn. Schwed. Rhod.-Kong. Exped. Bot.* 1 (2): 274. 1916. *Clerodendrum uncinatum* var. *parviflora* Schinz apud Thomas, *Engl. Bot. Jahrb.* 18: 90, in syn. 1936. *Kalaharia uncinata* var. *paaviflora* [Mold.] ex Anon., *Biol. Abstr.* 56 (1): B.A.S.I.C. S.141, sphalm. 1973.

Bibliography: Gürke, *Engl. Bot. Jahrb.* 18: 181. 1893; R. E. Fries, *Wiss. Ergebn. Schwed. Rhod.-Kong. Exped. Bot.* 1 (2): 274. 1916; Junell, *Symb. Bot. Upsal.* 1 (4): 103 & 106, fig. 161. 1934; Thomas, *Engl. Bot. Jahrb.* 18: [Gatt. *Clerod.*] 90. 1936; Fedde &

Schust., Justs Bot. Jahresber. 60 (2): 573. 1941; Anon., Biol. Abstr. 56 (1): B.A.S.I.C. S.141. 1973; Mold., Biol. Abstr. 56: 69. 1973; Mold., Phytologia 25: 220, 231, 237, & 240. 1973; Hocking, Excerpt. Bot. A.23: 292. 1974; Mold., Phytologia 28: 458. 1974. Illustrations: Junell, Symb. Bot. Upsal. 1 (4): 103, fig. 161. 1934.

This poorly differentiated variety is said to differ from the typical form of the species in its thinner pubescence, longer and thinner peduncles, somewhat smaller flowers, and brilliantly red, less early caducous corollas. It is based on *Hens s.n.* from Stanley Pool and *Descamps 129* from Lualaba, Zaire, the former collected in 1887.

Fries (1916) cites *R. E. Fries 604* from Zambia and comments that the plant is "Ein halbmeterhoher Strauch auf Brandfeldern wachsend, die lebhaft ziegelroten Blüten Mitte Sept. schön entwickelt. Die Varietät, die sich von der Hauptform durch lichtere Behaarung, längere und dünnere Blütenstiele und etwas kleinere Blüten (letzteres an meinen Exemplare weniger auffallend) unterscheidet, ist vom oberen Kongo-Gebiet (Stanley-Pool und Lualaba) ausgegeben, weshalb mein Fund sich den übrigen geographisch gut anschliesst". He notes that the typical form has "leuchtend roten Blüten fangen Ende Juli an, sich zu öffnen", but this statement probably refers to f. *rubra* Mold. The small-flowered variety is not mentioned by Schinz (1889) as claimed by Thomas (1936), but only typical "*Clerodendron uncinatum*" is there discussed.

Citations: ZAIRE: *Descamps 129* (Br--cotype); *Hens s.n.* [Congo 1877] (Br--cotype).

KALAHARIA UNCINATA f. *RUBRA* Mold., Phytologia 23: 210. 1972.

Bibliography: J. Hutchins., Botanist South. Afr. 476 & 511. 1946; Brenan, Mem. N. Y. Bot. Gard. 9 (1): 37. 1954; Anon., Biol. Abstr. 54 (4): B.A.S.I.C. S.143. 1972; Mold., Biol. Abstr. 54: 1925. 1972; Mold., Phytologia 23: 210 & 421 (1972) and 25: 231. 1973; Anon., Assoc. Étud. Tax. Fl. Afr. Trop. Index 1972: 56. 1973; Hocking, Excerpt. Bot. A.23: 290. 1974; Mold., Phytologia 34: 262. 1976.

This form differs from the typical form of the species in having deep-red or scarlet (rather than yellow) corollas. It is based on *Rodin 2710* from Namibia, collected in open bush-veld with *Acacia*, *Zizyphus*, *Grewia*, and other trees, near Otjiwarongo on the road to Outjo, on December 10, 1947, deposited in the United States National Herbarium at Washington.

It is of interest to note that var. *hirsuta* and var. *parviflora* also appear to be red-flowered. It is therefore rather unfortunate that the nomenclatural type of the species happens to be the yellow-flowered form.

Collectors describe the present form as a rounded, shrubby, perennial herb with a woody root, 0.4--1.2 m. tall, with curved spines and showy flowers, or as a small, erect or wide-spreading spiny shrub, "half-shrub", or shrublet, branched from a woody base, often with erect soft branches to 18 inches tall, renewing

its growth after brush-fires, the leaves opposite, aromatic, oval, very deep-green, sticky, with a sharp downwardly recurved spine "at each petiole base (but not petiolar)". They have found it growing in dry waste ground, in yellow sand, and on open savannas in red sandy soil of slopes between dunes, at 1000--1400 m. altitude, in flower in April, June to August, and December to February. Robinson calls it a "common very beautiful but noxious weed in agricultural lands". Brass found it "occasional on roadsides in open woodlands". Leistner describes it as "frequent". Story found it "locally frequent in open woodlands of *Burkea*, *Ochna*, and *Acacia* on sand. The only vernacular names recorded for the plant are "dale" and "kikosa".

The corollas are described by collectors as having been "red" on *Borle* 319, *Brass* 16881, *Codd* 5849, *Merxmüller* 1225, *Rodin* 2710, and *Story* 5260, "rose" on *Quarré* 3434, "very vivid red" on *Quarré* 4217, "blood-red" on *Seydel* 3674, "scarlet" on *Hutchinson* 3426 & 3882 and *Winter* 7501, "scarlet and yellow" on *Robinson* 2401, "cinnabar-red with yellow throat" on *Giess & al.* 6651, and "crimson with yellow center" on *Leistner* 1813.

Hutchinson (1946) cites his nos. 3426 & 3882.

Citations: ZAIRE: *Quarré* 3434 (Br, Br, Br), 4217 (Br, Br, Br, Br, N). ZAMBIA: *E. A. Robinson* 2401 (Ba). ZIMBABWE: *Borle* 319 (W--1028989). MALAWI: *Brass* 16881 (N). NAMIBIA: *Codd* 5849 (Ss); *Giess, Volk, & Bleissner* 6651 (Mu); *Leistner* 1813 (Mu); *Merxmüller* 1225 (Mu); *Rodin* 2710 (Ba--isotype, W--2062821--type); *Seydel* 3674 (N, W--2671434); *Story* 5260 (Mu, Mu). BOTSWANA: *Winter* 7501 (Mu).

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NOTES ON THE GENUS *KAROMIA*

Harold N. Moldenke

Lack of time this late in my life has made impractical the detailed monograph originally planned for this and all other genera of this family, but it has seemed worthwhile to place on record the bibliographic and herbarium notes assembled on the genus by my wife and myself over the past fifty years. Herbarium acronyms employed hereinafter are the same as used consistently since 1932 in all previous installments of these notes and are fully explained in my "Fifth Summary of the *Verbenaceae*....." (1971), volume 2, pages 795--801.

KAROMIA Dop, Bull. Mus. Hist. Nat. Paris, ser. 2, 4: 1052--1053. 1932.

Synonymy: *Karoma* Barkley, List Ord. Fam. Anthoph., ed. 2, 76 & 177. 1965.

Bibliography: Dop, Bull. Mus. Hist. Nat. Paris, ser. 2, 4: 1052--1053. 1932; Dop in Lecomte, Fl. Gén. Indo-chine 4: 891--893.

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Trees; leaves decussate-opposite, simple, exstipulate, marginally entire, petiolate; inflorescence cymose, determinate, the cymes di- or trichotomous, arranged in leafy terminal panicles; flowers hypogynous, slightly zygomorphic; calyx inferior, gamosepalous, obconic, the rim subentire, greatly enlarged in fruit; corolla gamopetalous, hypocrateriform, somewhat zygomorphic, the tube shortly cylindrical, the limb subbilabiate, the posterior lip bifid, the inferior lip trifid; stamens 4, subequal, inserted in the corolla-tube, very much exserted; anthers 2-celled, dorsifixed, the cells divaricate, dehiscent by means of a longitudinal slit; ovary superior, compound, bicarpellary, 2-celled, each cell again 2-celled, the ultimate locules each 1-ovulate; pistil one; stigma shortly bifid; fruiting-calyx hypocrateriform, membranaceous, venose, the tube very short, the limb spreading, rounded, subentire or obscurely 5-lobed, greatly ampliate; fruit drupaceous, the drupes subturbinate, flat above and slightly 1-sulcate, immersed in the tube of the mature fruiting-calyx, splitting by means of 4 slits near the apex, the exocarp thin, formed of two layers, externally soft, internally crustaceous, the endocarp divided into 4 nutlets, the nutlets trigonous, separate, 1-seeded; seeds without endosperm, erect; radicle short, inferior; cotyledons elliptic.

Type species: *Karomia fragrans* Dop.

Dop (1932) comments that "Par sa graine sans albumen, sa drupe a 4 noyaux ce genre se classé dans la tribu des Clerodendrees. Il se rapproche du g. *Holmskioldia* Retz par son calice. Cependant dans ce dernier genre le calice au moment de l'anthese est deja subarrondi campanule et 10 fois plus large que le tube de la corolle. Dans le g. *Karomia* au contraire au même stade de l'evolution de la fleur le calice est petit, obconique, de même dimension que le tube de la corolle. Ce n'est que plus tard, sous le fruit, que le calice accru aura pris une forme et une dimension assez comparables a celles que l'on rencontre dans le g. *Holmskioldia*. En outre dans le g. *Holmskioldia* les lobes de la corolle sont courts et le tube généralement long. Dans le g. *Karomia* les lobes de la corolle sont très grands et le tube très court. A cet égard la corolle ressemble assea à celle du g. *Teucrium* Hook. f. Si j'ajoute que dans le nouveau genre les étamines sont insérées au sommet du tube de la corolle et non au milieu, que les loges des

anthères sont divergentes et non parallèles, sa validité semble suffisamment établie."

The genus, as far as it is known now, is monotypic. It is perhaps worth noting that the original publication is sometimes given erroneously as "ser. 3" or even "ser. 4".

KAROMIA FRAGRANS Dop, Bull. Mus. Hist. Nat. Paris, ser. 2, 4: 1053. 1932.

A tree, 12--13 m. tall; trunk to 45 cm. in diameter; branches terete, very lightly puberulent, finally glabrous; bark black, lenticellate; petioles slender, 1 cm. long, canaliculate above; leaf-blades chartaceous, rigid, ovate, 9--11 cm. long, 4--6 cm. wide, apically acute or short-acuminate, marginally entire, basally rounded or obtuse, glabrous on both surfaces, brunnous above in drying, paler beneath; midrib slender, rounded, impressed above, very prominent beneath; secondaries 10--12, very slender, slightly recurved at the leaf-margins; veinlet reticulation conspicuous; peduncles slender, 15--20 mm. long; cymes 10 cm. long and wide, forming a leafy terminal panicle, many-flowered, dichotomous or sometimes trichotomous, puberulent; inflorescence-branches capillaceous, flexuous; bracts foliaceous, puberulent, those subtending the flowers minute, linear, 3 mm. long; pedicles 1--2 mm. long, puberulent; flowers very pleasantly fragrant, 12 mm. long and wide; calyx onconic, slightly incurved laterally, lightly pubescent, 5-venose, the rim with 5 rounded very short lobes 2 mm. long and wide; corolla dark-blue, its tube cylindric, 3 mm. long, externally pubescent, internally glabrous, the limb subbilabiate, puberulent with gland-tipped hairs especially basally, the upper lip bifid, the lower lip 3-fid, the 4 superior lobes erect, oblong, 6 mm. long, 4 mm. wide, apically rounded, the lower lobe dilated, cucullate, 10 mm. long, 6 mm. wide, marginally entire; stamens subequal, very long-exserted; filaments 2.5 cm. long, glabrous, inserted at the apex of the corolla-tube and extending between the upper corolla-lobes; anthers ovate, 1 mm. long, glandular, dorsifixed, the thecae divaricate; ovary subturbinate, 1.5 mm. wide, villous and glandular; style filiform, slightly surpassing the stamens; fruiting-calyx subtentire, 3 cm. wide, with 5 radiating veins, the rim obscurely 5-lobed, the lobes apically rounded, with a numerous firmly conspicuous veinlet reticulation; fruit drupaceous, subturbinate, 4 mm. long, 3 mm. wide, almost flat above, pubescent and glandulose; seeds separate in the center of the cavity.

This rare species is based on *Poilane* 9892 from Ka Rom and 17865 from Cana, in Phanrang province, Annam, Vietnam, in "Essence forestière croissant vers 400 mètres sur un sol très sableux". Dop (1932) reports the vernacular name, "ca dien", for the species and asserts that its soft wood is of only poor quality.

Thus far, the species is known only from the two original collections deposited in the herbarium of the Muséum National d'Histoire Naturelle in Paris.

ADDITIONAL NOTES ON THE GENUS *AVICENNIA*. XIII

Harold N. Moldenke

For a detailed explanation of the herbarium acronyms used hereinafter in this paper and in all previous installments in of these notes, see my "Fifth Summary of the *Verbenaceae*...." (1971), volume 2, pages 795 to 801.

AVICENNIA L.

Additional & emended synonymy: *Avicenia* Roxb., Hort. Beng. 46. 1814. *Racka* J. F. Gmel. ex Meisn., Pl. Vasc. Gen. 2: 200, in syn. 1840. *Rack* Bruce ex Meisn., Pl. Vasc. Gen. 2: 200, in syn. 1840. *Aviccnnia* Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 51, sphalm. 1978. *Avecinia* Lantoh, in herb.

Additional & emended bibliography: L., Syst. Nat., ed. 1, 18. 1740; Gled., Berl. 5: 128. 1749; B. Juss., Hort. Trian. 1759; L., Gen. Pl., ed. 6, Ord. Nat. 1764; L., Syst. Nat., ed. 12 rev. [13], 1: 426. 1767; J. A. Murr. in L., Syst. Veg., ed. 13, 484. 1774; Scop., Introd. 174. 1777; J. A. Murr. in L., Syst. Veg., ed. 14, 579. 1784; Gis., Carl. Linn. Prael. Ord. Nat. 486. 1792; Pers., Syst. Pl. 616. 1797; Duchesne, Dict. 3: 334. 1804; St.-Hil., Expos. 1: 248. 1805; P. Beauv., Fl. Oware Benin 1: 79--80 & 99, pl. 47. 1806; R. Br., Flind. Voy. 2 App. 3: 566. 1814; Roxb., Hort. Beng. 46. 1814; Spreng., Anleit. 2: 419. 1817; Steud., Nom. Bot. Phan., ed. 1, 96. 1821; Jack, Descr. Malay. Pl., imp. 1, 58--59. 1822; Jack, Malay. Misc., imp. 1, 2: 58--59. 1822; Reichenb., Ap. Mössl. 1: xxxix. 1827; Bartl., Ord. 180. 1830; Spreng. in L., Gen. Pl., ed. 9, 2: 483. 1831; Cham., Linnaea 7: 370--371. 1832; Hook. & Arn., Bot. Beech. Voy., imp. 1, 94. 1832; Piddington, Tab. View Gen. Char. Roxb. 106--107. 1836; Hook. & Arn., Bot. Beech. Voy., imp. 1, 306. 1838; Meisn., Pl. Vasc. Gen. 2: 200 & 272. 1840; Hook. & Arn., Bot. Beech. Voy., imp. 1, 449. 1841; Reichenb., Nom. 108. 1841; Spach in Orbnigny, Dict. Hist. Nat. 2: 373. 1842; Jack, Calc. Journ. Nat. Hist. 4: 194--195. 1843; Nutt., N. Am. Silva 2: 144, pl. 105. 1846; Lindl., Veg. Kingd. 665. 1847; Wight, Icon. Pl. Ind. Orient. 4 (3): 12 & 16, pl. 1481 & 1482. 1849; W. Griff., Icon. Pl. Asiat. pl. 448. 1854; W. Griff., Notul. Pl. Asiat. 4: 173, 181, & 185--195. 1854; Miq., Fl. Ind. Bat. 2: 911 (1857) and Suppl. 1: 244. 1860; Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (3): 226. 1863; Kurz, Rep. Veg. Andam. App. A.45. 1870; Pfeiffer, Nom. Bot. 1 (1): 339--340 & 438 (1873), 1 (2): 1847 & 1850 (1874), and 2 (2): 1569, 1570, & 1593. 1874; F. Muell., Descr. Notes Pap. Pl., imp. 1, 91 & 110. 1875; Kurz, Forest Fl. Brit. Burma 2: 252, 275--276, & 587. 1877; Ferno-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 162. 1880; Vidal, Sin. Gen. Fam. Pl. Leñ. Filip. [Introd. Fl. For. Filip.] 1: 201, 206, & 336 (1883) and 2 [Atlas]: 36, pl. 75, fig. G. 1883; Balf. f., Trans. Roy. Soc. Edinb. 31: [Bot. Socotra] 237 & 414. 1888; Warb., Engl. Bot. Jahrb. 13: 426--427. 1891; Brehm, Merv. Nat. Monde Pl. 2: 348. 1894; Gürke in

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The genus number for *Avicennia* in the Linnean Herbarium is 813 as correctly stated by Savage (1945). Duncan (1974), Napp-Zinn (1974), Walsh (1974), and Thanikaimoni (1976), as well as Terrell, have joined the ever-increasing ranks of botanists who accept the *Avicenniaceae* as a valid and distinct family of plants. Novak (1961) agrees with Junell (1934) in placing the genus in the *Lamiaceae*. Some authors give *Guapira* Aubl. and *Mangium album* Rumpf as synonyms of *Avicennia*, but the former is a synonym of *Pisonia* L. in the *Pisoniaceae* and the latter belongs in the synonymy of *Avicennia marina* var. *rumphiana* (H. Hallier) Bakh.

According to Chapman (1976) the known uses of members of *Avicennia* include the wood employed as an inferior firewood; resin and ointment made from the seeds is applied to ulcers and tumors; the bark is used in the treatment of skin parasites and gangrenous wounds; the wood is used for making charcoal; the foliage is used as food for camels; salt is extracted from the wood ash; the seedlings are eaten; and the nectar is used by honeybees in the manufacture of their honey. He lists the following algae that are often found in connection with *Avicennia*: *Catenella impudica*, *Dictyota* sp., and *Dictyopteris propagulifera*. He also lists the following terrestrial fungi as attacking the genus: *Botrytis argillacea* var. *avicenniae* McAlp., *Eudimerium avicenniae* Hansf., *Fomes avicenniae* Bacc., *Irene sepulta* (Pat.) Toro, *Schizophyllum commune* (Fries) Fries, and *Sphaeronaema avicenniae* Frag. & Cif.

Zamski (1979) discusses the mode of secondary growth and the 3-dimensional structure of the phloem in *Avicennia*. He reports that "The mode of development of successive cambia and the differentiation of cambium derivatives are unique to *Avicennia*...and do not follow the scheme proposed for members of other families possessing included phloem. The sequence of formation of cambial derivatives and their differentiation are: there are few parenchyma cells toward the inside; the xylem is toward the inside with continued production of up to 10 files of parenchyma cells toward the outside; a ring of 1--3 sclereids thick develops, 1--3 cells from the outer limit of the secondary parenchyma files; the scler-

eids start to develop very early, sometimes when only 4 outer cambial derivatives have been produced; the cambium gradually ceases to function and phloem strands are formed by cell divisions in the parenchyma files, only short fragmented cambium remnants are left on the inner side of the phloem; and a new cambium develops in the most distal parenchyma file, immediately outside the sclereids. The new cambium layer originates withing the outer parenchyma cells which were among the first derivatives of the previous cambium. Occasionally the sclereids do not form a complete ring and the cambium produces a conjunctive-tissue connection through the gap. The phloem strands associate in a very complicated net-like structure. There are many tangential links within the same ring and radial links through a conjunctive-tissue connection between adjacent rings."

AVICENNIA AFRICANA P. Beauv.

Additional bibliography: D. Dietr., Syn. Pl. 3: 619. 1843; Pobéguin, Pl. Méd. Guin. 341. 1906; Stapf, Ind. Lond. 1: 370. 1929; Exell, Journ. Bot. 69, Suppl. 2: 146. 1931; Walsh in Reimold & Queen, Ecol. Haloph. 59. 1974; V. J. Chapm., Mangr. Veg. 19, 21, 24, 27, 75, 76, 78, 80, 81, 85, 86, 221, 222, 265, 281, 372, 374, 378, 390, & 436, fig. 4, 11, 55, 57, & 176 b & c. 1976; Mold., Biol. Abstr. 61: 4888. 1976; Terrell, U. S. Dept. Agr. Agric. Handb. 505: 17 & 160. 1977; Mold., Phytologia 40: 407 & 409. 1978; Hocking, Excerpt. Bot. A.33: 89. 1979; J. & E. Kohlmeyer, Marine Mycol. 93, 95, 96, 319, 389, 400, 414, & 535. 1979; Mold., Phytologia 46: 60. 1980.

Additional illustrations: V. J. Chapm., Mangr. Veg. fig. 4, 57, & 176 b & c. 1976.

Chapman (1976) lists the following marine fungi often found on *A. africana*: *Didymosphaeria enalia* Kohlm., *Leptosphaeria avicenniae* J. & E. Kohlm., *Lulworthia* sp., and *Phoma* sp.

Pobéguin (1906) cites *Conakry 1228* from the Republic of Guinea.

Additional citations: LIBERIA: Mayer 164 (W--2630439).

AVICENNIA ALBA Blume

Additional & emended bibliography: W. Griff., Notul. Pl. Asiat. 4: 185--188 & 190--195. 1854; Miq., Fl. Ind. Bat. Suppl. 1: 244. 1860; Koord & Valet., Meded. Lands Plant. Bat. 42 [Bijdr. Booms. Java 7]: 216 & 221--222. 1900; King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 867--869. 1908; E. D. Merr., Interpret. Rumph. Herb. Amb. 456. 1917; Haines, Bot. Bihar Orissa, ed. 1, 725. 1922; E. D. Merr., Univ. Calif. Publ. Bot. 15: 268. 1929; Stapf, Ind. Lond. 1: 370. 1929; Dop in Lecomte, Fl. Gén. Indo-chine 4: 894--895. 1935; Fletcher, Kew Bull. Misc. Inf. 1938: 405 & 443--444. 1938; Worsdell, Ind. Lond. Suppl. 1: 111. 1941; Haines, Bot. Bihar Orissa, ed. 2, 2: 760. 1961; Jafri, Fl. Karachi 290 & 351. 1966; Walsh in Reimold & Queen, Ecol. Haloph. 59, 84--86, 95, 97, 98, 106, & 152. 1974; V. J. Chapm., Mangr. Veg. 3, 20, 26, 27, 105--109, 113, 114, 118, 123, 125, 128, 129, 132, 134, 136, 139, 141, 144, 148, 250, 252, 268, 271, 288, 289, 308, 310, 390, 405, 416,

& 436, fig. 11, 74, 77a--79, 83, 186b, & 213 (4). 1976; Hepper in Edlin & Nimmo, *Illust. Encycl. Trees* 226--228. 1978; Mold., *Phytologia* 40: 407--409 & 412. 1978.

Additional illustrations: V. J. Chapm., *Mangr. Veg.* fig. 77a, 186b, & 213 (4). 1976; Hepper in Edlin & Nimmo, *Illust. Encycl. Trees* 226 (in color). 1978.

Recent collectors describe this species as a tree, 3--10 m. tall, the bole 15 cm. in diameter, the crown 4 m. wide, and the corollas 4-parted, and have found it in flower in December, January, and April. The corollas are said to have been "pale orange yellow" on *Meijer SAN.24927*, "light-orange" on *Canfield 374*, "orange-yellowish" on *Meijer SAN.56058*, and "yellow" on *Canfield 321*. *Canfield* refers to it as a "common tree in mud at edge of mangrove with *Bruguiera*, *Scyphiphora*, *Xylocarpus*, *Nypa*, *Schefflera*, and *Derris*," and as a "common tree in clearings along river in volcanic clay soil with *Nypa*, *Derris*, and *Rhizophora*", at 2--5 m. altitude. Santapau & Shah (1969) list the species from Salsette island. Dietrich (1843) gives the distribution of the species as "Java et Arabia felix" -- it does not, of course, occur in Arabia, where *A. marina* (Forsk.) Vierh. is the only native species of the genus.

Walsh (1974) records the chromosome number as 16. Fletcher (1938) notes that the nomenclatural type of the species is from the Malay Archipelago and lists the plant from India, Cochinchina [Vietnam], to northern Australia. From Thailand he cites *Kerr 4027*, *8920*, *9163*, *10969*, *14236*, *16581*, *17948*, & *19070* and *Put 1721*.

The *Nicholson 19126*, distributed as *A. alba*, actually is *A. marina* (Forsk.) Vierh., as is also *Meijer SAN.27653*, while *Lantoh SAN.62376* is *A. officinalis* L.

Additional citations: PALAU ISLANDS: Babeldaob: *Canfield 321* (W--2839227), *374* (W--2839230). Yap: *Falanruw 3365* (W--2881150). GREATER SUNDA ISLANDS: Sabah: *Meijer SAN.24927* (Ld), *SAN.56058* (Ld).

AVICENNIA BALANOPHORA Stapf & Mold.

Additional bibliography: Walsh in Reimold & Queen, *Ecol. Haloph.* 59. 1974; V. J. Chapm., *Mangr. Veg.* 3, 20, 24, 390, 391, & fig. 11. 1976; Mold., *Phytologia* 33: 240. 1976.

Walsh (1974) misspells Stapf's surname as "Stapft".

AVICENNIA BICOLOR Standl.

Additional bibliography: Walsh in Reimold & Queen, *Ecol. Haloph.* 59. 1974; V. J. Chapm., *Mangr. Veg.* 21, 24, 67, 68, 390, 391, & 436, fig. 11 & 48b. 1976; Mold., *Phytologia* 40: 408. 1978; Rabinowitz, *Biol. Abstr.* 66: 6272. 1978; Rabinowitz, *Biotropica* 10: 47 & 48. 1978; Rabinowitz, *Journ. Ecol.* 66: 45--52. 1978

Additional illustrations: V. J. Chapm., *Mangr. Veg.* fig. 48b. 1976.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"PLANTS ON STAMPS" edited by Doris Patterson, Anne Delfeld & Alice Sents, 168 pp. & hundreds of b/w photos on 12 pp. from Scott's Catalogue. American Topical Association, 3306 North 50th Street, Milwaukee, Wisconsin 53216. 1979. \$10.00 paper-bound.

This is Volume I of Handbook No. 94 and includes stamps issued through 1959 and a general index of plant names, scientific and common, to 1975. The "basic list is by country, since that is where you start with an unknown". This is followed by alphabetical family lists and the index. More volumes are planned. This book will be a joy and ready source of much information for the many folks who are interested avocationally and vocationally in phases of botany and also in philately.

"ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS" Volume 10 edited by Richard F. Johnston with Peter W. Frank and Charles D. Michener, vi & 454 pp., 29 b/w figs., 21 tab., 5 maps & 28 photos. Annual Reviews Inc., Palo Alto, California 94306. 1979. \$17.00 in the U.S.A., \$17.50 foreign.

This series of the Annual Reviews invariably has all or at least several papers that are stimulating and provocative in their content, organization and new associations engendered. This time, for example, there are Janzen's "How to Be a Fig", White's "The Plant as a Metapopulation", Brown, Reichman and Davidson's "Granivory in Desert Ecosystems", Nevo's "Adaptive Convergence and Divergence of Subterranean Mammals", and Silberglied's "Communication in the Ultraviolet". Such mention as this does not segregate the best from the better, but rather just indicates the reviewer's main interests. The inclusion at the end of the book of Order Form tear-sheet and envelope is certainly efficient.

"THE WHITE REDWOODS -- Ghosts of the Forest" by Douglas F. Davis & Dale F. Holderman, 45 pp., 15 color & 8 b/w photos, & 1 map. Naturegraph Publishers, Inc., Happy Camp, P. O. Box 1075, California 96039. 1980. \$3.50 paperbound.

The included coastal map of California spots the albino coast redwood sites visited by each of the forester and forest history editor-authors from north of Eureka to south of Monterey with a concentration in and around Santa Cruz. This albinism is associated with absence of the palisade layer and many dorsal stomata in the needles. The partial albinos (variegated) and the all-white sprouts derive their nourishment from other parts of the plant. Some have been known to grow to 80 ft. tall and produce pollen buds. There are photographs of seedlings from a cross between a variegated albino and a normal redwood. Interesting indeed!

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STUDIES IN BIGNONIACEAE 37: NEW SPECIES
OF BIGNONIACEAE FROM EASTERN SOUTH AMERICA

Alwyn H. Gentry¹
Missouri Botanical Garden

Collections of Bignoniaceae received for identification from Cayenne and various Brazilian herbaria continue to include numerous undescribed species. Eastern Brazil is the world's most poorly known area for Bignoniaceae and one of the richest in species of the family. I thank the curators of CAY, GUA, HB, INPA, P, R, and RB for making available to me the collections which included the ten novelties described here.

ANEMOPAEGMA PABSTII A. Gentry, sp. nov.

Frutex scandens, ramulis teretibus, cavis, puberulis, sine consociebus glandularum in nodis inter petioles; pseudostipulae carentes. Folia 2-3-foliolata, interdum cirrho simplici; foliolis ovatis vel elliptico-ovatis, bullatis, infra puberulis. Inflorescentia floribus in racemo axillari dispositis. Calyx late campanulatus, truncatus, sparse puberulus; corolla aurata, tubulo-campanulata, extus lepidota; ovarium complanato-ellipsoideum, stipitatum. Capsula late elliptica usque ad suborbiculam, sparse lepidota, seminibus orbiculatis.

Liana; branchlets terete, hollow, longitudinally striate, puberulous with subappressed trichomes and minutely lepidote, not lenticellate, without interpetiolar glandular fields or pseudostipules. Leaves 2-3-foliolate, tendril apparently simple; leaflets ovate to elliptic-ovate, obtuse to acuminate at apex, rounded at base, coriaceous to subcoriaceous, distinctly bullate with veins and veinlets impressed above and raised below, 3-12 cm long, 2-9 cm wide, below rather densely puberulous with crisped trichomes to sparsely but distinctly papillose, above impressed-lepidote, the surface papillose and shiny, glabrate except for short trichomes along midvein and sometimes sparsely on lateral nerves; petioles 0.5-1.5 cm long, petiole 2-7 cm long, puberulous with

1. Supported by a series of grants from the National Science Foundation.

crisped subappressed trichomes. Inflorescence an axillary raceme, puberulous. Flowers with the calyx broadly campanulate, truncate, 4-6 mm long, 6-8 mm wide, rather sparsely puberulous, inconspicuously lepidote glandular, the surface somewhat roughened; corolla yellow (noted as "r6seas" on one collection), tubular-campanulate above a narrowly tubular base, 4.5-5.5 cm long, 1.2-1.4 cm wide at mouth of tube, the tube 4-5 cm long, lobes 0.5-1 cm long, lepidote outside and on lobes, the margins ciliate; stamens didynamous, the anther thecae divaricate, 3 mm long, the filaments ca. 2.5 cm long, inserted ca. 10 mm from base of tube; ovary compressed-ellipsoid, densely minutely lepidote, 2-3 mm long, 1.5 mm wide, on a conspicuous 0.5 mm long stipe; disk pulvinate, almost subglobose, 1 mm long, ca. 2 mm wide, tapering to base of stipe. Capsule broadly elliptic to suborbicular, the apex apiculate, the base obtuse to short-stipitate, 7.5-10 cm long including the up to 1 cm long stipe, 5.5-7.5 cm wide, the surface tannish minutely roughened, shiny, scattered lepidote or with a few scattered impressed plate-shaped glands; seeds orbicular, ca. 3 cm diameter, the wing completely surrounding and not clearly differentiated from the body, wing gradually shading to thin and tannish at margin.

Type: BRAZIL: Bahia: BR-4 em km. 968, trepadeira do fl. amarelas, 16 Jan 1965, Pereira and Pabst 9482 (holotype, HB; isotype, MO).

Additional collections examined: BRAZIL: Minas Gerais: Ao longo da rodovia Rio-Bahia, perto da divisa com Bahia, 18 Jan 1955, Herlinger 10215 (MO, NY, UB). Abre campo; trepadeira, flores amarelas, 28 Jan 1965, Herlinger 10289 (UB). Goiás: Road Estreita to Tocantinopolis, km. 1-5; liana, corolla pale yellow, 9 Aug 1964, Prance and Silva 58633 (K, NY). 2 km N of Araguaína, 300 m, sandy cut-over woodland with well-developed cerrado, liana, fruit green, 13 Mar 1968, Irwin et al. 21139 (MO, NY).

This is one of the relatively few conspicuously puberulous leaved species of Anemopaegma and is probably most closely related to A. oligoneuron (Sprague and Sandw.) A. Gentry of the Guayana region and central Amazonia, some of whose forms have similarly bullate leaflets. Although it is probable that more than one species are currently treated under A. oligoneuron, all collections referred to that species differ from A. pabstii in such important characters as glabrous corolla tube, pubescent fruits, and trifid tendrils. The stem of A. oligoneuron is never hollow and the leaflets are palmately veined at the base. The Prance collection was originally identified (with a query) by D. Hunt at Kew as A. oligoneuron and the fruiting

Irwin collection was identified by me and distributed as A. cf. hilarianum, a related species but with a very different inflorescence. Later I referred all of these collections in the herbarium to A. cf. goyazense K. Schum. but that species, which might prove a part of A. scabriusculum, is actually a quite different cerrado subshrub with reduced petioles and petioles.

The Goiás collections of A. pabstii have large less conspicuously bullate somewhat more glabrescent leaflets than those from the Minas Gerais-Bahia border area but are almost certainly conspecific.

ANEMOPAEGMA SETILOBUM A. Gentry, sp. nov.

Frutex scandens, ramulis teretibus, puberulis, sine consociabus glandularum in nodis inter petioles; pseudostipulae parvae, subulatae. Folia 2-foliolata, interdum cirrho trifido, foliolis ovatis, infra molliter villosis. Inflorescentia floribus in panicula axillari contracta dispositis. Calyx cupulatus, 5-dentatus dentibus setaceis, villosus; corolla aurata, tubulo-campanulata, glabra; ovarium ellipticum, minute lepidotum. Capsula immatura stipitata, globosa, dense villosa.

Liana; branchlets terete, longitudinally striate, elenticellate, tannish puberulous, the nodes without interpetiolar glandular fields; pseudostipules small, subulate, paired in each leaf axil. Leaves 2-foliolate, sometimes with a trifid tendril, the leaflets ovate, the apex acute to acuminate, the base rounded to truncate or shallowly subcordate, 7-16 cm long, 3.5-11.5 cm wide, chartaceous, venation plane or slightly impressed above, prominulous below, softly villous below with tan simple trichomes, drying olive above, tannish olive below, petiolules 1-2.5 cm long, petioles 3.5-4.5 cm long, villous. Inflorescence axillary, branching near base, contracted-paniculate, villous. Flowers with the calyx cupular, with 5 setaceous teeth 2-3 mm long, otherwise truncate and 5-6 mm long by 7-8 mm wide, the teeth extended as calycine ridges near apex of calyx, tannish villous; corolla yellow, tubular-campanulate above a 1.5-2 cm long narrowly tubular base, this slightly expanded at extreme base, 4-5.5 cm long, 1.5-2 cm wide at mouth of tube, the tube 3-4 cm long, the lobes ca. 1 cm long, glabrous outside and inside even on lobes except inside at level of stamen insertion, stamens didynamous, inserted ca. 15 mm from base of tube, the filaments 1.5-2.8 cm long, anther thecae divaricate, 3 mm long; pistil 3-3.5 cm long, the ovary elliptic, flattened, slightly contracted at base, with a noticeable midline, 2.5 mm long, 1.3 mm wide, minutely lepidote and apparently slightly puberulous (moldy),

disk ovoid-pulvinate, 1 mm long, 2 mm wide. Fruit (immature) stipitate globose, densely brownish-villous, to 6 cm long including the 1.5 cm long stipe, to 3.5 cm in diameter; calyx not persistent; seeds undeveloped.

Type: BRAZIL: Espírito Santo: entre Linhares e São Matheus, planta com flores aureas vistosissimas, solo argilo-arenoso, 22 Feb 1965, Duarte 8861 (holotype, RB; isotypes, MO, HB).

Endemic to the Rio Doce region of coastal Brazil in Minas Gerais and Espírito Santo States.

Additional collections examined: BRAZIL: Minas Gerais: Reserva Florestal do Rio Doce, Mata da Lagoa do Anibal, 230-250 m, trepadeira, fruto ainda verde, 29 Aug 1973, Sucre, Martinelli and Silva 10114 (MO, RB). St. Paulo de Muriahe, June 1880, Millo + Netto s.n. R24001 (R), São João Baptista da Gloria, 28 Jul 1880, Netto 1208a (P), Espírito Santo: Aldiramento dos Indios, 4 Jul 1942, Bruno 106 (R).

This species is most closely related to A. jucundum Bur. and K. Schum., formerly placed in the segregate genus Pseudopaezma, which is endemic to the catinga region of Rio Branco in extreme northern Amazonian Brazil. It differs from A. jucundum in yellow rather than red corolla, relatively contracted axillary inflorescence, larger thicker leaflets with a more densely pubescent undersurface, and especially a larger calyx with shorter much thicker subulate (rather than hair-like and to 6 mm long) calyx teeth. This species was given the nomen nudum Anemopaezma nettoanum Glaziou (Mem. Soc. Bot. France 3f: 524. 1911). Sandwith, convinced of the identity of this plant with A. jucundum and mistrusting Glaziou's collection data, annotated the Paris "type" of Glaziou's nomen nudum as "surely collected not in Minas Geraes but in Amazonas or Guiana". The additional collections cited here prove that in this case Glaziou's data were correct and that the plant represents an undescribed taxon quite distinct from A. jucundum.

ARRABIDAEA LIMAE A. Gentry, sp. nov.

Frutex scandens, ramulis teretibus, puberulis, sine consociibus glandularum in nodis inter petioles. Folia 3-foliolata, foliolis anguste ellipticis. Inflorescentia terminalis floribus paucis. Calyx campanulatus, subtruncatus, glabratus; corolla purpurea pallida, tubulo-campanulata, extus puberula; ovarium oblongum, minute lepidotum. Capsula linearis, uni-formiter complanata, glabra.

Liana or shrubby vine, branchlets terete, minutely puberulous, glabrescent, without interpetiolar glandular fields or pseudostipules. Leaves 3-foliolate, the tendril not seen; leaflets narrowly elliptic to narrowly elliptic-oblong, obtuse at apex, sometimes minutely retuse and sometimes minutely mucronate, rounded at base, 1.1-5 cm long, 0.9-2.5 cm wide, chartaceous, minutely puberulous along midvein above and sometimes along main veins below, otherwise glabrous, drying dark gray or blackish, prominently reticulate above and below, petiolules 0.3-1.5 cm long, petioles 1-3.6 cm long, puberulous. Inflorescence two or three terminal flowers, puberulous. Flowers with the calyx campanulate, subtruncate, 6-7 mm long, 6-7 mm wide, glabrous or with a few inconspicuous subappressed trichomes near margin, eglandular, drying black; corolla (only 1 seen) whitish purple, tubular-campanulate, 3.2 cm long, 1.1 cm wide at mouth of tube, the tube 2.1 cm long, the lobes 1 cm long, puberulous outside and on lobes inside; stamens didynamous, the thecae divaricate, 3 mm long, the connective slightly thickened, not extended; pistil 2-2.5 cm long, the ovary oblong, 2-3 mm long, 1 mm wide, densely minutely lepidote; disk annular-pulvinate, 1 mm long, 3 mm wide. Capsule linear, compressed, 8.5-24 cm long, 1.4-1.8 cm wide, inconspicuously scattered lepidote, otherwise glabrous, drying uniformly blackish or dark brown, the midrib barely or not at all prominent, margins slightly raised, not angled; seeds thin, bilate, 1-1.4 cm long, 3.4-4.6 cm wide, the hyaline membranaceous wings rather sharply demarcated from the largish brown body.

Type: BRAZIL: Pernambuco: 6 km Espírito Santo na estrada para Araripina, caatinga, cipó com fl. alvo-violáceo, 4 Jan 1961, A. Lima 61-3592 (holotype, IPA; isotype, MO).

Endemic to the dry caatinga of Bahia and Pernambuco states in northeastern Brazil.

Additional collections examined: BRAZIL: Bahia: Serra do Curral Feio, 26 km NW of Lagoinha (which is 5.5 km SW of Delfino) on side road to Minas do Mimoso, caatinga, 650 m alt., 41°23' W, 10°16' S, 7 Mar 1974, R. Harley et al. 16926 (K, MO). Pernambuco: Araripina, Est. Exp. Araripe, em capoeiras baixas, arb. subscandente, "fl. am.-alaranjado", fr. imaturos, 4 Apr 1963, A. Lima 63-4159 (IPA).

This species is closely related to widespread and variable A. corallina (Jacq.) Sandw. which also occurs in the northeastern Brazilian caatinga. As represented in northeastern Brazil, A. corallina is very different from A. limae with thicker densely pubescent fruits, larger rounder, densely

pubescent leaves and many-flowered openly paniculate pubescent inflorescence. Elsewhere, especially in northern Venezuela, glabrate forms of A. corallina approach A. limae in some respects but these glabrate collections of A. corallina always have the typical tan-drying dark-pitted, square-margined fruit of that species and much larger differently shaped leaves without the conspicuously prominulous-reticulate venation (cf. Mansoa lanceolata (DC.) A. Gentry) which characterizes A. limae. Since the three available collections of A. limae show so little variation and A. corallina, as represented by many collections from northeastern Brazil, is so completely different where the two species overlap, I have little doubt that this caatinga plant is adequately differentiated for specific recognition.

ARRABIDAEA SIMPLEX A. Gentry, sp. nov.

Suffrutex erectus, ramulis subtetragonis, sine consociebus glandularum in nodis inter petioles. Folia simplicia, anguste ovata, plerumque glabra, infra lepidota, nervorum secundariorum trichomatibus in axillis. Inflorescentia floribus in racemo terminali dispositis. Calyx tubulo-infundibuliformis, irregulariter bilabiatus, lepidotus; corolla plerumque purpurea, tubulo-infundibuliformis, puberula; ovarium lineari-oblongum, lepidotum. Capsula anguste oblonga, glutinosa, seminibus complanatis, bialatis.

Erect glutinous subshrub 0.5-1 m tall; branchlets subtetragonal, finely longitudinally striate, glabrous or lepidote, without interpetiolar glandular fields or pseudostipules. Leaves simple, ovate to narrowly ovate, acute to acuminate, the base rounded, coriaceous, 3-12 cm long, 1-5 cm wide, above glabrous except for inconspicuous short trichomes near base of midvein, below lepidote, otherwise glabrous except for conspicuous tufts of trichomes in lateral nerve axils, sometimes also puberulous along midvein, inconspicuously 3-veined from base; petiole 0.8-2.5 cm long, lepidote and puberulous. Inflorescence a few-flowered terminal raceme, more or less lepidote, the pedicels 6-13 mm long. Flowers with the calyx tubular-infundibuliform, irregularly bilabiate to subtruncate, 16-29 mm long, 7-10 mm wide, glandular lepidote, glutinous, with a shiny surface when dry; corolla whitish to magenta, narrowly tubular-infundibuliform, 5.5-7.5 cm long, the tube 4.5-5.5 cm long, the lobes 1-1.5 cm long, puberulous; stamens didynamous, the thecae divaricate, 5 mm long; ovary linear-oblong, tetragonal, densely lepidote, 4 mm long, 1 mm wide; disk annular-pulvinate, 0.6 mm long, 3 mm wide. Capsule narrowly oblong, viscous, glandular-lepidote, 7.5-12 cm long, 2-2.4 cm wide,

the midrib not evident, margins slightly raised, drying dark brown with lighter flecks; seeds thin, bialate, 1.3-1.6 cm long, 2.1-4.5 cm wide, the truncate-tipped wings brown except a narrow marginal fringe, the seed body not clearly demarcated.

Type: BRAZIL: Goiás: Parque Nacional do Tocantins, entre a Sede e Veadeiros, em campo cerrado, arbusto de 60 cm, folhas glutinosas, flores de calice verde, corola externamente rosa-claras, internamente cremes, tecas marron-claras, 26 Sep 1967, DeHaas, Sr., J. H. de Haas, and R. B. Belém 344 (HB, holotype; MO, isotype).

Apparently endemic to the Rio Tocantins drainage from 700 to 1000 m in the northcentral part of the Brazilian planalto in Goiás State.

Additional collections examined: BRAZIL: Goiás: Chapada das Perdizes, cerrado aberto, arbusto, 20 Jul 1963, E. Heringer 8925 (NY, UB, fragm. MO). Serra dos Pirineus, 75 km N of Corumbá de Goiás on road to Niquelandia, valley of Rio Maranhão, gravelly ce rado slope, 700 m elev., viscous subshrub ca. 50 cm tall, corolla whitish, 21 Jan 1968, Irwin et al. 18931 (UB); same loc., shrub ca. 1 m tall, corolla violet, gallery margin, 22 Jan 1968, Irwin et al. 19041 (UB). Chapada dos Veadeiros, 10 km S of Alto do Paraíso (formerly Veadeiros), 1000 m, rocky slopes, erect subshrub 1 m tall, fruit green, 23 Mar 1969, Irwin et al. 24959 (NY, UB).

Arrabidaea simplex is one of the very few consistently simple-leaved species of Arrabidaea and of the whole tribe Bignoniaceae. It is also unusual in Arrabidaea in its simply racemose inflorescence and erect subshrub habit. The new species is closely allied to A. craterophora (DC.) Bur. Its most important difference from A. craterophora is in the much shorter broader fruit; the fruit of A. craterophora is linear and only about 1 cm wide but 15-19 cm long. Besides the fruit A. simplex differs from A. craterophora in its differently shaped clearly simple almost glabrate leaves with longer petioles. Arrabidaea craterophora has very short petioles less than (1-) 0.5 cm long; the predominant simple-leaved form of A. craterophora mostly has four nearly sessile leaves per node, these clearly derived from the four leaflets of a pair of 2-foliolate leaves. The secondary nerves of A. craterophora are more prominent beneath and the lower leaf surface is usually puberulous throughout and at least pilose along the median nerve. Arrabidaea craterophora occurs to the south and east of the localized range of A. simplex in the cerrado and cerrado of southern and central Goiás, Maranhão, Minas Gerais, Mato Grosso, and São Paulo. There is also a vegetatively distinctive form

of A. craterophora in the mata de cipó of Bahia which is possibly specifically distinct. Unlike A. simplex, the Bahia plant has a fruit similar to typical A. craterophora.

ARRABIDAEA TYNANTHOIDES A. Gentry, sp. nov.

Frutex scandens, ramulis teretibus, sine consociebus glandularum in nodis inter petioles. Folia 2-3-foliolata, interdum cirrho simplici, foliolis anguste ellipticis, glabratitis. Inflorescentia floribus in panicula terminali dispositis. Calyx campanulatus, bilabiatus, dense puberulus; corolla rosea, bilabiata, puberula; ovarium lineare, minute lepidotum. Capsula (immatura) linearis, conspicue lepidota.

Shrubby vine, branchlets terete with very tiny whitish lenticels when older, minutely dark-lepidote, otherwise glabrous without interpetiolar glandular fields or pseudostipules. Leaves 2-3-foliolate, sometimes with a simple tendril, the leaflets narrowly elliptic, more or less acute at apex (badly eaten by leaf-cutters), rounded at base, 5-12 cm long, 1.4-4.6 cm wide, subcoriaceous, slightly minutely puberulous near base above when young, otherwise glabrous except for minute dark-drying impressed lepidote scales, the venation prominulously reticulate; petiole 1.3-3 cm long, the petiolules 0.6-1.6 cm long, grooved above, dark-lepidote at maturity, minutely puberulous above when young. Inflorescence a terminal panicle, puberulous with short crisped trichomes, bracts and bracteoles minute or lacking. Flowers with the calyx campanulate, irregularly shallowly bilabiate, 6-8 mm long, 5-6 mm wide, densely whitish puberulous; corolla rose with yellow throat, strongly bilabiate, 1.5-1.7 cm long, bilabiate split over half its length, the two upper lobes almost fused, only ca. 3 mm long, the three lower lobes ca. 7 mm long, puberulous outside and on lobes inside; stamens didynamous, the anthers exserted, the thecae 2 mm long, only slightly divergent, not twisted and reflexed at base, the connective not extended; pistil ca. 15 mm long, the ovary linear, 4-5 mm long, 1 mm wide, slightly contracted at base, minutely rough-lepidote; disk patelliform-pulvinate, 0.5 mm long, 1.5 mm wide, indistinctly 5-lobed. Capsule (very immature and only 3 cm long) linear, conspicuously rough-lepidote.

Type: BRAZIL: Minas Gerais: Pedra Azul, Pedra da Conceição, arbusto escandente de fl. rosas e fauce amarela, 20 Apr 1964, Z. Trinta and E. Fromm 762 (holotype, HB; isotypes, MO, NY).

This species is exactly intermediate between *Arrabidaea* and *Tynanthus*, combining the distinctive flower shape of the latter with other characteristics of *Arrabidaea*. It is completely unlike any described species in either genus and superficially almost more reminiscent of some species of *Vitex* of the Verbenaceae.

DISTICTELLA CREMERSII A. Gentry, sp. nov.

Frutex scandens, ramulis teretibus, puberulis, sine consociibus glandularum in nodis inter petioles; pseudostipulae carentes. Folia 2-foliolata, interdum cirrho trifido, foliolis ellipticis, lepidotis, infra sparse puberulis saltem nervorum secundariorum in axibus. Inflorescentia floribus in panícula racemiformi dispositis. Capsula late ellipsoidea vel subglobosa, teres, dense tomentosa, seminibus suborbiculatis, exalatis.

Liana; branchlets terete, longitudinally striate, glabrescently puberulous, usually drying reddish brown, without interpetiolar glandular fields or pseudostipules. Leaves 2-foliolate, often with a trifid tendril; leaflets elliptic, acuminate to apiculate at apex, obtuse to rounded at base, coriaceous, 3.5-16 cm long, 1.5-7 cm wide, lepidote, especially below, puberulous in axils of lateral nerves below and usually also along midvein, without concentration of plate-shaped glands near base of midrib; petiolules 0.3-1.5 cm long, petiole 1.2-3.5 cm long, appressed puberulous. Inflorescence narrowly paniculate, racemiform, minutely puberulous. Flowers not seen. Capsule broadly ellipsoid to subglobose, completely terete, the midrib not visible, 5.5-8 cm long, 4-5 cm diameter, densely yellowish tomentose, without raised warty-glandular areas; seeds suborbicular, ca. 1.5 cm long, 1.5-1.8 cm wide, rather thin, uniformly brown and rather woody, wings not evident.

Type: FRENCH GUIANA: Haut Tampoc, le long des Criques pres de la Crique Alice; liane ripicole; fruit terminal a 2 loges contenant de nombreuses graines, 1 Apr 1977, G. Cremers 4589 (holotype, MO; isotype, CAY).

Endemic to the interior of French Guiana.

Additional collections examined: FRENCH GUIANA: Haute Approuague, crique Matarony; liane, écorce noire-rougeatre, bois jaune, fruits verts, 20 Mar 1967, Oldeman B997 (MO, P). Riviere Camopi, végétation ripicole, en amont du Saut Yaniwé, liane ligneuse, fruits elliptiques de 11 x 5.5 cm, vert clair

(ES71), lignifiés, veloutés, pendants, 11 Mar 1974, deGranville 2080 (MO).

Vegetatively D. cremersii can not be reliably distinguished from widespread and variable D. magnoliifolia (HBK.) Sandw. which occurs sympatrically with it in the Guianas. However the round practically globose fruit of the new species is remarkably different from the flattened one of D. magnoliifolia. Besides its shape the fruit of D. cremersii differs from that of D. magnoliifolia in having a smooth (not raised warty) surface and a different generally denser, finer and more yellowish indumentum. The nearly orbicular wingless seeds of D. cremersii are also decidedly different from the transversely oblong, winged seeds of D. magnoliifolia. The fruit differences, similar to those between other species pairs of Bignoniaceae which I have interpreted as representing differential adaptations for wind versus water dispersal, would seem to mandate species recognition, especially in Distictella where most of the accepted species, though ecologically, geographically and even morphologically clear cut, are based predominantly on vegetative differences. The only vegetative feature which might help separate D. cremersii from D. magnoliifolia is the presence of trichomes in the leaf axils below, but some collections of D. magnoliifolia also have this character. In the interior Guianas and most of Amazonia the lateral nerve axils of D. magnoliifolia are uniformly glabrous but this character breaks down around the periphery of Amazonia (including coastal Guiana) where pubescent leaf axils tend to predominate, especially in juvenile leaves. In Amazonian Peru all collections from seasonally inundated forests (where D. magnoliifolia is one of the commonest lianas) have glabrous axils while most (but not all) from upland non-inundated habitats have pubescent lateral nerve axils. All fruits seen from outside French Guiana are of the typical compressed, wing-seeded form proving that pubescent leaf axils is not in itself a strong enough character for species recognition.

LUNDIA HELICOCALYX A. Gentry, sp. nov.

Frutex scandens, ramulis sparsim hirsutis, sine consociibus glandularum in nodis inter petioles; pseudostipulae carentes. Folia bifoliolata, interdum cirrho simplici, foliolis oblongo-ovatis, basim cordatis, pilosis. Inflorescentia hirsuta, floribus paucis. Calyx cupulatus, dentibus setaceis 4-6 mm longis; corolla tubulo-campanulata, velutina; stamina thecis dense pilosis, filamentis pilosis; ovarium oblongum, pilosum. Fructus ignotus.

Vine, branchlets terete, sparsely hirsute with stiff trichomes, finely longitudinally striate, without noticeable lenticels, interpetiolar glandular fields and pseudostipules absent. Leaves 2-foliolate, sometimes with a simple tendril, the leaflets oblong-ovate, the apex acute to short-acuminate, the base cordate, 5-11 cm long, 3-6.5 cm wide, chartaceous, venation prominulous below, plane above, pilose with rather scattered ca. 1 mm long trichomes, drying reddish black above, brown with darker brown main veins below, petiolules 1.5-2.3 cm long, petiole 3-4 cm long, hirsute. Inflorescence a few flowers terminal on a young lateral branch, sparsely hirsute. Flowers with the calyx cupular, with 5 setaceous teeth 4-6 mm long, otherwise truncate and 5 mm long by 4-5 mm wide, the teeth somewhat extended as calycine ridges, hirsute at base and along the ridge below each tooth; corolla tubular-campanulate above a narrowly tubular base, "yellow", 5-6 cm long, the tube 4-5 cm long, 1.8-2 cm wide at mouth of tube, the lobes 1-1.5 cm long, velutinous outside and on lobes; stamens didynamous, the anther thecae divaricate, densely pilose, ca. 4 mm long, the filaments pilose with subappressed ascending trichomes, 1.2-2 cm long, pilose, inserted ca. 10 mm from base of tube; pistil 3-3.5 cm long, the ovary oblong, 3 mm long, 1.5 mm wide, densely appressed-pilose, the style and stigmas densely pubescent with appressed trichomes; disc absent. Fruit unknown.

Type: BRAZIL: Piaui: Municipio Buriti dos Lopes, Canto do Morro, 90-100 m, capoeira de solo arenoso, 20 Jun 1972, Sucre and Silva 9211 (holotype, RB; isotype, MO)

The long-toothed calyx, reminiscent of the sun's rays as portrayed by gradeschoolers, is the distinctive mark of this species. Except for its long-setate calyx teeth this species could easily be mistaken for the hirsute form of Lundia densiflora DC. (i.e. Lundia stricta); that species differs conspicuously in a perfectly truncate calyx. No other species of Lundia besides L. densiflora has the thick tubular-campanulate corolla of the new species. If correctly described, the yellow corolla of L. helicocalyx is also distinctive.

MEMORA MOLLIS A. Gentry, sp. nov.

Frutex scandens, ramulis subteretibus, puberulis, sine consociibus glandularum in nodis inter petioles; pseudostipulae parvae, subfoliaceae. Folia pinnata vel bipinnata, foliolis usque ad 13, interdum cirrho simplicis, foliolis ovatis vel ellipticis, infra molliter pilosis. Inflorescentia floribus in racemo elongato dispositis, minute puberula. Calyx

campanulatus, minute 5-denticulatus, puberulus; corolla aurata, tubulo-infundibuliformis, glabra; ovarium lineare, lepidotum et minute puberulum. Capsula linearis, valde complanata, lepidota, leviter puberula, seminibus complanatis, bialatis.

Liana; branchlets subterete, puberulous to glabrescent, drying brown with inconspicuous lenticels, the nodes without interpetiolar glandular fields; pseudostipules small, sub-foliaceous, to 6 mm long and 4 mm wide. Leaves pinnate to bipinnate with up to 13 leaflets, sometimes with a simple tendril; leaflets ovate to elliptic, long acuminate, rounded to cuneate at base, subcoriaceous, 3-17 cm long, 1.4-7.5 cm wide, sparsely but softly pilose below, glabrous above except near base of midvein; petiolules and petiole puberulous to glabrate. Inflorescence an elongate raceme, often several per node, drying olive, minutely puberulous with crisped trichomes, the pedicels 1.3-2.8 cm long; bracts narrow, inconspicuous, 2-3 mm long, the bracteoles located 3-5 mm below base of calyx, sub-linear, 3-5 mm long, 1 mm wide. Flowers with the calyx campanulate, coriaceous, minutely 5-denticulate, 6-7 mm long, 5-8 mm wide, distinctly broader at top, drying brownish or brownish olive, puberulous; corolla yellow, tubular-infundibuliform, ca. 4 cm long, ca. 1.5 cm wide at mouth of tube, the tube ca. 3 cm long, the lobes ca. 1 cm long, glabrous outside and inside; stamens didynamous, the thecae divaricate, 2-3 mm long; pistil 2.5-3.2 cm long, the ovary linear, lepidote and minutely puberulous, 5-6 mm long, 0.8 mm wide; disk patelliform-pulvinate, 1 mm long, 2-2.5 mm wide. Capsule linear, serially slightly constricted between seeds, strongly compressed, 62-88 cm long, 1-2.5 cm wide, conspicuously lepidote and slightly puberulous, drying grayish; seeds thin, bialate, 1.5-1.8 cm long, 6-7 cm wide, the brownish wings indistinctly demarcated from the seed body.

Type: BRAZIL: Amazonas: Manaus-Caracarai Highway, Km. 60, 3 km W of Reserva Experimental Station of INPA, 15 Aug 1974, Prance, Pennington, Nelson and Ramos 21658 (holotype, INPA, isotype, MO)

Known only from the Manaus region in Central Amazonian Brazil. The known extremes of its range are only about 200 km apart.

Additional collections examined: BRAZIL: Amazonas: Manaus-Itacoatiara Road, km. 157, Gentry and Ramos 13357 (AAU, K, MG, MO, INPA, NY, P, R, US), 13362 (MO, INPA). Manaus-Itacoatiara Road, km. 144, Gentry and Ramos 13370 (INPA, MO). Manaus-Itacoatiara Road, km. 155, Gentry and Ramos 13343 (INPA,

MO). Lago do Castanho-Mirim, 22 Jun 1973, Byron Coelho and Mello s.n. (INPA 39148)(INPA, MO).

This species is closest to Memora racemosa A. Gentry of lower Amazonia from which it differs in much longer vegetative trichomes, shorter calyx, longer puberulous pedicels with bracteoles near the tip instead of the middle, lack of conspicuous lenticels, mostly bipinnate leaves, and longer puberulous (as well as lepidote) fruit. It is also similar to sympatric M. adenophora Sandw. in its pubescent leaves and inflorescence but differs in such characters as non-foliaceous bracteoles, lack of foliaceous pseudostipules, much longer fruit; lack of gland-tipped pubescence and 5-denticulate rather than bilabiate calyx.

PLEONOTOMA BRACTEATA A. Gentry, sp. nov.

Frutex scandens, ramulis acute tetragonis, glabris, sine consociebus glandularum in nodis inter petioles, pseudostipulae foliaceae. Folia 6-30-foliolata, interdum cirrho trifido, foliolis ovatis, glabris. Inflorescentia terminalis, congesta, conspicue bracteata. Calyx cupulatus, minute 5-denticulatus; corolla flava, tubulo-campanulata; ovarium cylindricum. Capsula fusiformi-oblonga, valde complanata; seminibus complanatis, bialatis.

Liana; branchlets acutely tetragonal with raised detachable angles, glabrous, without interpetiolar glandular fields, a ridge connecting pairs of petioles; pseudostipules foliaceous, 1.5-2.5 cm long, 1-3 cm wide. Leaves ternately (2-)6-30-foliolate, sometimes with a trifid tendril; the leaflets ovate, acute, rounded at base, 1.6-7 cm long, 0.7-4 cm wide, membranaceous, glabrous or slightly and inconspicuously puberulous on base of midvein above; petiole sharply angled, the petiolules and subpetiolules laterally compressed, conspicuously grooved adaxially, glabrous except for a few minute trichomes at joints, petioles 1-4 cm long. Inflorescence a very contracted apparently fasciculate terminal raceme subtended by conspicuous foliaceous bracts (= the pseudostipules of the reduced terminal leaf pair) which completely cover the calyces and buds. Flowers with the calyx cupular, truncate to minutely 5-denticulate, 6 mm long, 3-4 mm wide, sparsely lepidote, the margin ciliate, otherwise glabrous, with conspicuous plate-shaped glands in upper third; corolla (womewhat shrivelled) yellow, tubular-campanulate above a narrowly tubular base, 4-5 cm long, 0.8-1 cm wide at mouth of tube, the tube 3.5-4 cm long, the lobes 0.5-0.8 cm long, the tube glabrous outside, the lobes puberulous and glandular lepidote with plate-shaped

glands at base; stamens didynamous, the anther thecae divaricate, 2 mm long, the connective extended; ovary (partially destroyed) cylindrical, ca. 2 mm long, 0.7 mm wide; disk annular-pulvinate, 1 mm long, 2 mm wide. Capsule thin-valved, strongly flattened, fusiform-oblong, 8-9 cm long, 1.7-1.8 cm wide at middle, glabrous, the midrib not evident; seeds flattened, 1-1.2 cm long, 2.3-2.7 cm wide, bialate, the brown wings not clearly demarcated from seed body.

Type: BRAZIL: Pará: Obidos, Serra da Escama, na capueirão, 9 Sept 1928, Sampaio 4909 (holotype, R; isotype, MO).

Apparently endemic to the area of Obidos and Santarem in west central Para State.

Additional collections examined: BRAZIL: Pará: Serra da Escama, Obidos, 9 Sept 1928, Sampaio 4902 (R, fragment MO). Santarem, Belterra, Porto Novo, capoeira rala; cipó, fruto maduro marron, deiscente, 3 Dec 1978, M. Lobo, R. Vilhena, and B. Ribeiro 86 (MO, NY).

This species is remarkable for its contracted inflorescences subtended by conspicuously foliaceous bracts. It was identified as P. aff. variabilis by Sampaio, but differs from that species in its conspicuous foliaceous pseudostipules as well as the bracteate inflorescence. Sandwith annotated a sheet of this species as P. brittonii (i.e. P. melioides (Moore) A. Gentry), "a form with reduced inflorescence and short calyces." Pleonotoma melioides, probably the closest relative of P. bracteata on account of the shared characters of large foliaceous stipules and relatively large glabrous leaflets, differs in an openly racemose non-bracteate inflorescence, larger flowers and calyces, a larger fruit (14-34 cm long, 1.9-3.4 cm wide) and seeds, and a more westerly geographic range (plus a previously unreported disjunct population in Espirito Santo).

TYNANTHUS SASTREI A. Gentry, sp. nov.

Frutex scandens, ramulis teretibus, glabratis, elenticelatis, sine consociebus glandularum in nodis interpetioles, pseudostipulae carentes. Folia 2-foliolata, interdum cirrho trifido, foliolis ellipticis, sparse et minute puberulis saltem secus venas. Inflorescentia floribus in panicula axillari dispositis. Calyx late campanulatus, truncatus, puberulus; corolla alba, bilabiata, extus puberula; ovarium puberulum.

Liana, branchlets terete, very minutely subpuberulous

when young, glabrescent, finely longitudinally striate, completely elenticellate, without interpetiolar glandular fields or pseudostipules. Leaves 2-foliolate with a trifid tendril, the leaflets elliptic, acuminate, obtuse to acutish at base, 5-12 cm long, 2-8 cm wide, extremely sparsely and minutely appressed-puberulous mostly along main veins above and below, the venation plane above, prominulous below, drying olive-gray; petiolules 2.5-4 cm long, petioles 4-5.5 cm long, very minutely puberulous at least on upper surface. Inflorescence an open axillary panicle, its branches minutely puberulous. Flowers with the calyx broadly campanulate, truncate, 1 mm long, 1.5-2 mm wide, puberulous; corolla white with yellow in throat, bilabiate, 0.6-0.8 cm long, split about half its length, the two upper lobes and three lower lobes respectively almost fused, densely puberulous outside, stamens didynamous, the anther thecae divaricate, 0.5 mm long, twisted near base and reflexed forward, the connective extended; pistil 5 mm long, puberulous, the ovary conical, ca. 1 mm long and 0.7 mm wide, densely puberulous; disk not evident. Capsule not seen.

Type: FRENCH GUIANA: Sinnamary, route de Ste. Elie, 3 km avant la parcelle, Arbocel, liane rampante, normalmente sur végétation forestière, pillosité roussâtre, 23 Sept 1977, Sastre 6015 (holotype, MO; isotype P).

Endemic to the coastal forests of French Guiana.

Additional collections examined: FRENCH GUIANA: Bord de la piste de St. Elie, Km. 10.2, liane ligneuse rampant, grandes inflorescences axillaires avec nombreuses petites fleurs jaunes à corolla rapidement caduque, 18 Apr 1979, M. F. Prevost 529 (CAY, MO).

This species is most similar to T. schumannianus (O. Ktze) A. Gentry on account of its small flowers and glabrescent vegetative parts. It differs most conspicuously from that species in its smooth, completely elenticellate branchlets.

BACCHARIS VANESSAE, A NEW SPECIES FROM
SAN DIEGO COUNTY, CALIFORNIA

R. Mitchel Beauchamp
PACIFIC SOUTHWEST BIOLOGICAL SERVICES, INC.
6474 University Ave.
San Diego, Ca. 92115

Field investigations in central coastal San Diego County have been rather intensive lately due to the numerous housing projects proposed there as well as to the state environmental protection laws which require such investigations. The survey of a 3-acre parcel during October, 1976 disclosed an undescribed Baccharis.

Baccharis vanessae sp. nov., B. sarothroideae similis sed involucri pistillati bracteis recurvatis ad reflexis, habitationeque in vegetazione densa sclerophylla nec in ripis alisque locis turbatis.

Diocious broom-like shrub 0.5-1.3 (2) meters high. Stems terete to slightly sulcate, green at first then browning, with with 5-7 lighter green longitudinal veins, numerous, slender and diffuse from a resprouting root crown. Internodes 3-24 mm. Leaves alternate, sessile, glabrous, narrowly oblanceolate to filiform, mucronate, 10-30 mm long, 1-3 mm wide, revolute and entire; deciduous after the first year. Heads solitary to glomerate on peduncles 3-40 mm long; involucre ca. 4-seriate, 3-5 mm in diameter in both sexes; phyllaris 23-30, lanceolate, scurfy-glandular, 2-6 mm long, chartaceous with a wide, green acuminate midrib and narrow, light green lacerate-ciliate margins, maturing dark brown; conspicuously reflexed on pistillate heads at maturity. Pistillate flowers ca. 25; corolla 2.5 mm long; style maturing to 5 mm long; achenes 2-3 mm long, rugulose, 10-nerved, glabrous; pappus uniseriate, white, 7-10 mm long. Staminate flowers ca. 15; corolla 4 mm long, the lobes 1.5 mm long, reflexed at anthesis; anther column 2 mm long, exerted; pappus uniseriate, light brown, 3-4 mm long. Chromosomes: $2n = 9$ pairs (Figure 1).

Type: United States: California: San Diego County: In Chaparral on Eocene sandstone along the north side of Encinitas Boulevard, 0.6 Km west of El Camino Real, elevation 90 meters, lat. $33^{\circ} 02' 50''N$ - long. $117^{\circ} 20'W$, 24 October, 1976, Beauchamp 4250 (Holotype: SD, Isotypes: MIN, NY, RSA, UC, US).

The specific epithet honors the author's first daughter. The plant is commonly referred to as Encinitas Baccharis.

The species differs from other known *Baccharis*, especially those in the southern California and adjacent northern Baja California area by its filiform leaves and delicate phyllaries which reflex at maturity (Figures 2 & 3). Also, unlike many of the sympatric *Baccharis*, i.e. *B. sarothroides*, *B. glutinosa*, *B. sergiloides* and *B. pilularis* ssp. *consanguinea*, which occur in disturbed or riparian situations; this new taxon grows in dense Chaparral vegetation which is dominated by *Adenostoma fasciculatum*, *Quercus dumosa*, *Xylococcus bicolor*, *Salvia mellifera*, *Arctostaphylos glandulosa* ssp. *crassifolia* and *Ceanothus verrucosus*, characteristically a closed type of plant community.

Although no burns have occurred recently in the vicinity of *B. vanessae*, the species appears to be able to regenerate from underground parts after being cleared by mechanical means.

B. vanessae occurs on three soil types. At the coastal sites about Green Valley at Encinitas, the soil association is with an alluvial-Huehuero complex; at the inland sites near Mount Israel-Del Dios, Poway and Mira Mesa, the plants occur on San Miguel-Exchequer and Cieneba series soils (Figures 4 & 5).

The Encinitas population involves currently 150 plants. Several large stands in the area are known to have been destroyed by development. Transplantation of several plants has been attempted under the misguided interests of species preservation. These plants are located at San Dieguito County Park. The Mira Mesa and Poway sites consist of one specimen each, so, for this dioecious species, the population probably will not increase at these sites. The Mount Israel-Del Dios population consists of about 700 plants, a large portion of which will be included in open space preserve areas of residential developments in the area.

Because of its highly localized nature in Chaparral associated with the relictual Torrey Pine forests of coastal San Diego County, *B. vanessae* appears to survive as a relictual species. Recently, the northernmost, quite disjunct and presumably relictual stand of *Haplopappus orcuttii* was found in Chaparral very near a population of *B. vanessae*. Examination of *B. vanessae* material by Oscar F. Clarke, former herbarium curator at UC Riverside, revealed that *B. vanessae* stems were often swollen with galls after being parasitized by a lepidopteran. Such mutualistic associations further tend to indicate the relictual nature of *B. vanessae* (O.F. Clarke, pers. comm.).

As a check into a possible hybrid origin of this species, suggested by Dr. Arthur J. Cronquist, New York Botanical Gar-

den, (pers. comm.), a sample of immature staminate flowers was fixed, stained and examined microscopically. Normal segregation of the 9 chromosome pairs was observed (H.L. Wedberg, pers. comm.). Further, staining of pollen from immature flowers showed that 90% of the grains were well filled and presumably functional (J.D. Jackson, pers. comm.).

Many people aided in the research into this new species over the last 4 years. Dr. John D. Jackson, University of Minnesota, aided by commenting on material sent him as well as his examination of the pollen. Dr. Hale L. Wedberg, San Diego State University, prepared the chromosome squash and photographed the meiotic figures. Dr. Arthur Cronquist's sage comments resulted in further investigation into the range and possible hybrid origin of the species. Michael Milligan prepared the close-up photographs of the flowers and inflorescences. Bridget A. Blair prepared the line drawings, courtesy of Regional Environmental Consultants. Dr. Reid V. Moran, Curator of Botany, San Diego National History Museum, reviewed initial drafts of this paper and supplied data on Baja Californian Baccharis and Archibaccharis.

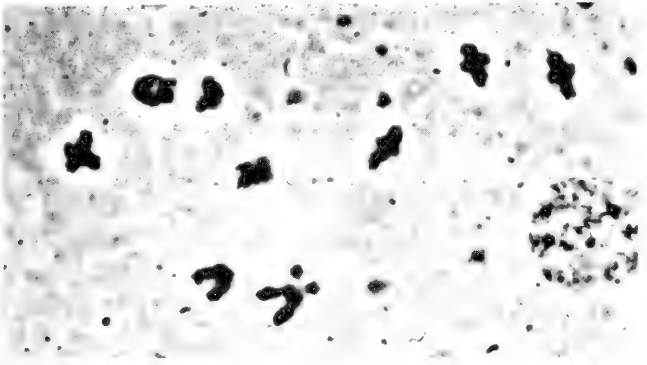


FIG. 1. Microphotograph of pachytene formation showing 9 bivalents in *B. vanessae* pollen mother cell.



FIG. 2. Photograph of staminate inflorescence of *B. vanessae*.

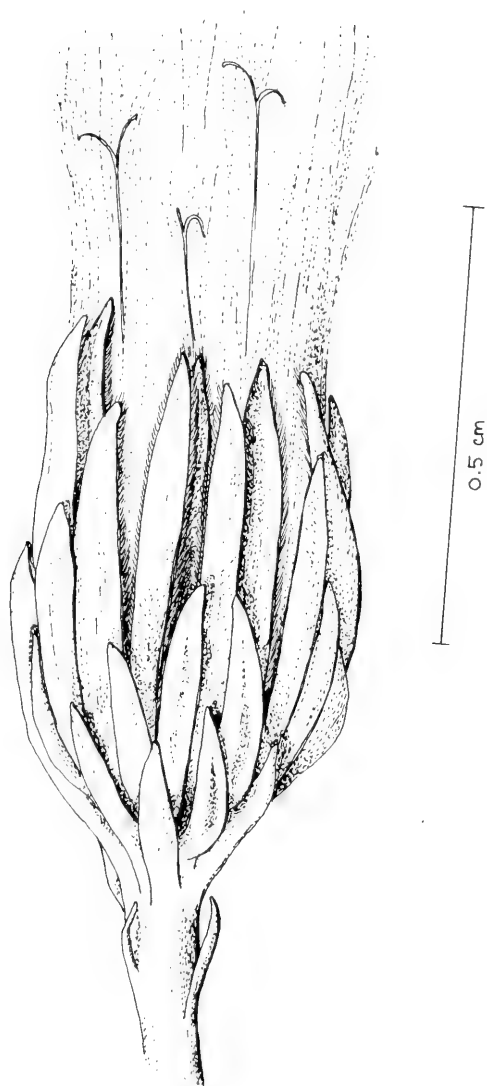
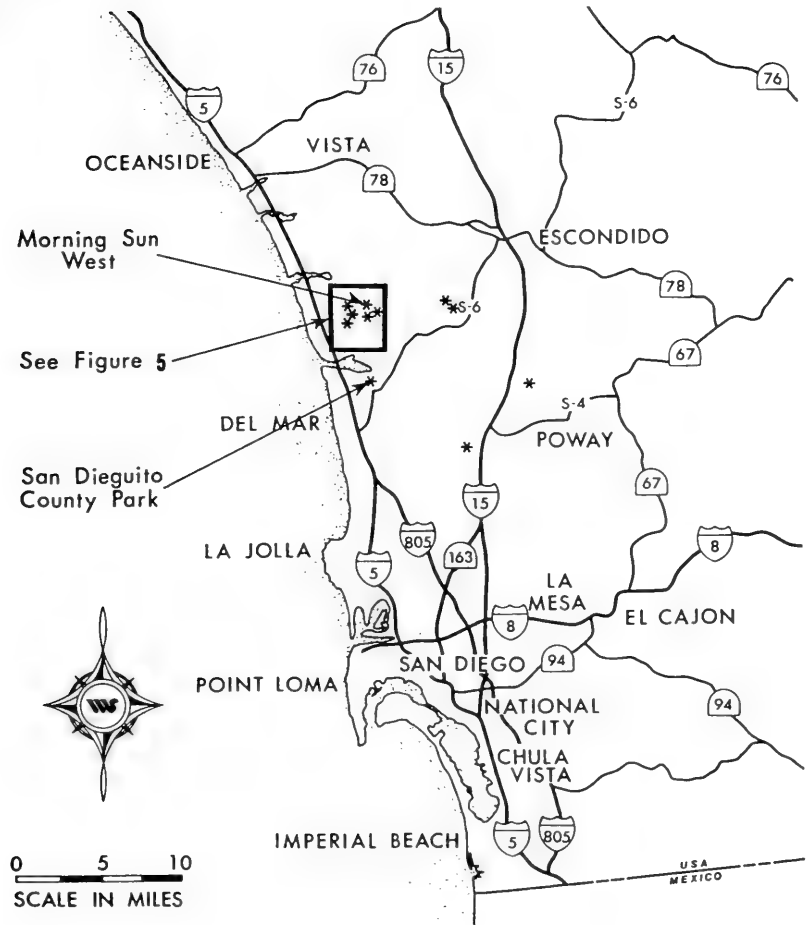


FIG. 3. Artist's rendering of a single pistillate flower of *B. vanessae*.



* Recorded locations of *Baccharis vanessae*

FIG. 4. Regional map of 4 known natural populations and single transplant site of *B. vanessae*, western San Diego County, California.

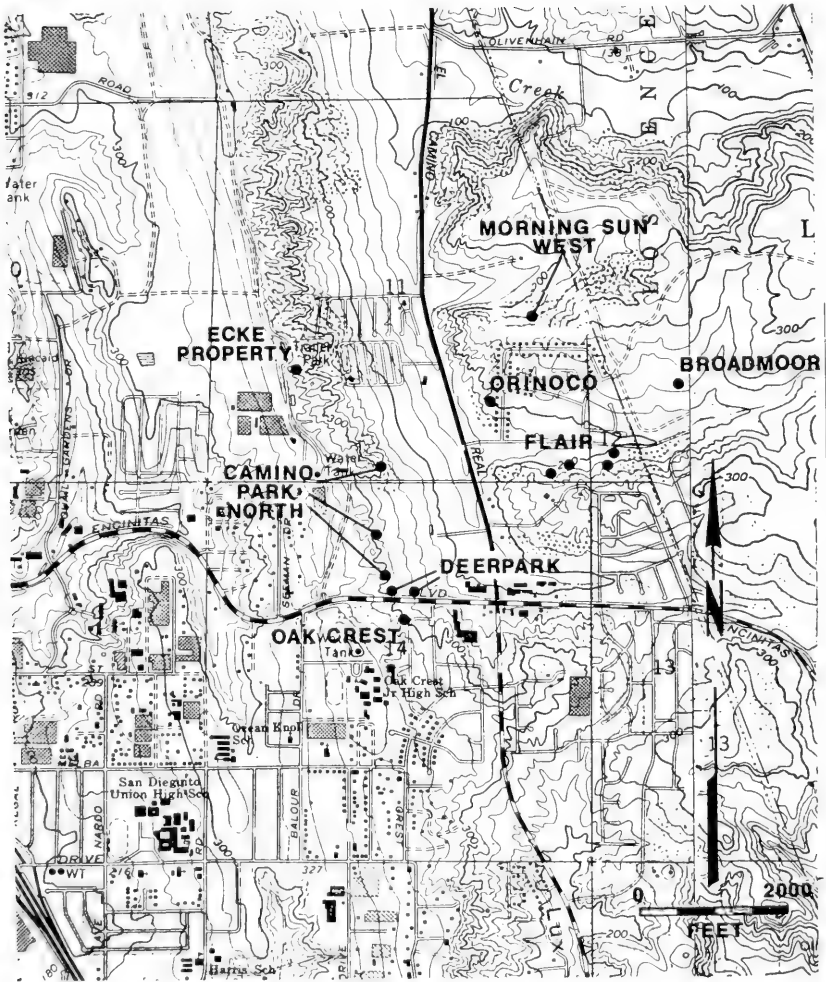


FIG. 5. Detailed map of Encinitas populations of *B. vanessae* Sites east of El Camino Real now extirpated.

NEW TAXA OF SOLANUM FROM PERU AND BOLIVIA

by C.Ochoa*

SOLANUM TAPOJENSE Ochoa sp.nov.

Herbaceum, tuberiferum. Plantae 50-60 cm altae, caules simplici vel ramificati, ad basim 3-5 mm crassi, pilis perbrevis obsiti, subpigmentati, anguste alati, alae rectae, internodia 3-6 cm longa. Stolones plus quam 1 m longi, albidi, 1.5-2.0 mm crassi; tubercula 2-3 cm longa, rotunda vel ovalia, albido-flava. Folia imparipinnata 14.5-17.0 x 9.0-10.5 cm, 3-4-juga; foliola interjecta nulla vel raro 2-3 parva, membranacea. Folia obscura, supra pilis brevis obsita (rachis et foliola inclusa), subtus dilute viridia, pilis in venulas tantum obsita, folia novella densius pilis semper albidis obtecta, petiolus 2.5-3.0 cm longus. Foliolum terminale lateralibus primi jugis majus 5.0-7.0 x 2.4-3.8 cm elliptico-lanceolatum vel late elliptico-lanceolatum, apice obtuso vel subacuto, basi laeviter rotundatus vel attenuatus. Foliola lateralia ad basim gradatim minora, sessilia, foliola primi jugis 4.0-6.0 x 1.5-2.3 cm, ovato-elliptica vel anguste oblongo-lanceolata, apice obtusa, basi oblique rotundata, sessilia, et etiam latere basiscopico anguste decurrentia. Foliola ultimi jugis visibiliter minora. Foliola pseudostipulacea falcata 7.0-8.0 x 4.0-5.0 mm. Inflorescentia cymosa, 15-20 flora, pedunculus 8-10 cm longus, 1.5-2.0 mm crassus, tanquam pedicelli sparse pilosus, pedicelli prope calycem articulati, pedicellus superior 4 mm longus, inferior 15-20 mm longus. Calyx dense pilosus, subpigmentatus, 6.5-7.0 mm longus, lobi anguste elliptico-lanceolati, acuminibus 2-4 mm longis. Corolla rotata, parva, 2.5-2.8 cm diam., obscure violacea, stella viride-flava. Columna antherarum assymetrica, antherae anguste lanceolatae 0.5-5.5 mm longae, basi cordatae, filamenta alba, 1.0-1.5 mm longa, glabra, stylus 9 mm longus, 2.5-3.0 mm exsertus, supra basim ca. $\frac{1}{2}$ partis inferioris papillis brevibus obtectum. Stigma ovale. stili apice vix crassius. Baccae rotundatae vel ovals, virides, 10-12 mm longae. Numerus cromosomatum $2n=2x=24$.

Peru: Dept. Puno, prov. Chucuito, inter Tapoje and Maucache; 3850 m.; inter saxa cum Stipa ichu, Astragalus sp., et Cajophora sp. crescit. Nomen vulg. Apharuma. Col.: C. Ochoa, n° 2789, marzo 1970. Holotypus: Hb. OCH.

SOLANUM INFUNDIBULIFORME Phil. var. ALBIFLORUM Ochoa var.nov.

Herbaceum, tuberiferum. Plantae parvae 15.0-30.0 cm altae. Caules debiles, simplices aut ramificati, erecti, laete viridi 1.5-2.5 mm crassi, pilis brevibus, delicatis, sparse obsiti. Stolones 20-25 cm longi, tubercula albo-flava, rotundata usque ad ovalia, 8-10 mm longa. Folia late viridia 5.0-10.0 x 3.0-5.0 cm, imparipinnata, 2-3-juga, raro 4-juga, pilis delicatis, brevibus sparse obtecta; foliola interjecta deficiencia. Foliola lateralia ad basim gradatim

minora, elliptico-lanceolata, apice obtusa, latere basis copiose ample decurrentia. Foliolum terminale lateralibus majus atque latius, 3.0-4.0 x 1.2-1.5 mm, anguste rhombo-lanceolatum, usque ad elliptico-lanceolatum, basi cuneatum, apice obtusum. Foliola primi jugis 1.5-2.5 x 0.7-0.9 cm. Foliola pseudostipulacea obliqua, elliptico-lanceolata aut late subfalcata 6.0-8.0 x 3.0-5.0 mm. Inflorescentia cymosa, 4-5-flora; pedunculi 3-4 cm longi, dense pilosi tamquam pedicelli et calyx; pedicelli ad 1/3 superior articulati, pedicellus superior 5 mm, inferior 12-15 mm longus. Calyx 6-7 mm longus, lobuli elliptici, in acumina 1.0-1.5 mm longa constricti. Corolla rotata 2.0-2.5 cm diam.; stella viride-flava aut flava. Columna antherarum subcylindrica, antherae lanceolatae 3.5-4.0 mm longae, basi cordatae, filamenta 0.5-0.8 mm longa, glabra. Stylus 7.0-7.5 mm longus, 1.5-2.0 mm exsertus, basi usque ad 1/2 papillis vestitus, stigma breviter capitatum. Ovarium globosum vel ovale. Numerus cromosomatum $2n=2x=24$.

Bolivia, Depto. de Potosi, Prov. Sud Chichas, Tajopunta, 4000 m Col. C. Ochoa, n° 11968, Martius 18, 1978. Holotypus Herbarium Ochoanum.

SOLANUM MICRODONTUM Bitt. var. MONTEPUNCOENSE Ochoa var. nov.

Herbaceum, tuberiferum. Plantae robustae, caules valde pigmentati, atropurpurei, conspicue alati. Stolones usque ad 2 m longi, tubercula roseo-malvacea, verrucosa. Folia imparipinnata, 1-2-juga, foliolis supra pilis brevissimis dense praedita; foliolum terminale lateribus valde majus, late elliptico-lanceolatum, apice acuminatum; foliola lateralia, primaria anguste elliptico-lanceolata apice subacuminato vel acuminato, vel aliquando acuto, sessilia vel breviter petiolulata. Foliola pseudostipulacea manifeste parva. Inflorescentia cymosa, pedunculi breves, pedicelli ad 1/3 superum articulati; calyx pilis albidis brevibus atque subtilis sparsim obtectus; lobi anguste elliptico-lanceolati, acumina inaequalia, acuta et subspathulata. Corolla rotata, atrolilacina ad violaceo pallida, acumina fere albida, lobi sine acumina 2 mm longi, acumen 4.5-5.0 mm longum. Stylus 11-12 mm longus, dimidium vel 1/3 inferius papillis obtectus. Stigma capitatum, styli apice vix crassius. Ovarium longum, conicum. Fructus ovato-conicus vel longo conicus, viridis, 2 cm longus, basim 1.4 cm crassus. Numerus cromosomatum $2n=2x=24$.

Bolivia: Depto. Cochabamba, Prov. Carrasco, inter vulgo Montepunco et Sehuencas ad 2500 m supra mare, in sylvis densis, inter frutices atque arbores, regio subtropica, humida; cum Capsicum sp., Solana non tuberifera floribus magnis albidis, crescit. Col. C. Ochoa, n° 12025; 26-III.-1978. Nomen vernaculum: Aphauma. Holotypus: Herbarium Ochoanum.

SOLANUM ANDERSONII (Regmandra?) Ochoa sp. nov.

Herbaceum, non tuberiferum. Plantae fruticosae, usque ad 1 m altae, caules fragiles ramosae, brunneae vel griseae, glabrae. Folia crassa ad extremum caulem disposita (Caules et rami pro parte majore nudi). Folia parva, dilute viridia, subverniosa, lobata vel subpinnata, 3-4 lobi vel pinnae, supra glabra, in juventute pruinosae subtus paucis atque sparsis pilis obsitae, rhachis subtus ad medium pigmentatus. Inflorescentia cymosa, paniculata, 4-5 flora. Pedunculi 3-4 cm longi, virides vel leviter violaceo-pigmentati, pedicelli dilute viridi, 12-20 mm longi, articulatio basalis pigmentata. Calyx glaber, carnosus, 8-9 mm longus, viridis, leviter costillatus, in basi pigmentatus, lobuli fere basim versus partiti, lanceolati, apice 7 mm longo, obtusi. Corola lilacina, intus dilute lilacina, glabra, infundibuliforme, numquam plene aperta, numquam plene aperta quamobrem, rotata, petala valde apiculata, extus pilis brevibus sparsioribus obsita, stella obscure atroviolacea; antherae 5.5-6.0 mm longae, basi 1 mm latae, deorsum sine rima, poris terminalibus nullis, dehiscentia lateralis vel longitudinalis, dorso cremeas, latere ventrali brunneo-pigmentati, aperturae thecarum margines colore brunneo pigmentatae, antherae non in columnam dispositae, sed liberae erectae cum apicibus divergentes. Stylus 7-8 mm longus, glaber, viridis vel supra basim ca.1/3 partis pigmentatus, stigma tetragonum, pallide viridum, 1.5 mm crassum; filamenta 4-5 mm longa, atro-violaceo pigmentata, graciles, glabra. Baccae globosae, laete virides, splendentes, 8-10 diam. Cromasomatum numerus $2n=2x=24$.

Peru: Departamenti Ica, Provinci Nazca, in vecinitis Marcona, 700 m supra mare. Collectum C.Ochoa n° 13026, Augustus 13, 1978. Holotypus Herbarium Ochoanum. Ilustrious botanici Dr. Gregory Anderson diccata.

*C.Ochoa, Head, Taxonomy Department, International Potato Center, P.O. Box 5969, Lima, Peru.

ADDITIONAL NOTES ON THE GENUS *AVICENNIA*, XIV

Harold N. Moldenke

AVICENNIA L.

Additional bibliography: A. L. Juss. in Orbigny, Dict. Univ. Hist. Nat. 13: 185. 1849; Peters, Naturwiss. Reise Mossamb. 6 (1): Bot. 266. 1861; Byrne, Atoll Res. Bull. 240: 30, 32, & 191, fig. 10. 1980; Mold., Phytologia 46: 193--199. 1980; Sullivan, Bot. Soc. Am. Misc. Ser. Publ. 158: 113. 1980; Teas, Bot. Soc. Am. Misc. Ser. Publ. 158: 115. 1980.

The *Riba & Gómez Pompa 326* distributed as *Avicennia* sp. is not avicenniaceous nor verbenaceous.

AVICENNIA ELLIPTICA Holm

Additional bibliography: Mold., Phytologia 40: 408. 1978.

Recent collectors describe this species as a tree, 18 m. tall, with slightly fragrant flowers, and have found it in anthesis in October. Araujo & Maciel refer to it as frequent in the mangrove formation in Espirito Santo and the corollas are said to have been "white" on their no. 3330.

Additional citations: BRAZIL: Espirito Santo: Araujo & Maciel 3330 [Herb. FEEMA 15513] (Ld).

AVICENNIA EUCALYPTIFOLIA Zipp.

Additional bibliography: H. Hallier, Meded. Rijks Herb. Leid.

37: 87--88. 1918; Walsh in Reimold & Queen, Ecol. Haloph. 59. 1974; V. J. Chapm., Mangr. Veg. 21, 24, 173, 174, 390, & 436, fig. 11. 1976; Mold., Phytologia 40: 408. 1978.

AVICENNIA GERMINANS (L.) L.

Additional & emended synonymy: *Avicennia tomentosa* var. *campechensis* Humb. & Bonpl. apud Steud., Nom. Bot. Phan., ed. 1, 96. 1821. *Avicenna nitida* Jacq. ex Mold., Suppl. List Inv. Names [1], in syn. 1941; Lescure, Cahiers O.R.S.T.O.M. Biol. 12: 362. 1977. *Avicenna nitida* Jacq., in herb.

Additional & emended bibliography: Jacq., Select. Stirp. Amer. Hist. Picta pl. 169. 1780; Lam., Tabl. Encycl. Méth. Bot. 3: pl. 540. 1797; Steud., Nom. Bot. Phan., ed. 1, 96. 1821; Vell., Fl. Flum. Icon. 6: pl. 56. 1827; D. Dietr., Syn. Pl. 3: 619. 1843; Nutt., N. Am. Silva 2: pl. 105. 1846; Baill., Hist. Pl. 11: 88. 1891; Sarg., Silv. N. Am. 6: pl. 296. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 181. 1895; Constant in Brehm, Merv. Nat. Monde Pl. 2: 348. 1895; Koord. & Valet., Meded. Lands Plant. Bat. 42 [Bijdr. Booms. Java 7]: 216. 1900; M. Coult., Rep. Mo. Bot. Gard. 15: pl. 24. 1904; Wettstein, Veg. Südbras. pl. 17 & 18. 1904; Rogers, Tree Book 401. 1905; N. L. Britton, N. Am. Trees 826. 1908; Börgesen, Bot. Tidsskr. 29: 201, 214, 216, & 217, fig. 7--11. 1909; Engl. & Drude, Veget. Erde 9 (1): 2, pl. 45. 1910; Wettstein, Handb. Syst. Bot., ed. 2, 73. 1911; Neger, Biol. Pflanz. 352. 1913; B. L. Robinson, Proc. Am. Acad. 5: 531. 1916;

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Additional & emended illustrations: Nutt., N. Am. Silva 2: pl. 105. 1846; Metcalfe & Chalk, Anat. Dicot. 2: [1028], fig. 246 G. 1950; Alain in León & Alain, Fl. Cuba, imp. 1, 323, fig. 139. 1957; J. F. Morton, Wild Pl. Surviv., ed. 2, 11. 1974; V. J. Chapm., Coast. Veg., ed. 2, 219--222, fig. 8.2--8.5. 1976; V. J. Chapm., Mangr. Veg. fig. 16, 169b, 176 (a, g, k, & l), 178, 197, 201, 203--207, 209--213 (5--7), 214--218, 254--260 (1--3), & 294. 1976; Gunn & Dennis, World Guide Trop. Drift Seeds opp. 49. 1976; Batson, Gen. East. Pl. 147. 1977; Lescur, Cahiers O.R.S.T. O.M. Biol. 12: [363], fig. 1 (2) & 2 (1, 3, & 4). 1977; Pool, Snedaker, & Lugo, Biotropica 9: 201 & 202, fig. 3--8. 1977; Rabinowitz, Biotropica 10: 49, fig. 5. 1978.

Rabinowitz (1978) discusses in detail the characteristics of dispersal and establishment for the water-borne propagules of *Avicennia* as compared to those of *Laguncularia*, *Rhizophora*, and *Pelliciera*, including period and pattern of flotation, period of obligate dispersal, time required to root firmly, longevity, and vigor. The dispersal properties correlate with the spatial distribution of adult trees within the swamp. Genera, like *Avicennia* whose adults (at least in Florida) are found on higher ground on the landward edge of the intertidal zone, have small propagules that require a period of freedom from tidal inundation of approximately 5 days in order to establish themselves firmly in the substrate. Gunn & Dennis (1976) describe and illustrate the disseminules of the present species as they occur washed ashore on tropical beaches. They state that the "Unfolded cotyledons are said to serve as miniature boats, but this does not explain how germinating and non-germinating fruits float. It would appear that buoyancy is due to buoyant seedling or fruit tissues. The buoyancy lasts about a year and nearly 100 percent of seedlings washed ashore are viable. "Unlike most disseminules, the black mangrove usually drifts as seedlings, not as seeds or fruits. The fruit acts as a surrogate seed coat, because the seed coat is absent. The embryo germinates while the fruit is still attached to the parent tree. When the seedling drops, it may be self-planted in the mud below the parent tree, or be carried into the ocean by the tide....Black mangrove was introduced into west Africa by man. While the red mangrove (*Rhizophora mangle*) and its relatives have rugged appearing drift seedlings, black mangrove seedlings appear to be so delicate that they would not be able to withstand the vicissitudes of drifting or being stranded." [to be continued]

CONTRIBUTION TO THE LICHEN FLORA OF BRAZIL V.
Three interesting records from Rio Grande do Sul.

HECTOR S. OSORIO' and C. S. ARBELO MARTINS''.

- ' Departamento de Botanica, Museo Nacional de Historia Natural, Montevideo URUGUAY.
- '' Museu de Ciencias, Pontificia Universidade Catolica do Rio Grande do Sul, Porto Alegre, BRASIL.

Among the lichens collected by the junior author in the Brazilian state of Rio Grande do Sul three interesting species could be identified. These are either new records for the state flora or they amplify their previously known distribution area.

The collections here reported are preserved in the Museu de Ciencias, Pontificia Universidade Catolica do Rio Grande do Sul, Porto Alegre (PUCRGS/MC) and the Duplicatas in the senior's private herbarium.

Cladonia confusa R. Sant.

BRASIL: Rio Grande do Sul, Cambará do Sul, on stones, Febr. 1978, leg. C.S.Arbelo Martins (PUCRGS/MC, Herb. Osorio).

The subgenus Cladina is rather scarcely reported in the literature for Rio Grande do Sul. Des Abbayes (1939) mentions two collections of Cladonia impexa for this state but he does not indicate localities. In no later revisions of this subgenus (Santesson 1942, Ahti 1961) are mentioned neither such collections nor even any other. However both authors mention several collections of Cladonia confusa in the neighbouring state of Santa Catalina, all belonging to the last century, in which this species seems to be common.

The specimens studied by the authors are in agreement with the descriptions given by Santesson and Ahti (loc. cit.) and with the material collected in Uruguay: Rocha: Estancia Siete Cerros, Köfaragó-Gyelnik Lichenotheca parva 18 (Herb. Osorio).

Cladonia chondrotyna Vain.

BRASIL: Rio Grande do Sul, Cambará do Sul, on stones,

Febr. 1978, leg. C.S.Arbelo Martins (PUCRGS/MC, Herb. Osorio).

This species, scarcely reported in the literature, is known from a single locality in the state of Rio Grande do Sul: Santa Cruz (Sandstede 1938). The author's collections is in agreement with the uruguayan material identified by T. Ahti (URUGUAY: Treinta y Tres, Cuchilla de Dionisio, Estancia La Teja, Osorio 6098 in herb.

Stereocaulon ramulosum (Sw.) Räsusch.

Brasil: Rio Grande do Sul, Canela, on stones, Oct. 1976, leg. C.S.Arbelo Martins (PUCRGS/MC, Herb. Osorio) This species is known from several states in the south eastern Brazil and it reaches the State of Santa Catarina in this country (Müller Arg. 1891, 1895). The collection studied by the authors is the southernmost record of this species in Brazil and the first record of this genus for Rio Grande do Sul State.

SUMMARY: The genus Stereocaulon is reported for Rio Grande do Sul by first time. The occurrence of Cladonia confusa in this state is confirmed and a second of Cladonia chondrotypa is pointed out.

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- MULLER ARG., J. 1891. Lichenes Schenkiani. Hedwigia 30: 219-234.
- 1895. Lichenes Uleani in Brasilia lecti. Hedwigia 34: 39-42.
- SANDSTEDE, H. 1938. Ergänzungen zu Wainio's Monographia Cladoniarum Universalis, unter besondere Berücksichtigung des Verhaltens der Cladonien zu Asahina's Diaminprobe. Repert. spec. nov. regni veget. Beih. 103: 1-103.
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A STUDY OF THE STACHYS PALUSTRIS L.
COMPLEX (LABIATAE) IN NORTHERN NORTH AMERICA*

L.S. GILL

Department of Biological Sciences,
University of Benin,
P.M.B. 1154,
Benin City, Nigeria

Stachys palustris is a widely occurring species distributed throughout temperate Eurasia and North America. It is very variable in such characters as habit, pubescence, leaf shape and serration, calyx structure, and corolla size and colour. In North America this species is particularly variable and several attempts at a taxonomic treatment have been made by previous workers. Rydberg (1904, 1906 and 1932) described several new species from western North America, all of which are referable to the S. palustris complex. Jennings (1920) described 3 new varieties from northwestern Ontario. Epling (1934) recognized 2 subspecies but included other forms in S. rigida Nutt. and so called S. x ambigua Smith. Fernald (1943) recognized 5 varieties based on leaf and pubescence.

All these workers however based their conclusions purely on a study of herbarium material together with their knowledge of these plants in the field. In the present study I have coupled such observations with others on the cytology and behaviour of the plants under cultivation, in an attempt to produce a more satisfactory treatment of variation in this species within North America.

Living material from 45 populations of Stachys palustris, collected in localities throughout the greater part of its range in North America were brought into cultivation at Waterloo. Type material of the numerous species, varieties and forms which have been described from North America by previous workers and which appear to belong to this species complex, was examined to ensure that all the known variants were included in the cultivated material. Meiotic preparations were made following Gill (1971).

* This work was done at the University of Waterloo,
Ontario, Canada.

From a study of this living material and the extensive herbarium* collection, it became apparent that three main variational trends exist in North America. It was concluded that these are best treated as subspecies. They consist of:

- 1) plants of the Great Lakes region - characterized by bushy habit, thin pubescence, glossy dark green foliage, rich magenta pink flowers, narrow oblong-lanceolate leaves, and spinescent spreading subulate calyx teeth (subsp. arenicola).
- 2) plants of the prairies - characterized by little branched erect habit, dense pilose pubescence with very viscid short glandular hairs, dull greyish green foliage, pale pink flowers, ovate-lanceolate leaves, and soft erect broadly lanceolate calyx teeth (subsp. pilosa).

All the plants belonging to both these types that were grown in the garden retained their characters under cultivation, and they clearly represent distinct ecological races adapted to the particular conditions prevailing in these 2 very different regions.

- 3) However, the situation is complicated by the occurrence of more or less intermediate plants. These occur in the Atlantic regions of Canada and the north eastern United States, and also extend westwards as isolated, though large colonies as far west as Wisconsin and the Lakehead area of Ontario, and northwards to James Bay. The occurrence of such intermediates is perhaps readily explicable in the more westerly areas where it is conceivable that both subspecies may have come into contact and hybridized. However, the abundance and predominance of these apparent intermediates in the Atlantic region, far removed from the prairie subspecies is inexplicable on the basis of hybridization between adjoining populations. The intermediate plants are variable and are apparently morphologically the same as the European populations of this species. But the European populations are different cytologically with $2n=102$ (Morton 1973. Wilcock & Jones 1974). Hence, a possible

* ACAD, ALTA, CAN, DAO, HAM, MCM, MT, MTJB, MTMG, NFLD, OAC, QK, QMP, QPH, QFA, QFS, QUE, SASK, TRT, USAS, UWO, UBC, V, WIN, WINF, CM, PFES, VC, WLU, Lakehead University, University of Waterloo & J.K. Morton.

explanation lies in the occurrence of this European type in eastern North America, either as an introduction or more probably as a native. Many European species occur in eastern North America and show an amphiatlantic distribution, being absent from central and western North America (e.g., Satureja vulgaris). According to Blackett et al. (1965), the dispersal of such species over what is now the Atlantic, occurred either during the late Tertiary or in the early Pleistocene when continental drift separated the continents and severed the last land connections.

These intermediate plants, though variable from population to population, retain their characters in cultivation. Usually they look like the Great Lakes type but have a broader inflorescence, broader, larger leaves, less spinescent, partially lanceolate calyx teeth, and a rather dense long pubescence, but they are not viscid. As they appear to be inseparable from the European plant (to which Linnaeus gave the specific epithet) it seems best to include them in the type subspecies - palustris. Experimental work is needed to determine the relationship of these North American and European populations. However, until evidence to the contrary is available, the needs of the taxonomist would appear best served by equating the North American and European populations. Accordingly, in North America, I am of the opinion that Stachys palustris is represented by 3 subspecies. A key and the full descriptions of these are given below:

Key to the subspecies

- | | |
|---|---------------|
| Stem green; inflorescence lacking
purple pigmentation | 1 |
| Stem purplish grey; inflorescence with
purple pigmentation..... | 2 |
| 1. Stem angles with long spreading hair
without pustulate bases; nodal
tuft of hairs absent, calyx teeth
soft and broadly triangular | <u>pilosa</u> |



FIG. 1

Stem angles with reflexed hair with pustulate bases; nodal tuft of hairs present- calyx teeth acuminate and narrowly triangular palustris

2. Stem angles with long stiff hair with pustulate bases, nodal tuft of hairs present- calyx teeth outwardly curved; woody with subulate tips.. arenicola

S. palustris ssp. pilosa
(Fig. 1)

Stoloniferous perennial viscid glandular herb about 40-90 cm. high; stem dull green with long loose spreading hair on the angles; hairs usually without pustulate bases; sides of stem short pilose; nodal tuft of hairs absent; leaves acute narrowly ovate to ovate-lanceolate, shortly petiolate, rounded to subcordate at the base, coarsely serrate, dull grey green, 4-10 cm. x 2-3 cm., densely pilose above and softly pubescent beneath along the veins. Inflorescence lacking purple pigmentation, flowers in distant whorls forming a spike up to 40 cm. long and 1.7 cm. broad, bracts serrate; ciliate; calyx dull green with long spreading silky hair; with short glandular and long eglandular hairs; calyx tube 4 mm., long, campanulate, eglandular inside; calyx teeth 3-5 mm. soft, broadly triangular; straight, (Fig. 4), corolla 12-15 mm. long pale pink.

Exciccatae.

- Bailey 270 Blackie, Alberta
 Bird 73 Vermillion, Alberta
 Calvert s.n. Mahor, Saskatchewan
 - ditto - Cross lake, Minnesota
 Cody & Loan 4445 Pt. Fitzgerald, Alberta
 Dore 11716 Lethbridge, Alberta
 Gardener G4 Churchill, Manitoba
 Hodges 89 Calgary, Alberta
 Morton N.A. 3788 Vermillion, Alberta
 " N.A. 3815 Fort Saskatchewan Alberta
 " N.A. 3415 Calgary, Alberta
 " N.A. 1897 Gunn, Alberta
 " N.A. 3884 Cyprus Hills, Alberta
 " N.A. 3774 Moose Mts. Provincial
 Park Saskatchewan
 " N.A. 3888 Regina, Saskatchewan
 " N.A. 3444 McLean, Saskatchewan
 " N.A. 1801 Red Jacket, Saskatchewan
 " N.A. 3769 Brandon, Manitoba
 " N.A. 3754 Rennie Manitoba

Moss 5037 Gull Lake, Alberta
 Packer 25907 Morely, Alberta
 Raup 3174 Buffalo Park, Alberta
 11575 Fort Nelson, British Columbia
 3179 McMurry, Alberta

S. palustris ssp. arenicola

(Fig. 2)

Stoloniferous perennial non viscid herb, 40-90 cm. high; stems branched from the base, purplish grey, angles with long spreading or reflexed stiff hairs with pustulate bases; nodes with a tuft of cilia; leaves acute, oblong-lanceolate, rounded at the base, subsessile, closely crenate, dark to more or less glossy, 4-13 cm. x 1-3 cm., upper surface thinly appressed pubescent, lower surface hispid along the veins. Inflorescence purple, 1.5 cm. in breadth, whorls dense; close at first and then elongate into interrupted spike up to 15 cm. in length; bracts closely serrate; ciliate, longer than the calyx; calyx purple, glandular; 8 mm. long with few long hair on the teeth and nerves; teeth outwardly curved; woody with subulate tip; (Fig. 4); corolla 8-11 mm. long dark purple.

Exciccatae.

Calvert 536 Delaware, Ontario
 Erskine 1361 Wellington, Prince Co., Prince Edward Islands
 Gaiser 254 Walpole Island, Ontario
 Gill and Morton N.A. 3177 Fergus, Ontario
 Gill and Morton N.A. 3174 Flora, Ontario
 Montgomery 142 Port Credit, Ontario
 Montgomery 712 Bridgeport, Ontario
 Morton N.A. 3242 Long Sault Park, Ontario
 " N.A. 4366 Lake Simcoe, Ontario
 " N.A. 3190 Waterloo, Ontario
 " N.A. 3489 Port Buswell, Ontario
 " N.A. 3902A Yamaska, Quebec
 " N.A. 3244 Mississquoi Bay, Quebec
 " N.A. 4223 St. John Fredericton, New Brunswick
 " N.A. 3235 Crail Island, Long Sault, New York
 Rolland-Germain 2256 St. Adolphe, Quebec
 Scoggan 12370 Hampton, New Brunswick
 Scotts s.n. Toronto Island, Ontario
 Senn 5586 Muskoka, Ontario
 Shumovich 224 Whitby Twp., Ontario

S. palustris ssp. palustris

(Fig. 3)



FIG. 2



FIG. 3

Herbario de Facultad de Medicina de la
Universidad de Chile
Santiago, Chile
1958
Stachys palustris
C. Gill
Herbario de la Universidad de Chile

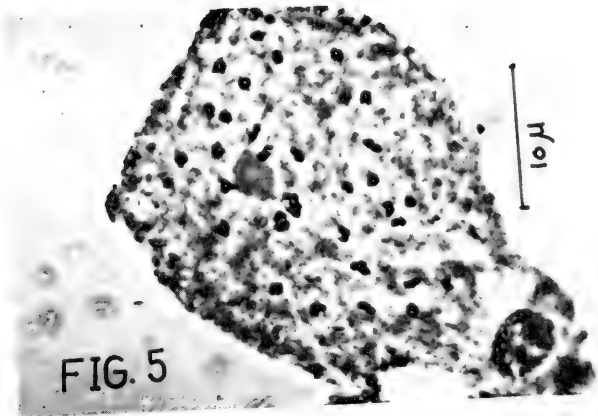


FIG. 5

Stoloniferous perennial herb about 40-100 cm., stem green with stout reflexed hairs with pustulate bases, nodes with tuft of hair, leaves narrowly oblong-lanceolate or linear lanceolate; rounded or subcordate at the base lower leaves shortly petiolate, the upper sessile, bracts linear large. Inflorescence broader up to 2.2 cm., flowers in whorls forming an interrupted spike 20 to 30 cm., calyx 8 mm., campanulate; with long hairs, teeth acuminate, narrowly triangular but not woody (Fig. 4), corolla 12-14 mm. purple pubescent outside.

Exciccatae.

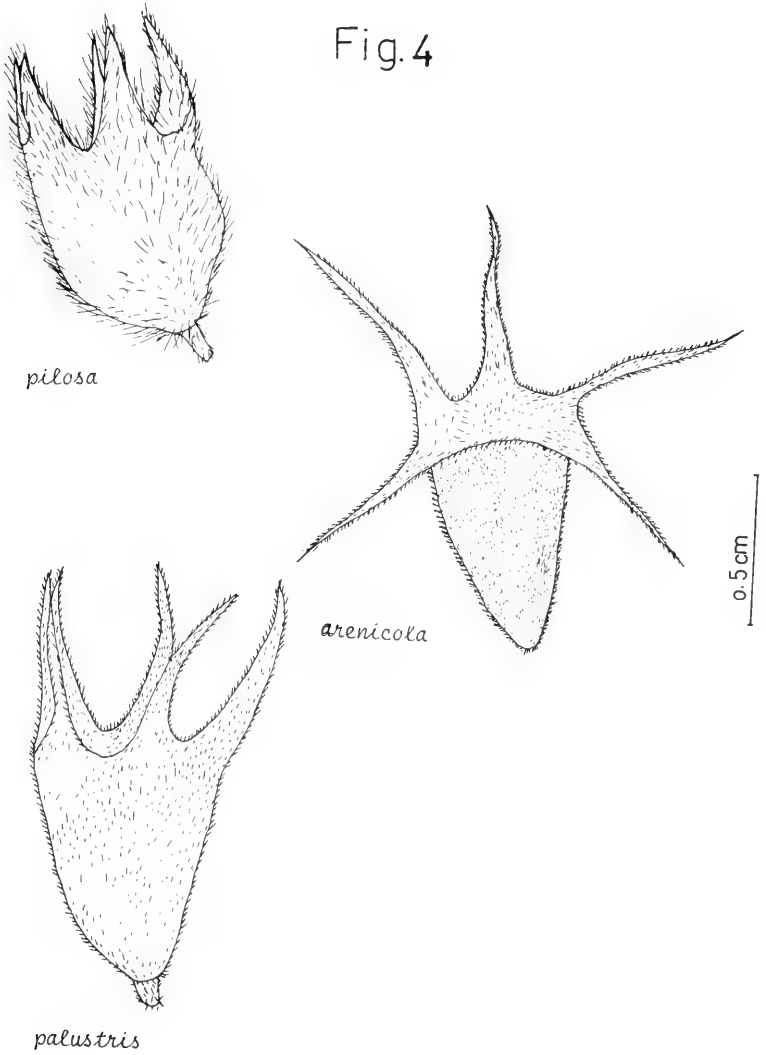
- Bloin et al 7522 Riviere du Loup, Quebec
 Dion and Hamel 43259 Yamaska, Quebec
 Hamel and Brisson 14978 St. Francois, Quebec
 O.E. and G.K. Jennings 6944 Nipigon Lake, Ontario
 - ditto - 7001 Qubabika Post, Ontario
 - ditto - 6636 Orient Bay, Ontario
 - ditto - 15052 Jarvis Lake, Ontario
 - ditto - 11031 Pelican Lake, Ontario
 - ditto - 2261 Kakabeka, Ontario
 Marie s.n. (GFA.55348) La Trappe, Quebec
 " s.n. (QFA.05024) Vandreuil, Quebec
 Morin 451 Neuville, Quebec
 Morton N.A. 4186 St. Simeon, Quebec
 " N.A. 4017 Rimouski, Quebec

Nomenclature

Stachys palustris was described by Linnaeus (1753). Subsequent workers in Europe have described many so called species and infraspecific taxa which are currently included in this species. However, of these only the type subspecies occurs in North America, though some of ~~the~~ material from this continent has been erroneously equated with the presumed hybrid between S. palustris and S. sylvatica (S. x ambigua Smith, e.g. by Epling 1934). This hybrid is of locally common occurrence in Western Europe, but does not occur in North America and the other parent - S. sylvatica is only very rarely encountered as an introduction.

Many taxa have been named from North America and several of these names have been taken up by subsequent workers and used for different entities. Hence much confusion now prevails, not only as to what taxa exist in North America, but also as to the correct names of these taxa. From a careful study of the literature, and of most of the type specimens, the following synonymy has been produced for the 3 subspecies which I recognize as occurring in North America.

Fig.4



CALYX STRUCTURE IN SUBSPECIES OF *STACHYS PALUSTRIS*.

Subsp. pilosa

- Epling, 1934, Rep. Sp. No. Regni, Vege, Band LXXX, Dahlem.
S. palustris var. pilosa (Nutt.) Fernald 1943, Rhodora,
 Vol. 45
S. pilosa, Nutt., in Jour. Acad. Phil. 7:48. 1834.
S. teucrifolia Rydb. F1. Colo. 297. 1906.
S. teucrifolia Rydb. in Bull. Torr. Bot. Cl. 31: 640. 1904.
S. asperrima Rydb. in Bull. Torr. Bot. Cl. 36: 682. 1909.
S. leiborgii Rydb. in Bull. Torr. Bot. Cl. 36: 682. 1909.
S. ampla Rydb. in Bull. Torr. Bot. Cl. 36: 683. 1909.
S. borealis Rydb. in Brittonia 1: 95. 1931.
S. malacophylla Greene, in Pittonia 3: 343. 1896.
S. bracteata Greene, in Pittonia 3: 342. 1896
S. rigida Nutt. ex Benth. in DC. Prodr. 12: 742. 1848.
S. ajugoides var. rigida Jeps. & Hoover, in Jeps. F1.
 Calif. 3: 426. 1943.
S. rivularis Heller, in Myhlenbergia 1: 33. 1904.
S. rigida ssp. rivularis Epling, Fedde Rep. sp. nov.
 Beih 80: 60. 1934.
S. rigida ssp. quercetorum Epling, Fedde Rep. sp. nov.
 Beih 80: 60. 1934.
S. quercetorum Heller, in Muhlenbergia 2: 318. 1907.
S. gracilentia Heller, in Muhlenbergia 2: 319. 1907.
S. viarum Heller, in Muhlenbergia 2: 316. 1907.
S. ramosa Heller, in Myhlenbergia 1: 116. 1906.

Subsp. arenicola L.S. Gill Stat. nov.

- S. arenicola Britt. Man. F1. N.U.S. 792. 1901.
S. palustris var. arenicola Farw. in Am. Midl. Nat.
 11: 82. 1928.
S. palustris var. homotricha Fern. in Rhodora 10: 85. 1908.
S. schweinitzii Rydb. in Brittonia 1: 95. 1931.
S. puberula Rydb. in Brittonia 1: 96. 1931.
S. pustulosa Rydb. in Brittonia 1: 95. 1931.
S. palustris var. phaneropoda Fern. in Rhodora 45: 475. 1945.
S. homotricha (Fern.) Rydb. in Brittonia 1: 95. 1931.

Subsp. palustris

- S. palustris L. sp. Pl. 580. 1753.
S. palustris var. puberula Jennings, in Jour. Wash Acad.
 Sci. 10: 458. 1920.
S. palustris var. macrocalyx Jennings, in Jour. Wash Acad.
 Sci. 10: 458. 1920.
S. palustris var. nipigonensis Jennings, in Jour. Wash
 Acad. Sci. 10: 458. 1920.

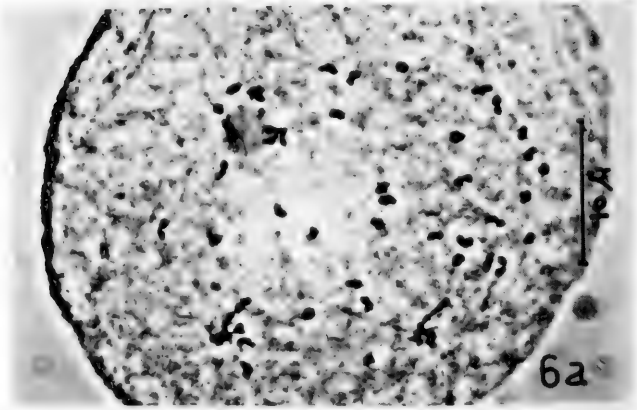
Cytology:

Sixteen populations of *Stachys palustris* (Table 1) from widely scattered localities in North America have been examined cytologically, and all but one proved to have a haploid number of 32 (Fig. 5). These included representatives of all three subspecies. A single population, which came from near Fredericton and was referable to subspecies *palustris* had a haploid number of 48 (Fig. 6a, 6b). It did not differ morphologically from other material of this subspecies and was fully fertile. Meiosis and pollen formation in all three subspecies are normal. Pollen size in both cytotypes is variable and ranges from 20.0 μ to 30.0 μ with a mean of 25.0 μ . European material of *S. palustris* is reported as having $2n=64$ (Wulf 1938, Rohweder 1937), $2n=102$ (Long 1940, Löve 1954, Morton 1973 and Wilcock & Jones 1974). However, Wilcock & Jones (1974) reported also different chromosome numbers ranging from $2n=97-103$, but nothing is known about the distribution of these cytotypes in Europe.

Distribution: (Fig. 7).

The distribution of the 3 subspecies is at this stage incompletely known. However, the species extends from Alaska, Hudson Bay and Newfoundland southwards to North Carolina, Illinois, Colorado and California. It is apparently absent from the west side of the Rockies. The northern limit (lat. 65°N., long. 126°W.), shows a correlation with the July isotherm of 60°F., and the -20°F. January isotherm. In the British Isles, the northern limit follows the July isotherm of 54°F. (Perring & Walters, 1962). Flowers from June to September.

Acknowledgments: - I am indebted to Prof. J.K. Morton for his keen interest in this study. This work was supported by a grant in aid of research to Professor J.K. Morton from the National Research Council of Canada. I am grateful to the Curators of the Herbaria which were consulted during the course of this study.



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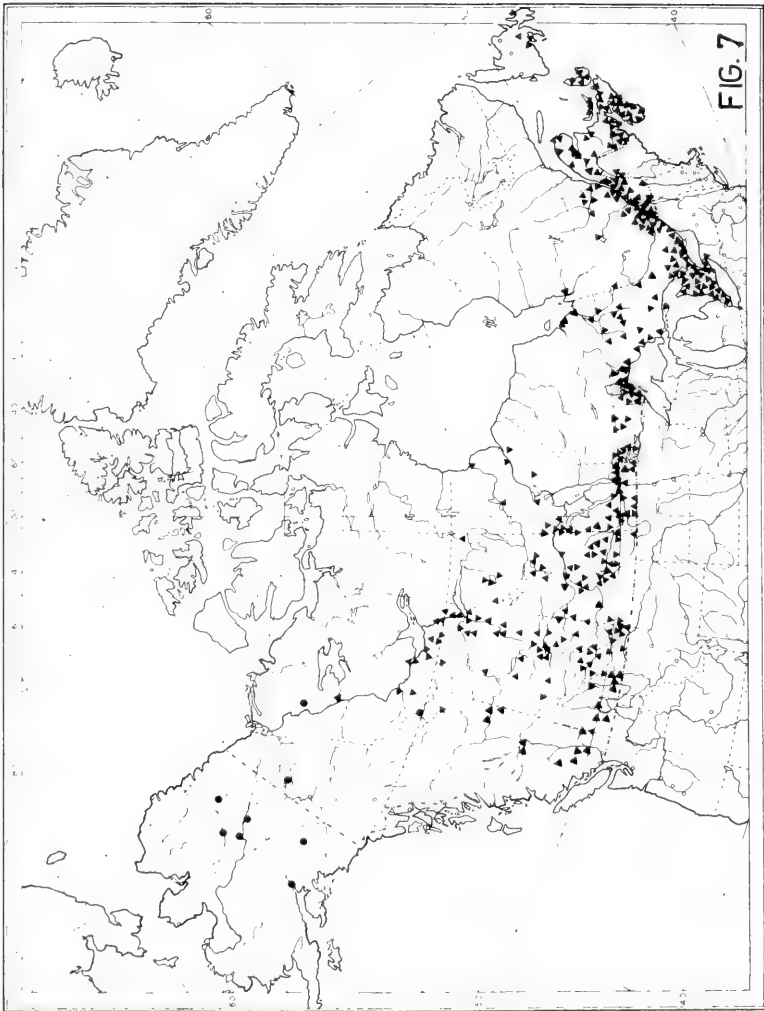


FIG. 7

STACHYS PALUSTRIS L.

Table I. Material of Stachys palustris examined cytologically

Origin	*Voucher	n
Bonaventure and St. Simeon. Gaspé, Quebec.	N.A. 4186	32
Fredricton, New Brunswick	N.A. 4223	48
Fredricton, New Brunswick.	N.A. 4225	32
Mississique Bay, Quebec.	N.A. 3244	32
Belleville, Ontario.	Can. 64	32
Sibley Peninsula, Ontario.	Can. 94	32
Port Arthur, Ontario.	Can. 100	32
Kakabeka falls, Ontario	Can. 102	32
Kapuskasing, route 11, Ont.	Can. 106	32
Balls falls, Ontario.	Can. 276	32
Luther Lake, Ontario.	N.A. 3075	32
Flora, Ontario.	N.A. 3174	32
Port Burwell.	N.A. 3489	32
Brandon, Manitoba.	N.A. 3769	32
Vermillion, Alberta.	N.A. 3787b	32
Calgary, Alberta.	N.A. 3415	32

* Voucher material of the above collections is housed in the herbarium of the Department of Biology, University of Waterloo, Ontario, Canada.

The designations Can. and N.A. refer to the material collected by L.S. Gill and J.K. Morton respectively.

BOOK REVIEWS

George M. Hocking
School of Pharmacy, Auburn University
Auburn, Alabama

(Reviews are in alphabetic order
of authors, organizations, etc.)

"MARINE ALGAE OF CALIFORNIA", by Isabella A. Abbott and G. J. Hollenberg. xv + 827 pp., 701 figs., 8 port., 5 maps. Stanford University Press, Stanford, California. 1976. \$22.50.

In this title, we have a masterly work on the seaplants found off the coast of California. 669 spp. of Algae have been described with illustrations of each of them. The introduction tells about the geography, climate, etc., of the area, with useful remarks on the classification, form, and physiology of Algae (with important references), the methods used in collecting and preparing the specimens, and instructions for obtaining maximum value from the book. The history of algal taxonomy for the area is given in some detail in a chapter by G. F. Pappenfuss (Landmarks in Pacific North American Marine Phycology), with many references. The systematic part following recognizes four phyla: Chrysophyta, Chlorophyta, Phaeophyta, Rhodophyta. This section has numerous analytical keys for precise identification of taxa. Detailed descriptions of orders, fams., genera, and spp. are presented. Much attention is paid to habitat and distribution of taxa. To aid in the use of these data, a detailed glossary will be found at the end of the volume just preceding the lengthy bibliography and the quite adequate index. A novel feature of the book is a master key to genera following the systematic part of the text (some spp. are included in this key). No new taxa or combinations were noted. The book is well made and surprisingly inexpensive at \$22.50. The two authors were assisted by six other algologists who each wrote a portion of the text. - The coverage is restricted to benthic multicellular organisms of macroscopic size, thus excluding the Cyanophyta (blue-green Algae), also the unicellular organisms of the Chlorophyta. (These exclusions are due to the highly complex nature of the organisms and the necessity of culturing and electron microscopy technics for their study). The Chrysophyta are represented in this book by only a single species, Vaucheria longicaulis Hopp. (macroscopic).

G M H

"REVIEWS OF PHYSIOLOGY, BIOCHEMISTRY, AND PHARMACOLOGY" (formerly "Ergebnisse der Physiologie, Biologischen Chemie und Experimentellen Pharmakologie"), edited by R. H. Adrian et al. Vol. 85, III + 231 pp., 64 figs., 7 tabs. Springer-Verlag, Berlin, Heidelberg, New York. 1979. DM 88--; U.S. \$48.40 (≈).

This series is composed of monographs or longer papers. In this volume, there are three lengthy papers with comprehensive bibliographies: (1) Orientation of animals in space and time (in German, with long abstract summary in English); (2) Biologic properties and detection of immune complexes in animal and human pathology (English but with no English or German summary); and (2) Pathophysiology of the enterohepatic circulation of bile acids (in English, with brief summary but none in German). Thus, although about 30% of the text is in German, the 3-page English summary makes it readily available to an English language reader. The book has a subject index and also an author index which cites both the place in the text where the author is mentioned as well as the page on which the bibliographic reference citation is given in detail. The first contribution explains reasons which account for an animal's orientation--optical clues, moving objects, the sun's position, polarized light (as indicative of sun position; in bees); chemical senses (odors); mechanical senses (echo location in bats; electrical field changes in electric fishes); and the earth's magnetic field (bird migrations). These various phenomena are described and discussed in considerable detail to give a total picture of how animals make their way in this world--something which previously has been a source of wonder and endless speculation!

G M H

"BIOACTIVE ORGANO-SILICON COMPOUNDS", (various authors). Topics in Current Chemistry (Fortschritte der Chemischen Forschung) Vol. 84: IV + 146 pp., 21 figs., 50 tabs. Springer-Verlag, Berlin, Heidelberg, New York. 1979. DM 88,--; US \$48.80(varies)

Two long articles occupy this volume, one on the syntheses and properties of bioactive organo-silicon compounds (pp 1-75), the other on the biological activity of silatranes, by M. G. Voronkov, of Irkutsk, Siberia (pp 77-135). Since silicon is next to oxygen, the most abundant element in the lithosphere (the 80-km. thick earth's crust), it is not surprising that it composes a number of biologically active substances. The composition of many compounds parallels that of carbon compounds. The first article by R. Tacke and U. Wannagat (of Brunswick, Germany) includes a good deal on the pharmacology and toxicology of Si compounds. The silatranes are not analogous to any known organic compounds (carbon compounds) and are tricyclic compounds containing Si, C, N, O, and H. They have many interesting biological properties, some of which might be applicable to medicine, agriculture, silk production, fur farming, etc.

G M H

"EXHIBITION OF INDIGENOUS HERBAL DRUGS", (Anonymous), Proceedings of the Inaugural Function, Nov. 20-22, 1976, v + 1-36. National Botanic Gardens, Lucknow - 226001, India. 1977.

Various speeches are recorded at the time of the opening of this large exhibition of Indian drugs, still widely used in the medicine of that country. It was mentioned that a survey of 1200 proprietary medicines showed nearly 425 botanical species were represented in the various formulations.

G M H

"HISTORY OF THE CONIFEROUS FORESTS, CALIFORNIA AND NEVADA", by D.I. Axelrod. 70: v + 1-62. Univ. Calif. Publ. Bot. 1976.

These forests occupied moderate to high altitudes in the Cordilleran region during the Paleogene, shifting westwards during the Late Oligocene and Miocene. With decreased precipitation and higher temperatures, forests became restricted to the mountains and coastal areas. Modern types of forest first appeared in the interior. Restrictions of forest types occurred during the Quaternary. During the Late Quaternary, xerothermic climates apparently eliminated relict forest stands in the Great Basin, Coast Ranges, Transverse Ranges, and Peninsular Range.

G M H

"DER EINFLUSS VON ANAESTHETICA AUF DIE KONTRAKTIONSDYNAMIK DES HERZENS" ("Influence of Anesthetics on the Contraction Dynamics of the Heart"), by K.-J. Fischer. Anesthesiology and Intensive Care Medicine Vol. 117: XII + 276 pp., 181 figs., 33 tabs. Springer-Verlag, Berlin, Heidelberg, New York. 1979. DM 79,-; US \$ 43.50.

This issue reports investigations of the direct action on the heart of seven different anesthetics, both inhalation and I.V. Investigations were carried out with an isolated heart (heart-lung preparation) of cat using equinarcotic concentrations (i.e., equivalent doses of the anesthetic) of the various intravenous and inhalation anesthetic relative to their effects on the contraction dynamics of the heart muscle. As a measuring method for quantitative studies, the "cardio-therapeutic index" was developed, based on the concentration of anesthetic in the blood, which reduces left ventricular pressure as compared with the norm. A special procedure is described, which can be adapted for definite narcotic concentrations to a heart muscle subjected to hemodynamic loads. Blood pressure was depressed with the anesthetics studied in the following order: etomidate < enflurane < diethyl ether < methoxyflurane < halothane < ketamine < hexobarbital. This title is written in German but

there is a two-page English summary at the end. For a subject of such prime importance in so far as both anesthesia and cardiac health are concerned, it would appear that this book might well be considered important enough for translation into the English language.

G M H

"HERBACEOUS FLORA OF DEHRA DUN," by C. R. Babu. xi + 721 pp., 1 map, 4 tabs. Publications & Information Directorate, CSIR, Hillside Road, New Delhi, India. 1977. \$60.00.

In this flora of the herbaceous plants, 1230 spp. are taken up, members of 624 genera and 115 families. The area covered lies in Uttar Pradesh in northeastern India, Dehra Dun representing one of the rich shallow valleys of the outer Himalayas. ("Dehra" is the name of a town which grew up around a temple established in A.D. 1699). The area is famous for its botanical beauty and is the home of a famous forestry school and institute. The first 30 pages or so are concerned with generalities, such as topography, vegetative zones, etc. The systematic portion following includes keys to families and to genera while under genera with two or more species there are keys to the species. At the end of the volume is a list of references with abbreviations and then the index. - The sequence of the families is that of Bentham and Hooker filius with modifications by Hutchinson and Airy Shaw. Descriptions of individual taxa while not exhaustive appear to be adequate for positive identification and confirmation. The metric system is used systematically throughout the volume. Descriptive texts appear under family and genus as well as under species. The economic uses where at all important are discussed. Where a group has recently been monographed, a reference is given. Where applicable, basionyms are shown and synonyms where these appear as accepted names in the Indian literature. This work is one more regional flora which will greatly contribute to man's knowledge of the plant world and will undoubtedly play a part in any future total flora of the Indian botany--as some greatly expanded and improved Hooker. The authors are to be commended on an excellent work on plant classification.

G M H

"THE GENERA OF HYPHOMYCETES FROM SOIL," by George L. Barron. xiii + 364 pp., 226 figs., 1 tab. Williams and Wilkins Co., 428 Preston, Baltimore, MD 21202. 1968. \$15.00

The cover of this attractive volume is embellished with an enlarged microphotograph of Cladosporium sphaerosporum (see also Fig. 55) and the same organism is used in the frontispiece. This organism is placed in the Dematiaceae, one of the four families of Hyphomycetes recognized in the classical system of arrangement,

that of Saccardo. - This group of the Deuteromycetes (Fungi Imperfecti) include some of the most important and interesting of the fungal organisms, such for instance as Penicillium and Candida. Some are important causative factors in allergy, e.g., Alternaria; others are important as plant pathogens, such as Botrytis; there are some which are pathogenic for animals, including man, as Histoplasma and Microsporium. - In some cases, mention is made of a genus being monotypic. It would have been helpful to have systematically indicated the number of known species in each genus. In this work, the author discusses the several methods of classification which have been proposed and opts for that of Hughes (with modifications). Ten sections are recognized based chiefly on conidial characteristics. - Following the succinct discussion of classification, the ten groups are considered (Aleuriosporae, Annellosporae, Arthrosporae, Blastosporae, Botryoblastosporae, Meristem Arthrosporae, Meristem Blastosporae, Phialosporae, Porosporae, and Symptodulosporae). There is also an odd group left over into which are placed those with anomalous spore formation; however, no formal name is used for these. There is a very brief chapter on the Mycelia Sterilia, a group which does not seem to fit in with others, which do not produce either sexual or asexual conidia, and some of which do not produce spores, bulbils, or sclerotia. This group presents an important challenge to mycologists. Chapter 4 is a key to the series and 5 is a key to the genera. Chapter 6, the outstanding feature of the work, is a series of generic descriptions in alphabetical order, starting with Abglio-phragma. This includes for each a generic description, diagnostic features, and notes, the latter with information on the various subdivisions of the genus including species. Following this is a list of excluded genera, a glossary, bibliography, and a subject index, mostly of systematic names. - This is a very important and useful volume to the botanist and especially the mycologist.

G M H

"THE CURVES OF LIFE, BEING AN ACCOUNT OF SPIRAL FORMATIONS AND THEIR APPLICATION TO GROWTH IN NATURE, TO SCIENCE AND TO ART," by Theodore Andrea Cook. xxxi + 479 pp., 415 figs., 12 pls. Dover Publications, New York. 1979 (1914). \$5.95.

The theme of this work is the universality of the spiral, both in nature and in man's works. The examples of the spiral's occurrence in nature seem to be almost endless in number. (The equivalent term, helix, is now very popular, applied as it is to the DNA molecule, actually a double helix, the important unit concerned in reproduction. This book, originally published 66 years ago, does not of course mention this important instance.) Examples are drawn from the anatomy of humans and lower animals,

architecture (such as spiral staircases), art, plants, animals (horns, shells, foraminifera), mathematics, spiral nebulae, watches and clocks, the screw, and so on. The works of Leonardo da Vinci are frequently cited: his works supply many examples of the spiral. The spiral contributes to beauty, both natural and artificial, but more than that it gives the sensation of continuous motion and of life.

G M H

"ANATOMY OF XYLEM AND PHLOEM OF THE DATISCEACEAE," by D. Davidson. Contrib. Sci. No. 280: 1-28, 39 figs. Nat. Hist. Mus., Los Angeles Co. 1976.

The woods of Octomeles sumatrana Miq. and of Tetrameles nudiflora R. Br. are described and compared with that of Datisca glomerata (Presl) Baill. The latter is similar to the wood of other "woody herbs" and dissimilar from that of the other two spp. However, the total evidence supports the view that all three genera belong to a single fam. It is believed that the differences between Datisceae (Datisca) and Tetrameleae (Tetrameles and Octomeles) do not necessitate subfam. status for the 2 groups but that they are better treated as tribes (cf. S Warburg, 1895).

G M H

"THE DIAPORTHALES IN NORTH AMERICA WITH EMPHASIS ON GNOMONIA AND ITS SEGREGATES," by Margaret E. Farr. Mycologia Memoir No. 7: 1-232, 132 figs. 1978.

The concept of Diaporthales (Euscomycetes) presented here is based on that of the fam. Diaporthaceae of Luttrell (1951). The order is divided into Suborders Gnomoniineae subord. nov. and Melanconidineae subord. nov., each with two families. Within the latter is contained Pseudovalsaceae fam. nov., with subfam. Allantoporthoideae subfam. nov., containing Allantoporthes decedens (Fr.) comb. nov. (Sphaeri d.) and Phragmodiaporthe tiliacea (Ellis) comb. nov. (Diatrype i.). Also in this subfam. are Ditopelleae tribus nov. with Dicarpella georgiana (Miller et Thompson) comb. nov. (Gnomoniella g.) and Sydowiella depressula (Karst.) comb. nov. (Gnomonia D.). In tribe Pseudovalseae is Chapectia gen. nov. with C. nigrospora (Peck) comb. nov. (Diatrype n.), C. ribesia (Sacc. et Scalia) comb. nov. (Pseudovalsa r.); Macrodiaporthe everhartii (Ellis) comb. nov. (Melanconis e.); and Pseudovalsa spinifera (Wallr.) comb. nov. (Sphaeria s.). In Gnomonia, 7 new sections are named, including sect. Cylindrica, with G. similisetacea sp. nov. (Ont. to Ore.; close to G. setacea (Pers. ex Fr.) Ce. et de Not) and G. rhuicola sp. nov. (No. Am.); sect. Clava, with G. dalibardae sp. nov. (Maine, No. Amer.; compared with G. waldsteiniae Dearn. et House) of sect. Angustispora sect. nov.; sect. Macula with G. dispora Demaree et Cole

ex Barr sp. nov. (Fla., Ga.); and sect. Latispora with G. ribicola sp. nov. (No. Am., similar to G. intermedia Rehm). Fam. Gnomoniaceae is subdivided into 3 subfams. including Gnomonioidae (with Gnomonia, etc.). Stegophoroideae subfam. nov. having tribe Stegophoreae (with Stegophora, etc.), Diaporthopsieae trib. nov. (with Diaporthopsis, etc.); subfam. Mamianioidae subfam. nov., including Endothieae trib. nov. In fam. Valsaceae Tul. et Tul. are recognized subfam. Plagiostomoideae subfam. nov., including trib. Plagiostomeae with Apioplagiostoma gen. nov. with A. populi (Cash et Waterman) comb. nov. (Plagiostoma p.) and 2 other new combinations. In Plagiostoma are recognized sect. Plagiostomella (v. Hoehnel) stat. nov., sect. Guignardia (Viala et Ravaz) stat. nov., sect. Disparicellula sect. nov., sect. Angustisporae sect. nov. Valsaceae subfam. Valsoideae includes Linosporeae trib. nov. Tribe Valseae includes five genera, thus Valsa, Cryptodiaporthe with 2 new sections. Diaportheae trib. nov. possesses 3 genera, including Diaporthe with Latispora sect. nov. and Cylindrica sect. nov. In the fourth fam., Melanconidaceae Winter, subfam. Melanconidoideae includes Plagiophialeae trib. nov. and tribe Melanconideae, which includes Dictyoporthe acerophila sp. nov. (New Hampshire, USA). Subfam. Massariovalsoideae subfam. nov. with 2 tribes, the typical one and Herco-sporae trib. nov. There are numerous keys at all levels with generally brief but substantial descriptions. In addition to those named, there are five new varieties and 39 new combinations also. Host and taxonomic indices, a bibliography, and list of excluded genera terminate the volume. Confusion is reduced in this monograph by the incorporation of a complete system of suborders, fams., subfams., tribes, and genera in a double spread (pages 16-17). A total of 4 fams, 9 subfams, 16 tribes, and 53 genera is recognized.

G M H

"The Recent Chemistry of Natural Products Including Tobacco," by N.J. Fina (Editor). Proceedings of the Second Philip Morris Science Symposium, Richmond, VA., 30 Oct., 1975. Philip Morris, Inc., New York. 176 pp., 44 figs., 15 tabs.; 1976. Gratis (?).

Eight papers are included, some of which are abstracted separately.

G M H

"A NOMENCLATOR OF GOSSYPIUM: THE BOTANICAL NAMES OF COTTON," by P.A. Fryxell. U.S. Dept. Agr., Agr. Res. Serv., Tech. Bull. 1491: iii + 1-114, 1976.

The main portion of the bulletin consists of a catalog of basionyms, with appended materials of value, such as a list of published fig-

ures of Gossypium types, a nomenclator for Gossypium names of rank higher than sp., nom. excludenda, etc. There are indices of type specimens, authors, and published names in Gossypium. The introductory section reviews the taxonomy of Gossypium, which is often complex and beset with many problems.

G M H

"THE HERBAL OR GENERAL HISTORY OF PLANTS" by J. Gerard. Dover Publications, Inc., 180 Varick St., New York 10014. xlv + 1678 pp. 2706 figs.; 1976 (1633).

Unabridged reproduction of the complete edition of 1633, cloth-bound: \$50.00. This is recognized as the greatest of the English herbals. Includes introductory history of botany by T. Johnson. A publisher's note gives the history and nature of the herbal.

G M H

"CHAVE PARA AS FAMILIAS ESPERMATOFITICAS DO BRASIL," by A. Goldberg and L.B. Smith. Flora Ilustrada Catarinense (Itajai, Sta. Catarina, Brazil) (part as separate) 1-204, 769 figs.; 1975/ 1976. (in Portuguese).

This key is intended to identify specimens only to family. There is intended to be no relationship between families indicated by their position in the key. The key (- p 33) is followed by a glossary, bibliography, and many plates (estampas) illustrating characters of the various genera.

G M H

"SCIENCES IN COMMUNIST CHINA: A SYMPOSIUM AT THE N.Y. MEETING OF THE A.A.A.S., Dec. 26-28, 1960," by Sidney H. Gould. Washington, DC American Assn. Advancement of Science, 884 pp. \$14.00

Much information and many thoughtful comments on the subject. Taxonomic botany is weakly developed in this country. Chemistry and chemical engineering are included.

GMH

"Medicine Tax Stamps Worldwide," by George Griffenhagen, R.Ph., M. S. American Topical Assn., Inc., Milwaukee, Wisc. 128 pp., many figs. and tabs. (s.n.) 1971. \$6.00

This exposition of the use of tax stamps on medicinals goes into much detail and covers the subject most admirably. Beginning with the first such stamp used, the tax on "quack medicines" beginning in 1793, it proceeds to tell the long history of the stamp tax in the USA, followed in turn by those used in Canada, South Africa, Japan, Italy, France, Portugal, Spain, and Latin America. The last chapter is a "potpourri" of medicine stamps, covering less important issues in other countries, such as India, Turkey, Tunisia, Norway, Belgium, Hungary, Poland, British Guiana, Egypt, etc.

G M H

"EDIBLE OILS AND FATS: RECENT DEVELOPMENTS," by Marcia Gutcho.
33 figs., many tabs. xiii + 402 pp., Noyes Data Corporation,
Park Ridge, N.J. 07656, 1979. \$39.00

This durably cloth-bound book presents much factual data on the fats and fatty oils, based chiefly on the texts of U.S. patents, issued from 1973 to the present. The U.S. patent literature represents the largest collection of technical literature in the world, its thorough nature being due to the fact that complete information ("disclosures") are required to be acceptable for the issuance of a patent. Much of the data given is not in the regular literature. The text is useful as a background for research. The Table of Contents in front is a kind of subject index. At the end are indexes of inventors, U.S. Patent numbers, and manufacturers. The book serves its purpose well in that it supplies detailed technical information on the subject and serves as a guide to the U.S. patent literature in the field. The book's detailed technical information at times, however, tends to be too detailed and technical for the average reader. The writing style of the author seems to make the material more complicated at times than it actually is. The book is not a reading book, but would serve quite well as a reference book. Overall, the book, as a reference book, serves the purpose for which it was written.

G M H

"MANUAL OF THE GRASSES OF THE UNITED STATES," by A.S. Hitchcock.
Second Ed. Revised by Agnes Chase. 2 vols.: Vol. 1: ii + 569
pp. Vol. 2: v + pp. 570-1051, total pp. 1051, tot. figs. 1200.
Dover Publications, Inc., New York. 1971 (1950). \$6.00 per
volume.

This great classic of American Gramineae is here republished in unaltered unabridged form, and thus again becomes available at a very moderate price to the botanical public. Volume I includes

an important and informative introduction and descriptions of members of the first 11 tribes of the family. Volume 2 completes this treatment with details on taxa of Tribes 12 to 14. Following this is a tabulation of the botanical synonyms of all the taxa followed by other appendigeal materials - unidentified names, names applied by various botanists but for which types are not available and descriptions are inadequate; a list of persons after whom grasses have been named; a glossary of technical terms; and an addendum of genera to those in the first edition of Hitchcock (1936).

G M H

"BRAIN FUNCTION IN OLD AGE: EVALUATION OF CHANGES AND DISORDERS," edited by F. Hoffmeister, C. Mueller, and H.P. Krause. (Bayer-Symposium 7). XI + 533 pp., 82 figs., 46 tabs. Springer-Verlag Berlin, Heidelberg, New York. 1979. DM, 88, --; US \$48.40.

In this work are disclosed the latest findings and theories from the field of gerontology. The content is divided among many fields, such as biochemistry, pharmacology, psychology, physiology, and so on. It tells of brain diseases, the psychology of the aged (gerontopsychology), geriatric psychiatry, and such changes in physiology as occur with increased age, such as blood distribution in the cerebrum, ischemia of the brain, disorders arising from stroke, and many other topics. Much of the book is taken up with methods for measuring mental and emotional changes in the ageing. Tests are given using questionnaires, personality inventories, mood scales, self-ratings and staff-ratings, projective tests (such as Rorschach), interviews, etc. Attempts are made to relate the status of mental/emotional parameters to circulation, metabolic rates, etc. A term new to this reviewer was "nootropic" drugs: these are mind-acting drugs, such as vincamine (from *Vinca*), hydergine (an ergot alkaloid), piracetam, Gerovital (procaine), etc.; these act on cognition and memory. One speaker proposed that the rubric "You are as old as you think" should be rephrased to read "You are as old as your ability to think." The effort is made at all times to distinguish the deterioration due to ageing from that which comes about due to a disease process not necessarily related to ageing. Thus, three types of diseases are recognized in geriatrics: (1) those having no relationship with the ageing process; (2) those which are modified by ageing in terms of duration and prognosis; and (3) those linked specifically with the ageing process itself. The text is entirely in English (except for a table on pp. 48-9). The text is based on a Bayer Symposium held at Grosse Ledder near Cologne, BRD, in 1978. The 37 authors (plus 3 editors) are mostly West Germans and US Americans but with representatives of 5 other countries. Discussions and bibliographies are at the ends

of the papers. Terminal indexes.

G M H

"THE WORLD'S WORST WEEDS: DISTRIBUTION AND BIOLOGY," by LeRoy G. Holm, Donald L. Plucknett, Juan V. Pancho, and James P. Herberger. xii + 609 pp., 220 figs. The University Press of Hawaii, Honolulu. \$35.00, 1977.

The valuable book under review is divided into two main parts: (I) Detailed information on 76 of the most destructive weeds, with chief emphasis on 18 of those which may be considered the "worst"—Cyperus rotundus (nut grass, referred to as "purple nutsedge" in the book), Cynodon dactylon (Bermuda grass), bindweed, and others. Part II is devoted to a presentation of 16 of the chief crops of the world, with much information on the chief weeds infesting them. There are several useful appendices: literature on weeds and on poisonous plants; a glossary; bibliography; an index of common weed names in several languages, and the general index. The first part treats the weed plants in a most thorough manner: a description (with figure), data on distribution and habitat, supplemented with a world map to show the generally wide dispersal of the weed; the biological "facts of life", such as physiological weaknesses, mode of propagation, etc.; the agricultural importance of the plant, with many details on cultivation of crops for which it is a partaker; commercial and other uses of the plant; and common names in many countries. The catalog of names is quite elaborate: thus for Imperata cylindrica (cogon grass), there are vernacular names for 39 countries or areas. For Portulaca oleracea, there are given 75 common names. There are 77 names given for Eleusine indica whereas Gerth van Wijk in his Dictionary gave only ten names. The world's "worst weed" is properly enough the first one in the book: Cyperus rotundus. (A good example of the inadequacy of common names is seen in the case of chickweed, which in Australia refers to Galinsoga parviflora, in the USA and Canada to Stellaria media, both considered (in this work). The American common names given are sometimes not commonly heard: Eleusine indica, generally known as 'wire grass' is given here as "goosegrass"; Amaranthus hybridus is generally known as 'pigweed'; not "smooth amaranthus" as given. Amaranthus spinosus is "careless" rather than "spiny amaranthus". "Nut grass" or "chufa" is a commoner designation of Cyperus esculentus than the name "yellow nutsedge" given in this book. Many areas have pernicious weeds which seem to be bad only in localized places. Thus, in Auburn, Alabama, we have trouble with Phyllanthus species, Salvia lyrata, Lamium spp. Taraxacum officinale, Linaria caroliniana and a Tradescantia species, none of which is taken up in this volume. It is perhaps because they are garden or lawn weeds that they are not included here in a book which deals mainly with weeds in planted crops, such as cotton and wheat. This book

should be a strong weapon in the continuing fight against one of the worst and most wasteful enemies of the human race.

G M H

"THE MYTH AND TRUTH ABOUT GINSENG," by Joseph P. Hou. 245 pp., many figs. and tabs. (s.n.). A.S. Barnes and Company, South Brunswick, N.J., 1978. \$9.95.

In this interesting and informative book about a drug much in the news these days, the author who is a Chinese-American has thoroughly studied the rather enormous literature on this material but he has also incorporated a good deal of practical information on the complex business of growing, processing, and merchandising the various ginseng products. Dr. Hou has shown that there is indeed a great deal of value in this ancient Chinese remedy. Pharmacological and clinical studies as well as the day-to-day use of the drug have shown many values, such as in reducing fatigue, inhibiting cancer, increasing the sexual strength of the individual, having sedative values, increasing mental efficiency, regulating the blood pressure, reducing atherosclerosis, opposing diabetes, and improving digestion. There is a good deal of evidence that ginseng promotes longevity and (what is equally important) improves the health of the aged. There are many references (ca 400), a glossary, and index. Truly this is a timely book!

G M H

"PLANT AND PLANET," by Anthony Huxley, (Ed. 2) 464 pp., 2 figs. Penguin Books, 625 Madison Ave., New York 10022. 1978, \$3.95.

In this volume, written by the son of the late Sir Julian Huxley, the functioning of the plant is recounted in a most interesting fashion. The evolution of plants, plant physiology, and plant sociology are treated in Chapters 1-25. Chapters 26 to 29 deal with the effects on the plant world of human activities of "exploitation, manipulation, and destruction." Chapter 30 gives a prophetic view of the future. In this book, the author has made every effort to remove as much technical terminology as possible to make for more interesting reading for the layman or the non-specialist. There is an unusually complete index for a book of this type.

G M H

"RUSSIAN DRUG INDEX," by Stanley Jablonski (compiler) and Robert M. Leonard (reviser). National Library of Medicine. U.S. Public Health Service Publ. No. 814, 103 pp. 1961.

This represents a compilation of currently used Russian drug materials, arranged by classification of pharmacological action (starting with "addicting analgesics and antagonists" and proceeding to "vitamins, minerals, nutritives." The compilation is based on the Russian literature from 1950-60. Synonyms, formulas, and references are given. Included are some drugs not known outside of the Soviet Union very well, such as the phytoncides, biogenic stimulators, and indigenous crude drug extracts. There is a comprehensive index at the end, which starts out with the numbered compounds.

G M H

"KONSTITUTION UND VORKOMMEN DER ORGANISCHEN PFLANZENSTOFFE (EXCLUSIVE ALKALOIDE)", by W. Karrer. 1-1205. Birkhaeuser Verlag Basel u. Stuttgart. 1976 (rec'd 1977). \$100.00.

This large volume represents a revision of the earlier edition of 1958. All known errata of the first edition have been corrected. Also, markings both in the text and in the index of chemical names have been used to indicate where additional information on the compound is contained in one of the two supplements (I: 1977; II: ca 1978, has not yet appeared). These will provide the latest information available. The three volumes furnish definitive information in an easily accessible manner on all known phytocompounds (i.e., where the chemical composition is precisely known). Whereas Wehmer's "Pflanzenstoffe" (in two editions but now somewhat out of date) presented the chemical compounds of plants (but in only a sketchy manner) under the heading of the plant, here the order is reversed and the compounds are discussed in some detail with their constants, and only incidental mention of the plant or plants of origin, sometimes with yields, etc., and importantly references to the literature. This no doubt shows the greater modern tendency of interest in compounds rather than in the crude plant material, which were formerly of course the most used and therefore the most important medicinal or pharmaceutical item. In this volume, the order of progression is from the simpler to the more complex compounds, thus beginning with the hydrocarbons (HC), progressing to those with oxygen (CHO), such as the alcohols, and many other groups, next to the sulfur-containing compounds (as the mercaptans), and finally to the N-containing compounds (the cyanides, amines, etc.). Following the enzymes, the final section is labeled "Various compounds" and includes chiefly the antibiotics which were not previously considered and which are of much more complex structure. - This work like the first edition is a part of the "Chemical Series" of the publishers,

which also includes the eight volumes of Hegnauer's celebrated compendium "Chemotaxonomie der Pflanzen" (the last two volumes of which are in course of publication), three works on the carotenoids, and two volumes on DDT (the synthetic insecticide). This present work is an important resource to a wide cross-section of science, agriculture, and industry, and it should definitely be available to interested persons in any good scientific-technical library. It is available in hard-back at the price of Swiss francs 238 (about \$100.00 U.S.). The book is well printed and bound; and will no doubt be of service for many decades to come.

G M H

"SCANNING ELECTRON MICROSCOPY IN BIOLOGY, A STUDENT'S ATLAS ON BIOLOGICAL ORGANIZATION," by R. G. Kessel and C. Y. Shih. XI + 1-345, 22 figs., 132 pls. Springer-Verlag, New York, Heidelberg, Berlin. 1974. \$19.90.

This atlas was intended for students at all levels from elementary grades to graduate school. The book demonstrates the great utility of electron microscopy both in the teaching area and in research. Many kinds of organs and organisms are demonstrated in the book starting with the more elementary and proceeding to the more complex organisms and tissues. The Introduction tells much about the theory and use of the Scanning Electron Microscope (SEM) and also how it is used and how slide specimens are prepared for use with it. The second chapter takes up various protozoa, Chapter 3 cultured cells, Chap. 4 the prokaryotes (bacteria and blue-green algae), Chap. 5 fungi and algae, Chap. 6 the multicellular plants (Musci, Hepaticae, conifers), Chap. 7 various organs of the Angiospermae, Chap. 8 multicellular animals (worms, molluscs, etc.), Chap. 9 animal organs and tissues, and Chap. 10 embryological stages of the animal. By using a large page, smooth paper, and excellent photographic reproductions, the quality of the book and its value to the student are greatly enhanced. This is really a most excellent model for teaching biology.

G M H

"AN ATTEMPT AT THE MORPHOLOGICAL ANALYSIS OF THE SOMATIC CHROMOSOMES IN ROSA CANINA L.," ^{Publications from} ^{the} Cairo University Herbarium No. 7 & 8: 33-39. 1977 (publ. 1978). By M. N. Koncalova.

The somatic metaphase chromosomes of six shrubs of R. canina were studied as to size, somatic association, and shape for evaluation of homologous chromosomes. The 35 chromosomes at each plate formed 5 morphologically similar septets, evidently equal to the 5 genomes of the sp.

G M H

"PHARMACIST LICENSE TESTS," (Licensing Exam Series), by Moses A. Levine and Arthur Liebers. (Ed. 1). v, 125 pp. Arco Publishing Co., Inc., 219 Park Ave. South, New York, N.Y. 10003. 1967 (1955). \$4.00.

An introductory part discusses the scope of the examinations, eligibility requirements for examination and reciprocity procedures, personnel and addresses of state boards (many old data), and a list of national professional associations (addresses should have zip code numbers). Each of the sections in this manual is separately paginated. There are several sets of state board examinations with questions and answers. Then a discussion of mathematics, rather elementary, is given (48 pp.), tips for those taking examinations (8 pp.), practice answer sheets, and a list of other books of the publisher (advertising) (18 pp.). Although some of the questions are a bit out of date, the book should still be very useful to the industrious student, in the way of review of his didactic studies.

G M H

"FLORA OF TAIWAN," by Hui-lin Li (Editor). Volume II. XII + 722 pp., 261 pls. Epoch Publishing Co. Ltd., Taipei, Taiwan, Republic of China. 1976.

This latest volume of the multi-volumed Flora includes families occurring in the Englerian sequence from Myricaceae to Cruciferae. 50 fams. are included, with Junglandsceae, Salicaceae, Betulaceae, Fagaceae, Ulmaceae, Moraceae, Santalaceae, Loranthaceae, Polygonaceae, Phytolaccaceae, Portulacaceae, Caryophyllaceae, Chenopodiaceae, Amaranthaceae, Magnoliaceae, Annonaceae, Myristicaceae, Lauraceae, Ranunculaceae, Berberidaceae, and Piperaceae, being some of the more important ones. - The following are new: 1) new SPECIES: Litsea lii Chang (similar to L. morrisonensis Hayata); L. linii Chang (endemic); Aristolochia kaio Liu et Lai (Pingtung; near A. shimadai Hayata); Calophyllum changii N. Robson (Taitung; nearest to C. pseudotacamacha Planchon et Triana). 2) new COMBINATIONS: Laportea pterostigma var. subglabra (Hayata) Liu (L. s.); Polygonum multiflorum Thunb. var. hypoleucum (Ohwi) Liu, Ying, et Lai (P. h.); P. thunbergii Sieb. et Zucc. form. biconvexum (Hayata) Liu, Ying, et Lai (P. b.); Dianthus superbus L. var. taiwanensis (Masamune) Liu et Ying (D. t.); Stellaria media var. micrantha (Hayata) Liu et Ying (S. m.); Cinnamomum philippinense (Merr.) Chang (Machilus philippinensis); Arabis formosana (Masamune) Liu et Ying (Arabis alpina L. var. f.); Cardamine scutata Thunb. var. formosana (Hayata) Liu et Ying (C. hirsuta L. var. f.). 3) new NAMES: Litsea kostermansii Chang (Actinodaphne pedicellata Hayata); L. orientalis Chang (Actinodaphne lancifolia (Siev. et Zucc.) Meissn. in DC, 4) new STATUS: Aconitum bartlettii var. formosanum (Tamura) Liu et Hsi Teh (A. form.);

A. bartletii var. fukutomei (Hayata) Liu et Hsieh (A. f.). - This volume like the first is well made with accurate typesetting, clear illustrations, and strong cloth binding. This represents the second of a total of six volumes which will complete the "Flora."

G M H

"FLORA OF TAIWAN," Volume III, by H.L. Li, T.S. Liu, T.C. Huang, T. Koyama, and C.E. DeVol (Eds.). XIII + 1-1000, 435 pls., 3 maps. Epoch Publishing Company, Taipei (Taiwan). 1977. \$32.00.

With this volume, half of the "Flora of Taiwan" (Formosa) has appeared; it is the largest of the volumes which have appeared so far. The plants covered range in Englerian order from the Hamamelidaceae (fam. no. 51) to the Umbelliferae (fam. no. 107), hence the coverage is of many of the most important economic groups in the plant kingdom. Many if not most of the taxa are illustrated with excellent full page drawings of a representative branch (if not the entire plant) and detailed sketches of leaf, floral, or fruit parts. The descriptions are those usual for a flora, both as to genera and species, with information on synonymy, distribution and habitat, and with the vernacular Chinese names in Chinese characters. There are keys to genera and in genera with two or more species, keys to species. There appears to be little or no information on economic values. Sixteen specialists contributed family treatments, including the first three of the editors as noted in the heading. All are Chinese with the exception of two Japanese and one American (P. Raven). As with the other volumes, the book is well printed and substantially bound and will make an attractive addition to the herbarium shelf or library, whether with or without the dust jacket. The table of contents shows the families while the terminal index lists all families, genera, species (both valid and synonymous), varieties, etc. The following new species are included: Sedum triangulosepalum Liu et Chung (endemic; on tree trunks); S. truncatistigmum Liu et Chung (endemic; on tree trunks); Begonia chitoensis Liu et Lai. New combinations: Photinia chingshuiensis (T. Shimizu) Liu et Su (Pou rthiaea c.); Vigna minima f. linealis (Hosok.) Huang et Ohashi (Phaseolus m.); Ampelopsis brevipedunculata var. ciliata (Nakai) Lu (A. heterophylla Siev. et Zucc. var. c.); A. cantoniensis var. lecoides (Maxim) Lu (A. l.); Cissus lanyuensis (Chang) F. Y. Lu (Tetrastigma l.); Corchorus aestuans var. brevicaulis (Hosok.) Liu et Lo (C. b.); Theligonum formosanum (Ohwi) Ohwi et Liu (Cynocrambe f.). New status: Daphniphyllum glaucescens subsp. Oldhamii var. kengii (Harusawa) Huang (D. k.); Skimmia japonica Thunb. var. distincte-venulosa (Hayata) Chang (S. d.); Elaeocarpus sphaericus (Gaertn.) Schumann var. hayatae (Kasehira et

Sasaki) Chang (E. h.); Viola formosana var. tozanensis (Hayata) Hsieh (V. s.). Also included are Vitis thunbergii var. taiwaniana Lu var. nov. and Begonia formosana f. albomaculata Liu et Lai f. nov. - In view of the dearth of information on oriental plants, this work should be considered of value to a general library with an important scientific sector; there is no argument over its importance to a science or biology collection. An advantage in its purchase lies in the really very attractive price of only \$32.00.

G M H

"FLORE MYCOLOGIQUE," Vol. III, by M. V. Locquin, J. F. Guyton, Editor. Cortinariales - A. Cortinaires visqueux. Texte. Hebelomataceae, Cortinariaceae (Myxacioideae). 1-160, many tabs. 8 rue de Mézières, 75006 Paris, Fra. 1977(1979).

In this Flora, for which 24 volumes are projected, the odd-numbered volumes are textual while even numbered volumes consist of plates (colored). Most of the text is in French but many headings and the important Glossary also are in English (a glossary in French appeared in Vol. I). The two chief divisions of the text are (1) Generalities; and (2) Determinations. Much important information appears in the general part: advice to mycophagists; what to do in case of poisoning; laboratory methods including the preparation of temporary and permanent slides; how to observe and describe the different parts of a mushroom, collection and preservation methods, chemical properties, etc. Terms describing tastes, odors, and colors are given in French, English, German, and Latin. Under Determination, general overview of living organisms includes his primary divisions into (1) Leucosporophytes Locquin (Protists and Fungi); (2) Chlorophyllosporophytes Locq. (all chlorophyll-bearing plants); and (3) Zoaires Locq. (Protozoa and Metazoa). Under Leucosporophytes, three superdivisions are listed, including Mycelia Locq., and seven divisions including No. 7, Mycota Locq. (Mushrooms), with 11 subdivisions, including Acromycotina Locq. with Class Basidiomycetes, Sub-class Basidiomycetidae, and Order Cortinariales, Group Strobilospore, and Fam. Hebelomataceae: this fam. and Sub-fam. Myxacioideae of Fam. Cortinariaceae are included in this volume. (The balance of Corticiaceae and also Fam. Naucoriaceae will be taken up in Vols. V and VI). Most of the volume is concerned with "Matrices," a very convenient tabular form of record apparently new with this author. In a Matrix, the various characters ("descriptors") (in Fra. and Eng.) appear on the horizontal lines, while the vertical columns are used to indicate spp. (or other taxa). Usually one character appears for each sp., but occasionally more than one sp. has the same character and of course a single sp. may show more than one character. The advantage of a matrix lies in the possibilities

of rapid survey and comparison of taxa. Following the many matrices covering levels of hierarchies from super-orders down to spp., descriptions are given of all spp. of Hebelomataceae (but none for Corticiaceae). (While very handy, the matrix alone is not adequate hence the inclusion of complete descriptions and also of figures (later in the following volume)). These include new taxa (12) and new combinations (47) and these are legitimized on a later page by supplying Latin diagnoses and basionyms. The Latin diagnoses of *Elia Magnus Fries* (Hymenomycetes Europaei, 1874) are given for spp. of *Hebeloma* and *Cortinarius*. A general and special bibliography are presented, a list of floras published in France or in French, and treatises and préçis which have come out in the French language. At the end are the Index and Table of Contents, the latter as customary in French works. -- The following novelties are included: (in addition to the new combinations): Hebelomataceae fam. nov., Cortinarioideae (Singer) subfam. nov., Gymnopiloideae subfam. nov., Rozitoideae subfam. nov., Myxacioideae (of fam. Cortinariaceae) subfam. nov.; and the following new genera: *Sarcoloma* (in fam. Hebelomataceae), and in Cortinariaceae: *Cerecium*, *Cyanicum*, *Hygramaricum*, *Hygromyxacium*, *Myxopholis*, and *Squaphlegma*. *Sarcoloma* includes two new combinations and *S. lignicola* sp. nov. (growing on the wood of *Quercus* sp.).

VOL. IV. CORTINARIALES A. PLANCHES. ILLUSTRATIONS DES ESPECES DE CORTINAIRES VISQUEUX. 1-156; 150 pls.; 1977 (1979).

In this volume of plates, 182 spp. are shown, the plates being paired with black and white on the left side bearing markings to aid in identifying the organisms. A code at the back indicates the meanings of symbols used to indicate general characters, frequency, ecology, edibility, consistency, surface features, organoleptic tests, and chemical reactions. The plate on the right is in natural colors and is without the special markings. Figures in parentheses indicate page of text where description is given. The figures are natural size or slightly reduced. This is said to be the most complete series of illustrations for this group of mushrooms. Both volumes and the others to come should be an important addition to the knowledge of the flora of Europe and of the world,

G M H

"FIBRINOLYTICS AND ANTIFIBRINOLYTICS", edited by F. Markwardt, HANDBOOK OF EXPERIMENTAL PHARMACOLOGY, N.S. Vol 46, XXI + 654 pp. 164 figs., 82 tabs. Springer-Verlag, Berlin, Heidelberg, New York. 1978. DM 320,-, U.S. \$160.00.

This volume examines "both sides of the coin" - those agents (the antifibrinolytics) which reduce the potential of clot

formation (the fibrinolytic process) and those drugs (etc.) which oppose this action. The antifibrinolytics are of course used where coagulation may be life-threatening, where thrombi or emboli formation is imminent, and the possibility exists of a fatal heart attack. On the other hand, the fibrinolytics may also save life where there may be a danger of bleeding to death because of a lack of fibrin-forming components in the blood stream. This book, entirely in English, has four sections: (1) The fibrinolytic process (with four chapters); this includes a chapter on the formation of fibrin (the clot skeleton) from fibrinogen; this is discussed in considerable detail; another chapter tells of the degradation products of fibrinogen and fibrin; another tells of the factors taking part in the fibrinolytic system; and finally a chapter on the measurement of fibrinolytic activity (assay). Section (2) in six chapters deals with the activators of fibrinolysis, including streptokinase (biochemistry, pharmacology, therapy), urokinase, synthetic fibrinolytic agents, and induction of the fibrinolytic activity in vitro; also a chapter on the indirect fibrinolytic agents, such as the sympathomimetic amines, the biogenic amines, various hormones (sex hormones, thyroid group, etc.) (thyroxin activates fibrinolysis and reduces platelet aggregation!), the anticoagulants (as heparin), vasodilators, diuretics, anti-phlogistics, and so on. The third section (3 chapters) takes up the fibrinolytically active enzymes, including plasmin (derived from plasminogen), fungal proteases, and certain enzymes contained in snake venoms. "Antifibrinolytics" is the heading of the fourth section, which is composed of two chapters, one on naturally occurring inhibitors of fibrinolysis: - some derived from the body tissues (human), others animal inhibitors, like aprotinin, found in tissues of the pancreas, parotid, glands, and lungs, and plant inhibitors, for instance Leguminosae (ex. peanut) and Gramineae seeds; and a last chapter on synthetic antifibrinolytics, such as aminocaproic acid. When we consider that most individuals in our western society die of cardiac "accidents", the real importance of these substances becomes manifest. Man often stands at a position between two evils like Scylla and Charbybdis - excessive clotting and inadequate clotting of the blood. One or the other can result in death. Hence, if it is taken for granted that life is man's most precious possession, this tome has the potential of being the most important of the series since it presents remedies for these dread accidents of life. The work is the product of 18 contributors including the editor (Institute for Pharmacology, Erfurt, DDR), most of these from behind the Iron Curtain (East Germany and Poland). However, the West is represented by several of the writers.

"MARTINDALE: THE EXTRA PHARMACOPOEIA, INCORPORATING SQUIRE'S COMPANION," Ed. 27, by Ainley Wade, Editor. xxxii + 2077 pp. The Pharmaceutical Press, 1 Lambeth High St., London SE1 7JN. 1977. \$60.00 (£30.)

The newest Martindale has so many useful features that it is difficult to encompass them all within the limits of an ordinary book review. This is a large paged volume, each page with double columns of text (the index pages have four columns). The text is in alphabetical order but the running titles at the tops of the pages are sometimes confusing since they are not always in alphabetical series. Let me illustrate: Halothane as perhaps the most popular of the general inhalation anesthetics is listed under "H" and appears at the head of several pages which concern both Halothane and general anesthetics as a group. But then appear in succession on the right hand pages other headings, Alphadolone, Alphaxalone, (used for short term anesthesia or induction of general anesthesia), Buthalitone Sodium, Chloroform, Cyclopropane, Enflurane, Ether, Ethylene, Fluoroxene, Ketamine, Methohexitone, Methoxyflurane, and several others. The alphabetical sequence is lost to the user. True the heading "Halothane and General Anaesthetics" is given on the left hand page throughout, but most users are guided by the headings on the right hand page. A remedy might have been the use of "Halothane" in bold face on the right, followed by the other sub-heading, or possibly the initial letter - a capital large sized "H" might have been used to keep the uniform letter heading. This mostly alphabetical sequence constitutes Part 1. In Part 2, "Supplementary drugs and ancillary substances" are taken up in alphabetical order, including such drugs as Abrus, Albumen, Alginic acid, and so on. Part 3 is a section on proprietary medicines, of the type sold over the counter, with formulas for each, and including a listing of manufacturers with their addresses. An index to clinical uses of items mentioned in Parts 1 and 2 and the comprehensive General Index complete the volume. Preceding Part 1 are reference materials often placed in appendices, such as elementary atomic weights, weights and measures, etc. - William Martindale prepared the first edition of this reference work which was published in 1883. Thus, an average of a little less than four years has separated new editions of the work. (The last previous edition appeared in 1972). Hence it is more current than the pharmacopeias. The monographs on the various drugs are fully informative. However, the order of subject matter is a bit puzzling: following synonyms, official status, chemical formulas, etc., the following sequence is used: dose; toxic effects; precautions; absorption and fate; uses; preparations. It seems to this reviewer that this is a reversal of the topics of interest to an ordinary user. He is most interested as a rule in use and this (it seems to me) should therefore come first. A little more history would

often be useful - when was the item first discovered or synthesized and when was it introduced into medical usage? are often questions of importance. - Many of the older drugs have been dropped from this edition - thus, for instance, Pyrethrum root (Anacyclus pyrethrum), Costus, Ceanothus, Castanea, Levisticum, etc. No doubt there is a keen competition for space and many of these had to go. It is for this reason that one should retain older editions of Martindale (or other reference books) because one never knows when the need may arise for information on some of the older medicinal agents. - This very useful reference work for the pharmacist recalls the dispensaries formerly so popular in the United States. Every pharmacy library should have one!

G M H

"PRELIMINARY INVENTORY OF THE BIOTA OF WOODSON COUNTY STATE FISHING LAKE AND GAME MANAGEMENT AREA," by Ronald L. McGregor. Reports of the State Biological Survey of Kansas No. 5: ii + 176 pp., tabs. State Biol. Survey of Kansas, Lawrence, Kans. 66044. 1976. Gratis.

Checklists are presented for lichens (22 taxa), mosses (44 taxa), liverworts (40 taxa), vascular plants (624 taxa). About half the text bears lists of animals.

G M H

"HISTORY OF NATURALIZED KANSAS PLANTS," by R. L. McGregor. Reports of the State Biological Survey No. 7: 35 pp. 1976. Gratis.

An annotated list is given of 207 taxa thoroughly established in the state, preceded by a history of the study of naturalized plants in Kansas. Indexes.

G M H

"WINTER GUIDE TO CENTRAL ROCKY MOUNTAIN SHRUBS (WITH SUMMER KEY)," (Ed. 2). xii + 1-274, 400 figs. Colorado Div. Wildlife, 6060 Broadway, Denver, Colo. 1976. \$3.50. W.T. McKean (Editor).

The format of this small hard-back volume is that commonly seen in such books, that is, descriptive text on one page faced by a page of drawings and photographs of the same plant. 107 spp. in 75 genera are covered. No conifers are included; however there are 15 deciduous tree spp. (ex. Quercus macrocarpa). The plants are arranged alphabetically by their generic names. The winter key precedes, the summer key follows, the systematic part of the text. The descriptions are practical, even down to odor and taste of various parts of the plant. A listing of the plants, with names and plant symbols (first 2 letters of

generic and specific names or first 5 letters of generic name where specific names are lacking) is given. There are also a glossary and bibliography. A really good buy at only \$3.50.

G M H

"MEDICAL EXAMINATION REVIEW BOOK," Volume 6. Public Health and Forensic Medicine. 143 pp., spiral binding. Medical Examination Publishing Company, Inc., P.O. Box 36, Fresh Meadows, Flushing 65, New York. 1961. \$6.00.

This volume contains 850 multiple choice and other types of objective questions in the field of public health and 150 objective questions on Forensic Medicine. The answers are keyed at the back. Proof of some of the statements are given by text and page number references. This work would be serviceable to pharmacy and nursing students as well as medical. One criticism of the book is that the type of question varies throughout the length of the book, so that it is not possible to pick up the book and start studying easily anywhere at random. In future editions, it would be distinctly advantageous to note type of question at the top of each page, thus by reference to the first number of a series which in each case is adjacent to or forms part of the instructions on special use or working procedure for the questions following.

G M H

"HAWAIIAN COASTAL PLANTS AND SCENIC SHORELINES" and "HAWAIIAN FOREST PLANTS," by Mark David Merlin. Each with 70 pages, many col. pls. The Oriental Publishing Co., Honolulu, Hawaii. 1979. \$3.50 (each).

Attractive brochures with colored and colorful illustrations of many of the plants of the areas indicated. The descriptive texts give data on distribution and uses, with brief descriptions. The native Hawaiian names are shown for many of the plants.

G M H

"INDEX TO PRINCIPES, Volumes 1-20," by H. E. Moore, Jr. pp. 1-68, (Unnumbered brochure). Journal of the Palm Society, 1320 S. Venetian Way, Miami, FLA 33139. 1977.

This is a subject and persons index which is very detailed and should furnish an excellent key to the contents of this valuable journal. It is in strict alphabetical order.

G M H

"DIE ROEHLINGE UND BLAETTERPILZE. 4, VOELLIG UEBERARBEITETE AUFL.," by M. Moser. Gams Kleine Kryptogamenflora Band IIb/2; XIII + 1-532, 13 pls. with 429 figs., 2 standard cards in pocket at back. VEB Gustav Fischer Verlag Jena, DDR. 58, --M (DDR), 1978.

This work covers the four orders: Polyporales, Boletales, Agaricales, and Russulales, as found growing in Europe. There are 17 fams., 205 genera, and 3150 spp. represented, but no claim is made to completeness. It is obvious that there has been a very thorough reworking of the last edition. - Thus there is a great increase in the size of this edition over the previous one: 532 pages versus 443 (see EBA 13: 389-390;1968). Keys to families and genera based on spore color and form appear on pages 26 to 52. However, as in other volumes of Gams Flora, the volume from beginning to end is essentially a large diagnostic key with interspersed descriptions of the taxa. - Included in this edition are secotioid forms, where the fruiting body is not normally formed, deformations in which the stipe is nearly fully reduced and the pileus portion only appears as a columella. The numbering system has been changed to a decade system to simplify the addition of new taxa. Thus, the number 3.3.3.2.5.2 has reference to Entoloma euchroum, in which each integer stands (in turn) for Agarieales/Entolomataceae (Rhodophyllaceae)/Entoloma/Leptonia (subgenus)/ unnamed subdivision of subgenus having stipe with bluish or violet tint/euchroum. Varieties are indicated by seven integers: thus 3.11.7.3.7.5.3 is the number assigned to Cortinarius glaucopus Fr. var. acyaneus Mos. - The following new combinations were noted: Resupinatus kavinii (Pilát) (Pleurotus k.); Entoloma icterinum (Agaricus icterinus Fr.); E. cuneatum (Nolanea cuneata Bres.); Psathyrella niveobadia (Drosophila n. Romagn.). There are in addition 47 other new combinations, several nomina nuda (such as Hygrophorus dichrous Kuehn. et Romagn.), and several provisional names. There are also a number of previously unpublished species included. This volume should prove of inestimable value in both field and laboratory (herbarium) for the identification and investigation of the numerous taxa of these Fungi.

G M H

"A FLORA OF SOUTHERN CALIFORNIA," by Philip A. Munz. vii + 1086 pp., 104 pls., 1 map. Univ. California Press, Berkeley, Los Angeles, London. 1974 (rec'd 1977). \$16.50.

The families within each major category in this Flora are placed in alphabetical order, furnishing us a novel arrangement, since generally the families follow some phylogenetic or evolutionary sequence (ex. Gray; Engler Gilg; et al.). Thus, under the dicots, the first family is Acanthaceae, the last Zygophyllaceae; for the

Monocots, the series runs from Agavaceae to Zosteraceae. The higher classifications used are similar to those of Tippo (1942), with three subdivisions represented in Division Tracheophyta, viz., Lycopsidea (club mosses), Sphenopsida (horsetails, etc.), and Pteropsida, this latter including four classes, Filicacae (ferns), Coniferae (conifers), Gnetacae (joint firs), and Angiospermae (seed plants), the latter with subclasses Dicotyledoneae and Monocotyledoneae (in that order). This splendid tome written by the late Director of the Rancho Santa Ana Botanic Garden, at Claremont, California, is a full grown successor to his "Manual of Southern California Botany" (1935), a much smaller work. Dr. Munz also compiled at least five other books on systematic botany, hence had developed the expertise requisite for this work. The introductory section, properly only nine pages long, is devoted to very brief discussions of the climate, vegetative zones, area covered, abbreviations, etc. The area served by this Flora extends from the Mexican border north to and including Death Valley, east to the Colorado River and the Nevada border, and west to the Pacific Ocean, the northern boundary on the coast being Santa Barbara County. The Channel Islands off the coast are included. From this large area of 30,000 square miles, ca 4,000 spp. have been reported (there is no census!!!), of which over 600 have been illustrated with line drawings; while the dust cover shows color plates of seven plants, unfortunately none are included in the text proper. Keys and precise descriptions are well done, and an adequate glossary and index terminate the book, which is a bargain at \$16.50.

G M H

"BIBLIOGRAPHY OF THE HISTORY OF MEDICINE," National Library of Medicine. No. 1, x, 290 pp. (PHS Publ. No. 1540). Public Health Service (U.S. Dept. Health, Educ., Welfare), Bethesda, Md. 1965, 1966. \$1.75.

In this volume, citations are provided to publications mostly published in 1965, but in some cases indexed in that year. There are 3 subdivisions: (1) biography of persons in the field of health sciences, and biographical data on the medical history of non-medical persons or on the medical aspects of outstanding individuals outside the medical field; (2) subject index; (3) author index. Preceding this main portion are lists of subject headings and of "civilization or chronologic" headings, such as Medieval, Oriental, 17th Century, etc., indicating subdivisions of individual citations. Thus, under "Child health" are such headings as "Prehistoric and Primitive", etc. - No. 2, 1966. - ix, 218 pp.; 1967. \$1.25. - Similar in plan to the first number. The annual volumes will be cumulated every 5 years. This work will be of undoubted value to both history and

medicine, and indirectly of benefit in advancing the cause of better health for the world's populations.

G M H

"POLLEN MORPHOLOGY AND THE RELATIONSHIP OF THE PLUMBAGINACEAE, POLYGONACEAE, AND PRIMULACEAE TO THE ORDER CENTROSPERMAE," by Joan W. Nowicke and J. J. Skvarla. *Smithsonian Contributions to Botany* No. 37: iii + 1-64, 200 figs., 5 tabs. 1977.

The pollen of 134 spp. in the three title fams. was examined by SEM, TEM, and light microscopy: great diversity was manifest especially in the Polygonaceae. However, the spinulose and tubuliferous-punctate ectexine found in most Centrospermeae taxa were not noted. The 3 fams. have anthocyanin pigments in contrast to the betalains found in all but two fams. of the Centrospermeae. All 3 fams. are known to have starch-type sieve-tube plastids rather than the protein type found in all centrospermeous fams. Because of these facts it is argued that contrary to common opinion the 3 fams. are probably not closely related to or derived from Order Centrospermae.

G M H

"WRITING SCIENTIFIC PAPERS IN ENGLISH, AN ELSE-CIBA FOUNDATION GUIDE FOR AUTHORS," by Maeve O'Connor and F. Peter Woodford. vii + 1-108, 9 figs., 3 tabs. Elsevier/Excerpta Medica/ North Holland, Amsterdam and New York. 1975. Dfl. 21.00/ US \$7.95.

This style manual was sponsored by ELSE (European Life Science Editors) and the Ciba Foundation chiefly as an aid to scientists in various of the continental countries of Europe in the preparation of papers in English. There are chapters on writing the first draft, typing, correcting proofs, etc., with five useful appendices (units, abbreviations, expressions to avoid, etc.). There will be later supplements (pamphlets) for various language groups and pockets are provided for these additional parts. This is a very practical book; the reviewer found special interest in the appendix "Expressions to avoid", f.i., "about" is preferable to "approximately," "expect" to "anticipate," "fewer" to "fewer in number," and so on.

G M H

"INDEX PSYCHOPHARMACORUM," by W. Poeldinger and P. Schmidlin. Deutsch-Français-English. 68 pp., several tables, cloth bound. Verlag Hans Huber, Bern und Stuttgart. 1963. Fr./DM. 14.80.

This trilingual manual includes a Foreword (also as Vorwort and

Préface), and an Introduction (also versions as Einleitung and "Introduction" (in French)), followed by tabular listings of neuroleptika, thymoleptika, thymereethika, and tranquilizers. The Cumulative Index at the end of the volume is a single index of course, even though headed by a title in three languages (Alphabetic Index, Alphabetischer Index, Index alphabétique). In view of the profusion of products of these classes now being prescribed, dispensed, and sold in every country, the need of such a convenient listing as this one becomes obvious. The class names shown above may puzzle some people. The neuroleptika or neuroleptics or neuroleptic drugs are those drugs sometimes classed as the "major tranquilizers." Under this are five subclasses distinguished on purely chemical bases, the first being the Rauwolfia alkaloids, the second the benzoquinolizine derivatives, and so on. The thymoleptika or thymoleptics or thymoleptic drugs are one of the groups of psychic energizers or anti-depressants, which are chemically distinctive from another group, the thymoerethika or thymoerethics. Finally, what are called "tranquilizers" (here spelled "tranquillizers") represent what are called in the USA "minor tranquilizers," which are often used for controlling nervous tensions (rather than psychoses where the major tranquilizers would be used) and other minor complaints which occur from day to day. In each major group, minor classes are distinguished in each case on the basis of their chemical structure. - Each of the many tables constituting the body of the book is divided regularly into three parts - the generic name and chemical name, the structural formula, and the trade-marked or proprietary names. These represent the most important product names but not all in use. Thus, for reserpine, 26 registered names are used, whereas the reviewer has a listing of at least 67 special names for this important alkaloid. The difference may lie in the relative importance of the products. The introduction mentions inclusion of "all the familiar trademarks under which a drug may be commercially available" and apparently the less important TMs have been eliminated to save space and meet the important needs.

G M H

"MAKING AQUATIC WEEDS USEFUL: SOME PERSPECTIVES FOR DEVELOPING COUNTRIES," by H. Popenoe (Chairman). viii + 1-175, figs. (s. n.). Nat. Acad. Sciences, Washington, D. C. 1976. (gratis).

This report of an Ad Hoc Panel of an advisory committee to the Commission on International Relations explores the possibilities of economic utilization of several important tropical water weeds: species of Eichhornia, Phragmites, Lemna, Spirulina, Azolla, Sagittaria, Neptunia, Typha, Ipomoea, Zizania, and many other genera. From being an increasing menace to waters, these could be utilized for fodder, food, fiber, soil additives, energy sources, etc.

"THE THEORETICAL FOUNDATIONS OF CHINESE MEDICINE, SYSTEMS OF CORRESPONDENCE," by Manfred Porkert. xvi + 370 pp., 81 figs., 28 tabs. The MIT Press, Cambridge, Mass. 1974. \$9.95.

This book explores in four chapters a relatively little known area - the system of correspondence in Chinese medicine. There is little or no biographical information on the author who has written in German on the subject (references 1961-5). The book is vol. 3 of a series "East Asian Science Series" intended to describe the development of science in the Far East. Apparently the book is not a translation but was written in English by the author. This is the first truly scholarly work on Chinese medicine in a western language and is a product of the author's wide knowledge of modern medicine, the Chinese language, and philosophy. Emphasis is placed on the points (foramina) along the conduits ("sinarteriae") which are conceived to carry the energy flow through the body. The balancing of this energetic flow by means of acupuncture and moxibustion is effected to produce a dynamic balance reflected in a state of good health. Systems of correspondence are complementary relationships of polar functions or qualities, such as yin-yang - yin the female, quiescence, responsiveness, conservatism, etc., yang the male, dynamic, active, aggressive, demanding, etc. This idea is carried out in every area - seasons, directions, medicines, etc. Five evolutive phrases are spoken of: water, wood, fire, metal, and earth. The ideas formulated are intriguing.

G M H

"RHODORA, Index to Volumes 51-75 (1949-1973)", by E. Rouleau (Compiler). vii + 287 pp. New England Botanical Club, Botanical Museum, Cambridge, Mass. 02138. 1976. \$10.00.

This collective index to "Rhodora: Journal of the New England Botanical Club" supplements another multivolume index, similar in format, an index to volumes 1 (1899) to 50 (1948) of the journal (the latter is still available; cost \$20.00). There are two indexes in each compilation: the first to taxa cited (mostly fam. and gen.) and the second a combined author and title index, the title entry being based on key words. Bold-face type is used to indicate newly described taxa or taxa with a new status. Bibliographic citations are most complete under the author name. Entries under the key word (of title) are skeletonized. Author entries are complete even up to citation of figures, etc. Where there is more than one author, the article is cited under each author. This compilation should be very useful to the botanist and especially to the taxonomist, since it covers a very active period in the botanical sphere.

G M H

"LATIN AND GREEK FOR BIOLOGISTS," by T. H. Savory. (Morrow Technical Library (Biology)). vii, 34 pp., 1 fig, (dust jacket). Morrow Publishing Co. Ltd., 276 Hempstead Rd., Watford, Herts., England WD1 31Z (Bonn Industries, Plainfield, N.J.). 1971. \$4.00.

In this volume a succinct review of the classical languages is presented, together with word lists pertaining to botany and zoology. Also included are classification schemes for plants and animals, together with representative genera, and in each case derivation of the names. The last chapter consists of thoughtfully formulated questions on the subject matter. This is a second edition.

G M H

"PREVENTIVE MEDICINE AND PUBLIC HEALTH," by Wilson G. Smillie and Edwin D. Kilbourne. Ed. 3, xvi, 602 pp., 43 figs., 48 tabs. The Macmillan Co., New York. 1963.

This generally adequate text is widely used in the United States in public health courses. There are two major parts: "Book" I on "Public health and the parasitism of man with a note on newer hazards," in which the various infectious diseases (caused by parasites) are discussed, along with public health measures at their suppression (the treatment is not of man as a parasite! as the title of this section might convey) and "Book" II, dealing with protection, prevention, and conservation in public health. The book has many useful features, such as charts and other graphic devices and would represent a useful teaching facility. The index however seems to be quite inadequate.

G M H

"FUNCTIONS OF GLUTATHIONE IN LIVER AND KIDNEY," edited by H. Sies and A. Wendel. XIII + 212 pp., 95 figs., 46 tabs, Springer-Verlag, Berlin, New York. 1978. DM 58,--; US \$32.00.

This volume, all in the English language, contains only four chapters. However, each is subdivided into sections with various authors: there is a total of 25 papers with 58 contributors (including the two editors) of international origin. (A group picture shows ca 32 of these; it was taken at the meeting where the subject matter was discussed, a conference of the Society for Biological Chemistry, held at Reisenburg Castle, in Germany, in July of 1978). Glutathione, a tripeptide, plays a significant role in oxidative reactions in intermediate metabolism. It has assumed much greater importance in recent years. The topics discussed in this book include: the regulation of the glutathione (G) level in the liver; (2) the role of gamma-glutamyl-

transferase in G turnover; (3) the part taken in redox changes by 2GSH/GSSG (reduced and oxidized states of G); and (4) the pharmacologic and toxicologic aspects, including possible liver damage and protective and detoxifying mechanisms. It is shown that among others the synthesis of prostaglandins requires glutathione, an indication of the great importance of this compound. The book is of interest in both chemical and medical areas.

G M H

"SYLLABUS FOR THE MEDICINAL AND EDIBLE NATIVE PLANTS OF BUTTE COUNTY, CALIFORNIA," by Mary Susan Taylor, iii + 81 pp., several figs., 2 maps. M. S. Taylor, P.O. Box 1686, Chico, CA 95727. (Mimeographed). 1977. \$4.50.

This brochure is intended for use in making field trips in this area of north central California (north of Sacramento). It bears a wealth of information on the plant communities of the area, the Maidu Indians, their medicinal preparations, poisonous plants of the area, and the useful plants found thereabouts. 13 pages of bibliography, a glossary of terminology, and indexes are useful appurtenances. The section on the Indians and their medicines is particularly informative.

G M H

"DRUGS, RITUALS, AND ALTERED STATES OF CONSCIOUSNESS," edited by Brian M. Du Toit. ix + 272 pp., figs., pls., tabs. A. A. Balkema, Rotterdam, Netherlands; P.O. Box 555, Forest Grove, OR 97116. 1977. \$16.50.

The impression conveyed from parts of this book is the urgent need for greater exploration and study of the natural plant materials used by the aborigines as medicines, hallucinogenic agents, and so on. With all the "boondoggling" going on in this country, it is a shame that more money is not assigned to explorations in the backward areas of the world, where in the course of time, the native peoples will have lost their ancient orally transmitted knowledge of these plant products. This volume incorporates the text of papers presented at a symposium held by the Society for Applied Anthropology in Amsterdam in 1975. While some of the articles are rather general and speculative in type, others, such as the two by R. E. Schultes deal with specific details of chemistry and botany of various plant hallucinogens. While there is a predominance of information on the American scene, some papers treat of Old World subjects. There is evidence in some articles of a poor job of proof reading - or else some authors were very careless! The book suffers from lack of an index. The biographical sketches of the 15 authors is a very useful

addition. This book will be of interest to the anthropologist, sociologist, pharmacognosist, and perhaps others,

G M H

"TOBACCO AND BRONCHO-PULMONARY CANCER," by P. Valade. *Rec. Med. Vet.* 141 (1): 45-56. 1965.

A review of the epidemiology of pulmonary cancer. The author demonstrates that there is a real (absolute) increase in the frequency of this disease in the world, that the cause of this increase appears to lie in the harmfulness of cigarette smoking, and that experiments demonstrate the carcinogenic effect of tobacco smoke. The media by which reduction of pulmonary cancer may be sought are: (1) education of the masses of people (2) prohibition of tobacco for young people and forbidding its use in public places (3) replacing cigarettes with the tobacco pipe. Among the educational methods used are the use of brochures, the radio and television, posters, etc. One figure is reproduced which has been used in Denmark, Venezuela, and the USSR: it shows a skull formed from the smoke of a cigarette.

G M H

"IDENTIFICATION PAR CHROMATOGRAPHIE SUR COUCHES MINCES DE GEL DE SILICE DE DROGUES VEGETALES DE LA P. B. V ET DE QUELQUESUNS DE LEURS DERIVES," I, II, by M. Vanhaelen. *J. Pharm. de Belgique* 23: 87-127; 1969. 24: 175-214; 1970.

Thin layer chromatography is proposed for systematic use in the identification of the various official crude drugs of Pharm. Belgica V, as well as of their galenical derivatives. In the second part, several drugs of PB V not included in the first part are covered as well as drugs of PB IV and three other drugs official in neither of these (star anise, *Illicum Anisatum*; artichoke; and broom tops, *Scoparius*). The technique of using 1 x 3 in. micro-slides for TLC is described in detail, and at the end of the second part, some theoretical matters on chromatography are discussed. Colored figures illustrate the chromatograms obtained. The drugs are arranged systematically in the order of their chief chemical constituents. An index of reagents is given and an index of the drugs studied at the end of part 2.

G M H

"ATLAS OF UNITED STATES TREES," Vol. 2, by L. A. Viereck and E. L. Little, Jr. iv + 1-19, 105 maps (tot. 127 pp.). U.S.D.A. Forest Serv. Misc. Publ. No. 11293. 1975.

A series of 23 large maps show climatic, geological, and botan-

ical information of general type. Following are 82 large maps showing the natural distribution of the same number of plant spp. There are represented 32 trees, 6 shrubs attaining tree size, and 44 shrubs of smaller size. Gymnosperms and dicots are represented in this preliminary forest atlas of the state of Alaska.

G M H

"ANALYTICAL MICROSCOPY," by T. E. Wallis. Ed. 3. viii, 226 pp., 96 figs, 5 pls. J. & A. Churchill, Ltd., 104 Gloucester Place, London W1. 1965.

The sub-title indicates that this practical laboratory volume has a broader scope than only pharmacognosy: "Foods, water, spices, and drugs." Earlier editions appeared in 1923 and 1957. The content is arranged as follows: Introduction; simple methods of preliminary treatment; surface preparations and sections; sedimentation and centrifugation; kneading (for starch and bran); elutriation; solvents; clearing reagents; other preliminary treatment; chemomicroscopy; micromorphology; sublimation, precipitation, and staining; measurement and drawing; numerical values; quantitative microanalysis; appendix (numerical data; reagents); bibliography; index. Were a person to master the contents of this manual, he could proudly proclaim himself "Microscopist." The essential technics are clearly presented and seemingly adequate.

G M H

"PFLANZENSYSTEMATIK: EINFUEHRUNG IN DIE SYSTEMATISCHE BOTANIK; GRUNDZUEGE DES PFLANZENSYSTEMS," Aufl. 2, by P. Weberlin and H. O. Schwantes. 389 pp., 106 figs. Verlag Eugen Ulmer, Postfach 1032, 7000 Stuttgart 1, BRD. 1975, DM 19,80. (Flexible binding)

Despite the outstanding importance which the physiological disciplines have assumed in areas of teaching and research, systematics has in no way lost its great significance for biology. It continues to be a basic requirement for work in the other disciplines of the biological field. False ideas prevail on the goals and mode of working of biological systematics. Thus, it is often felt that this activity has been exhausted in the simple description and distinction of taxa and a classification based on a kind of "drawer" system, in which each entity fits precisely into its proper position. In actuality, systematics does much more than that - it endeavors to give a complete picture of the complexities of the organism, and at the same time an understanding of its connections with other forms and the recognition of general biological laws. This information is needed to learn as much as possible about the form, mode of living, distribution,

variability, constituents, and all the other facets of the life system. To this end, the small text under review has performed so well that after only three years it has become necessary to bring out a new edition. The second edition shows many improvements over the first and bears the results of the latest researches. In this good book are treated the bases, objectives, and modes of study of systematic botany. It will provide both the beginner and the advanced student with a picture of the groups of the natural system and data on the probable relationships. Many plant forms are discussed, with special reference to those important in the household of nature and in the life of man, either as economic plants or as causes of plant, animal, or human disease. An abundance of outstanding illustrations increases the satisfaction of reading this modern and very worthwhile text book.

G M H

"FLORA OF CANYONLANDS," by S. L. Welsh. Naturalist 21(2): 26-39, 1 map, 11 figs. (some in color). 1970.

Semi-popular discussion of the flowering plants found in "Canyonlands National Park" located in S.E. Utah and set aside as a Park in 1964. (The name of the Park must not be confused with "The Canyonlands" as understood by geographers and geologists, which is a much more extensive area of S.E. Utah and adjoining W. Colorado). The 257,640-acre park is traversed by the Colorado River, along the banks of which lies much of the vegetation of the rather desolate area. Among the plants mentioned are grasses, pinyons, junipers, skunkbrush, blackbrush, Douglas fir, Rocky Mountain maple, aspen, death camas, cave primrose, hedgehog cactus, prickly pear, prince's plume, asters, tamarix, willow, Forestiera, sand dropseed, and ironwood. Two Pinus ponderosa trees are known, one of which was found used in the living standing state for removal of boards during 1819-20; it still survives!

G M H

"FLOWERS OF THE CANYON COUNTRY" and "FLOWERS OF THE MOUNTAIN COUNTRY," by Stanley Welsh (text) and Bill Ratcliffe (photos). ix + 56 pp., 103 col. pls./ xx + 84 pp., 113 col. pls. (respectively). Brigham Young University Press, Provo, Utah. 1975. Price unstated.

The pages of these large-page books are decorated with fine colored photographs of 101 plant species, plants which grow in the canyon country (especially in the Four Corners Region, where Arizona, New Mexico, Colorado and Utah come together at a point) and 100 taxa of the mountain country (the mountainous areas of

the western USA and south-western Canada). For each taxon taken up, there is an interesting paragraph of essential facts, including time of flowering, and an illustration. In both books, the plants are arranged in order of flower colors (white, red or pink, yellow or orange, blue or purple). These volumes are good gifts for anyone - beautiful and educational.

G M H

"ANGLO-AMERICAN AND GERMAN ABBREVIATIONS IN SCIENCE AND TECHNOLOGY," by Peter Wennrich. Ed. 1, Part 2; F-0, v + 609-1448 1977. Part 3: v + 1449-2276; 1978. R. R. Bowker Co., 1180 Avenue of the Americas, New York 10036, 1976. \$32.50 each part.

This valuable work on abbreviations is complete in three parts (volumes). It will be of great assistance in the interpretation and understanding of the numerous abbreviations appearing in the current scientific literature of the world. The first part contains over 50,000 abbreviations obtained from a search of more than 800 current journals of outstanding importance (see *ibid* 37(2): 172; 1977). This reviewer has had the opportunity of studying and using several similarly titled volumes but this has proven to be the most complete such compilation yet examined. The use of abbreviations in the scientific/technical literature seems to be growing at a rapid rate. The more considerate authors give the meanings of the abbreviations they use, either in the form of a tabulated footnote or on first mention in the paper or book. However, oftentimes there is no clue to identity and this can often be frustrating to the reader. Fortunately, the dictionary under review helps greatly to relieve this difficulty. Nothing in this world is perfect and it would be presumptuous to claim a complete coverage; however, the coverage is better by far than other dictionaries of this type I have studied. Thus, among other items checked, the zip code abbreviations for the United States are included. Several abbreviations were not found, such as: MRC (Medical Research Council); HLTH (health); OBSERV (Observatory); n c (new combination, botanical or zoological names); n s (new species, plant or animal); MA (Malt Agar (medium)); IIT (Illinois Institute of Technology); KASSR (Kazakh Soviet Socialist Republic); p p (partly, in part); TSSR (Turkman Soviet Socialist Republic); UKAEA (United Kingdom Atomic Energy Authority); NBC (National Broadcasting Company); NOAA (National Oceanic Atmospheric Administration); WOA (Wort Agar); RCA (Radio Corporation of America); SRC (Scientific Research Council).

G M H

"MEDICAL BOTANY: PLANTS AFFECTING MAN'S HEALTH," by Walter H. Lewis and Memory P.F. Elvin-Lewis. xvii + 515; 158 figs., 46 tabs. John Wiley & Sons, New York, Sydney. 1977. \$27.50.

This interesting volume includes folklore and ethnobotanical data on many plant species along with the latest findings of pharmacological laboratory and medical clinic. Not only medicinal plants but also those which are harmful and those producing hallucinations are given consideration. The text is gaited to various levels: it will be found interesting to physicians, pharmacists, and others in the health professions and also to the literate and educated layman with a serious interest in learning more about his world. Natural products were formerly widely if not solely used in healing and are even yet the basis of a major part of modern medication - if not in the form of compounds existing in nature, then very closely allied to these and derived from them. Thus, our most popular medication, aspirin, is closely related chemically to salicylic acid and the salicylates found in plants; but (what is more important) stimulated the search for closely related compounds which for one reason or another were better used in therapy. - The three major categories of the text are: (1) injurious (toxic); (2) remedial (medicinal); and (3) psychoactive plants. The arrangement followed is mostly that of the body system affected: thus in the order: nervous system, cardiovascular, metabolic, sensory organ, oral, gastrointestinal, respiratory, urogenital, dermal. The first category is that of a universal disease--cancer. - Plants of all categories from the lowest to the highest are included. Special features include a phylogenetic classification of the Plant Kingdom, a bibliography of herbal medicine, and a glossary. Some omissions noted: under cleaning gums (p. 247), there is no mention of using styrax (storax) as a chewing gum, a very common practice in the southeastern USA. There is no mention of diverticulitis, a very common intestinal ailment, and one becoming ever more common. This text makes for most interesting reading and might well be applied as a text for courses in pharmacognosy and pharmacology.

G M H

"ETHNO-BOTANY OF THE BLACK AMERICANS," by W. E. Grime.
Reference Publications, Inc., 218 St. Clair River Drive,
Algonac, Michigan 48001. 1979. \$19.95.

An introductory section of the book reviews the history of Negro habitation in the West Indian islands (to replace the Indian slaves who were unable to withstand the rigors of a state of slavery) and on the continental North America (both from 1502). The plants are arranged by the alphabetic order

of their generic names, including such well known plants as Arachis hypogaea (there is no mention of the recent finding that this plant may have originated in Africa rather than in South America). An index of common names would have been very useful. There is no easy way of identifying some of the common names encountered, such as calalu (colilu, culiul), eddoes (eddas), bonavist, etc. The book is well printed and strongly bound and is appropriately priced at \$12.50.

G M H

"NEISSERIA GONORRHOEAE AND GONOCOCCAL INFECTIONS," W.H.O., Techn. Rept. Ser. No. 616: 142 pp., 2 figs., 19 tabs. Geneva, Switzerland. 1978. Sw. fr. 12.-- Available in France at Librarie Arnett, Paris.

This is a report by a special group of the WHO and is intended to furnish the latest information on gonococcal infections along with the latest on control and research in progress. There is a chapter on the immunochemically related components of the microorganism, N. gonorrhoeae, including the pili, capsules, lipopolysaccharides, antigens, murein (a macromolecular cell casing of bacteria), cytoplasmic membranes, and so on. The need of animal models is brought out (gonorrhoea is pathogenic only among human beings). The pathologic effects of G.C. infections are detailed.

G M H

NOTE

This is the ninth collection of book reviews by G.M. Hocking to be published in PHYTOLOGIA. (27(3): 180-208; 1973.- 29(5): 395-445; 1975. - 30(6): 488-504; 1975. - 31(1): 30-61; 1975. - 34(1): 95-144; 1976. - 37(2): 98-176; 1977. - 40(3): 264-304; 1978. - 44(1): 33-64; 1979.) The first seven contributions were supported entirely by a Faculty Grant-in-Aid (No. 73-57) of Misc. Grants Fund 2775-17-5240 (Auburn University, Auburn, AL.), for which the reviewer is grateful, as also for the ca 20% support of the eighth issue (Misc. Grant Fund 6-40020; Auburn University).

CORRECTIONS FOR PHYTOLOGIA 40(3): 284; 1978.

In review of "Renal Transport," the first Chairman was K. Kramer (not Karmer).

PHYTOLOGIA 40(3): 293; 1978.

In title of "Flora of Hassan District," the state is Karnataka not Karataka, as given.

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BERNARDIA MYRICIFOLIA VAR. INCANOIDES (EUPHORBIACEAE),

NEW VARIETY FROM THE CHIHUAHUAN DESERT REGION

Marshall C. Johnston

Department of Botany and Plant Resources Center

The University of Texas at Austin, Austin, Texas 78712

Bernardia myricifolia (Scheele) Watson is a species of intricately branched shrubs occurring rather abundantly from the southern margins of the Edwards Plateau of central Texas southward through all of southern Texas, much of Tamaulipas almost to the Tropic of Cancer, northeastern Nuevo León and northeastern Coahuila; there are also disjunct populations near the towns of Huizache, Guadalcázar, and Rioverde in San Luis Potosí. Westward, the species invades the Chihuahuan Desert Region only in scattered localities, in the lower canyons of the Rio Grande (to Terrell County, Texas) and central and northwestern Coahuila, with one locality in southeastern Chihuahua, one in extreme southwestern Coahuila, and one in extreme northeastern Durango.

Plants at these last two mentioned localities differ from all the rest of the species in that the radii of the stellate trichomes of the herbage are appressed to the epidermis (rather than raised) and the ventral style-surfaces are merely rugose (as opposed to having extremely prominent laciniae in all other populations). Since these two populations form a variety well defined geographically and morphically, I propose a formal name as follows.

BERNARDIA MYRICIFOLIA var. INCANOIDES M. C. Johnst., var. nov.--A var. typica radiis trichomatum adpressis, stylis ventraliter leviter rugosis differt. TYPE: MEXICO: Durango, northern end of Sierra del Rosario, 25°45' N. lat., 104°00' W. long, 1800 meters, steep limestone slopes, with Agave lecheguilla Torr., Fouquieria splendens Engelm., Dasyllirion sp., Parthenium sp., Acacia sp., etc., 2 November 1972, M. C. Johnston, T. Wendt & F. Chiang 10022 (LL, holotype; isotypes MEXU and elsewhere). Other collection seen: Mexico, Coahuila, Sierra de Jimulco ca 10 km. south-southwest of La Rosita, 25°11' N. lat., 103°16' W. long., 1750 meters, limestone slopes with Acacia, Mimosa, Mortonia, Dasyllirion, Cordia, Opuntia, Eysenhardtia, 19 September 1973, J. Henrickson 13256 (LL).

The varietal name indicates a resemblance to B. incana C. V. Morton of Arizona, California and Baja California. This resemblance may be more than merely superficial, for the three species B. myricifolia, B. incana and B. obovata I. M. Johnst. although adequately distinct from each other seem to form a closely inter-related species-group.

The two species of Bernardia occurring in the Chihuahuan Desert Region may be distinguished as follow:

Leaves more or less elliptic or oblong, beneath prominently reticulate and densely stellate-pubescent, drying blue-green above; fruits mostly 3-loculed and 3-seeded; stamens 10--16.

. B. myricifolia

Leaves more or less obovate, beneath not prominently reticulate nor densely stellate-pubescent, drying pale gray-green; fruits 2-loculed, usually 2-seeded or by abortion 1-seeded; stamens 3--7 B. obovata

My collection was made during field studies supported in part by National Science Foundation grant BMS-00898-A02 and in part by the Marshall C. Johnston Research Fund. I am grateful to both, as well as to T. Wendt, F. Chiang-C. and Jim Henrickson, all of whom have worked diligently in the Chihuahuan Desert Flora project.

MAGNOLIA MACROPHYLLA MICHAUX NATURALIZED IN MARYLAND

Richard E. Riefner, Jr. and Joanne Tremper

Magnolia macrophylla Michaux, a widespread but rather rare and local tree, has been reported from southern Ohio and the mountains of Virginia, southward to Georgia, and west to Louisiana and Arkansas (Hardin 1972). This small tree occurs individually or in groves along streams or rich valleys and is noted for its remarkable leaf and flower size. The big-leaf magnolia produces the largest simple leaves - nearly 1 m. in length - of any tree found in temperate North America. Its cream-colored flowers, which are 32 - 46 cm. across, are the largest of the genus.

This species is grown occasionally as an ornamental in the eastern states and is hardy as far north as Massachusetts (Sargent 1949). Locally abundant in Baltimore County, Maryland, the species is here reported as an escape from cultivation. Birds probably dispersed seeds from residential yard plantings near the Patapsco River Valley State Park. This region of the piedmont plateau with its sheltered stream valleys and slightly acid silt loams, simulates its Southern Appalachian habitat well.

Collection data - BALTIMORE CO.: Mixed deciduous woods near meandering stream, Shelbourne and Sulphur Springs Rds., adjacent to the University of Maryland Baltimore County, 4/24/80, Riefner & Tremper 8026; alluvial bottomlands SE 1 mi. from Hilltop Rd., Patapsco River Valley State Park, 5/15/80, Riefner & Tremper 8056; rich woods S from Newburg Rd., 5/22/80, Riefner 8063; rich woods along Hilton Rd. near Patapsco River Valley State Park maintenance complex, 5/22/80, Riefner 8066.

The discovery of M. macrophylla in northeastern Maryland represents a range extension of several hundred miles from its previously known station in Virginia, and these new localities now form the northeasternmost range limit of the species outside of cultivation. Voucher specimens have been placed in the Towson State University Herbarium (BALT) and the Herbarium of the University of Maryland at College Park (M).

LITERATURE CITED

- HARDIN, J.W. 1972. Studies of the southeastern United States flora III. Magnoliaceae and Illiciceae. Elisha Mitchell Sci. Soc. 88: 30-32.
- SARGENT, CHARLES S. 1949. Manual of the trees of North America. New York: Dover Publications.

Richard E. Riefner, Jr.,
Joanne Tremper
1 Rambling Oaks Way
Baltimore, Maryland
21228

NOTES ON PALMAE, I.

Robert W. Read

Smithsonian Institution, Washington, D. C.

There has been a marked increase in the completion of local, insular, and geographical floras recently. Such publications are invaluable, not only to botanists of the area, but to scientists in other fields of study as well. This is especially true in ecology, pollination biology, vertebrate ecology, endangered species studies etc. where an accurate identification of the taxon is necessary for reliable scientific reports, or for repetition of certain observations and experiments. The following new Coccothrinax species is published in anticipation of the publication of a new Flora of the Cayman Islands soon to go to press. The name of the palm honors George R. Proctor, author of the flora and a most knowledgeable authority on Caribbean botany.

COCCOTHRINAX PROCTORII sp. nov.

Palmae solitariae caulibus 2-5 m. altis; folii pagina abaxialis argentea vel auricolor, dense lepidota squamulis persistentibus hyalinis, palmine (15-)18-30 cm. longo, segmentis 39-48, eis centralibus (52-)61-80 cm. longis (2.5-)3.2-4.2 cm. latis, vagina ex reti fibroso subtili constanti; inflorescentia brevis 5-7-partita, floribus eburneis, staminibus ca. 10, antheribus 1.6-2.4(-3.1) mm. longis; stigma et stylus ovario longiores. Specieis haec ab Coccothrinace jamaicense, C. argentata, et C. readii praecipue differt fibris fasciculis ingentibus laminae.

Trunk 2-5(-10) m. high, or possibly more, smooth, gray, slender columnar, solitary, unarmed.

Leaf blade circular in outline, with 39-48 narrowly trullate segments (52-)61-80 cm. long, (2.5-)3.2-4.2 cm. wide at the widest (which may or may not be at the point of connation), connate in the palman (15-)18-30 cm., tapering to a very slightly bifid apex, adaxial surface dark glossy green, principal nerves of recently expanded blade with caducous scales; abaxial surface appearing bright silvery to golden, covered with a dense indumentum of persistent irregularly shaped and interlocked fimbriate scales, the stalk or central portion of each scale conspicuous as a dark-colored dot; hastula various in outline and width (2.0-3.3 cm. wide) depending partially on extent to which the blade is expanded, at first often vested with an indumentum of adpressed gray scales, free adaxial extension 0.5-1.0 cm. long, conspicuously ciliate; petiole ancipitous (32-)75-80 cm. long by 1.1-2.5 cm. wide; abaxial surface of petiole usually densely covered with white scales that are soon lost along the central convex portion, those along the margins extending beyond margins;

sheath very slightly linguiform, woven of medium to fine fibers ca. 0.5 mm. thick, at first covered with white scales.

Inflorescence composed of 5-7 or more primary branches, the lowermost branch ca. 15-25 cm. long to apex, the terminal primary branch often not fully exposed; the primary bracts sparsely lepidote apically, less so basally; each primary branch once-compound with 17-40 ultimate branches, the peduncle of each primary branch usually lepidote with scattered to densely arranged caducous arachnoid scales at anthesis; the ultimate branches glabrous (3.4-)7.5-12.0 cm. long, with 30-45 or more pedicellate flowers. Flowers fragrant, white at anthesis, soon becoming creamy-white; pedicels at anthesis (1.2-)1.6-3.0(-3.5) mm. long; stamens about 10 in number, about equaling pistil; anthers 1.6-2.4(-3.1) mm. long; pistil pyriform, style elongate, usually straight, stigma and style (1.0-)1.2-2.0(-2.2) mm. long. Fruit purple-black at maturity like other species possibly passing through a whitish and pink stage first; mature fruiting pedicels (0.5-)1.0-4.0 (-5.4) mm. long; seed (4.5-)5.0-5.4(-5.9) mm. in diameter.

TYPE SPECIMEN: - Proctor 27991 collected 9 June 1967, east of Savannah Village on Grand Cayman. Holotype at IJ, isotype at US.

VERNACULAR NAME: - Thatch Palm

DISTRIBUTION: - Endemic to the Cayman Islands, where the species is "common in fields and woodlands", "throughout the islands on dry ground", and "dry wind-swept thickets on limestone". (Proctor Nos. 29045, 27991, and Brunt 1643).

SPECIMENS EXAMINED: CAYMAN ISLANDS: Grand Cayman. East of Savannah Village: 9 June 1967, Proctor 27991 (holotype IJ, isotype US). Newlands Barcadere Road: 16.7.65, M. Brunt 1643 (IJ). Gun Bay, on old coral beach ridges: 7 June 1967, J. D. Sauer. 4091 (WIS). Little Cayman. Thickets on sand ridge near west end of Charles Bight: 4 Aug. 1975, Proctor 35082 (IJ). Rocky thickets, near Snipe Point: 7 July 1967, Proctor 28033 (4 sheets) (IJ). "Near a vast expanse of wild Coccothrinax, along road of difficult access." 16 Nov. 1979, S. L. Olson, C. A. Meister, & H. F. James, USNH Reg. No. 338,476 (US). Cayman Brac. Raised beach, limestone ironshore formation, S. Coast: 25.7.65, M. Brunt 1674 (IJ). Near North-East Point: 8 Aug. 1968, Proctor 29045 (IJ). (2 sheets). Cultivated. United States Dept. Agric. Plant Introduction Station, Miami, Florida: 23 Apr. 1965, Read 1401 (US), seed originally collected by Fairchild and Dorsett on expedition to "Georgetown, Grand Cayman Isl. Mar. 1933."

DISCUSSION: - Coccothrinax proctorii belongs to a group of closely allied species distributed throughout the western Caribbean. Until recently, the lack of adequate field observations and comparable herbarium material has hampered an understanding of these ecologically and morphologically similar taxa. Such species are difficult to distinguish on morphological grounds unless complete material is available.

Morphologically, C. proctorii is distinguished by its flowers having the combined length of the stigma and style

greater than the length of the ovary. The length of the pedicels averages at least a millimeter to a millimeter and a half longer than those of *C. jamaicensis*, and the free portion of the leaf hastula rarely exceeds 1 cm. (based on relatively few samples). An adequate sample of leaf sheaths (mature but unexpanded) and leaf hastulas (also mature but unexpanded) would likely yield additional morphologically sound distinctions. Nevertheless, the taxa can be readily distinguished anatomically even on fragmentary material. Both living material and dried herbarium specimens present a strikingly silvery and frequently golden color on the undersurface of the leaves.

Based on numerous samples, the primary distinguishing features of the laminar anatomy are: an almost continuous band of girder-like fiber-bundles immediately below the adaxial hypodermis, mostly connected with each other adaxially and projecting well into the palisade region; but only rarely extending into the nearly continuous single row of hypodermal cells (Fig. A). In *C. jamaicensis* (Fig. B), with which this new taxon is most easily confused, the fiber-bundles appear as an irregular broken band of small clusters of few fibers each, not prominently intruding into the palisade region, but frequently interrupting the cells of the adaxial hypodermal layer.

Comparison of the leaf anatomy of the two taxa immediately reveals why the Cayman Islands species lends itself to rope making while the Jamaican species does not.

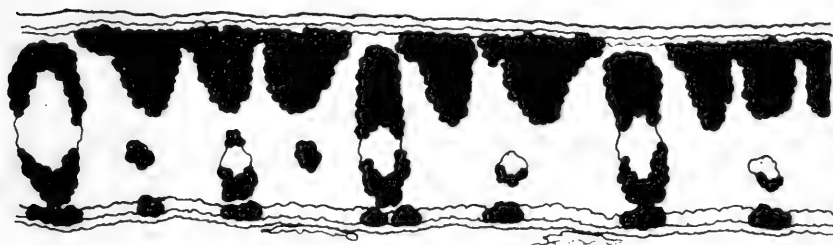


Fig. A

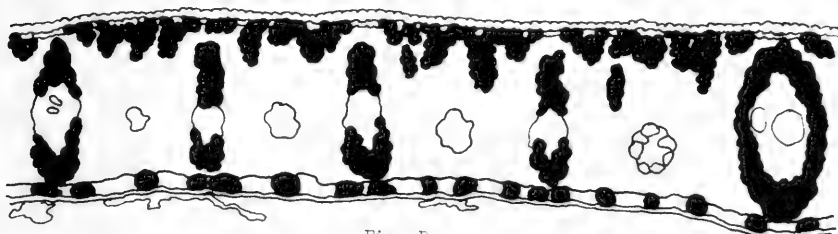


Fig. B

NOTES ON NEW AND NOTEWORTHY PLANTS. CXL

Harold N. Moldenke

AEGIPHILA GLANDULIFERA var. *PERUVIANA* Mold., var. nov.

Haec varietas a forma typica speciei recedit laminis foliorum irregulariter serratis utrinque minutissime puberulentis subtus dense glanduloso-punctatis.

This variety differs from the typical form of the species chiefly in its leaf-blades being more or less irregularly dentate along the margins, very minutely puberulent on both surfaces, and densely glandular-punctulate beneath.

The type of the variety was collected by Ramon Ferreyra (no. 10091) in matorral of tropical forest near Bellavista, in the valley of Huallaga, province of Huallaga, San Martin, Peru, at 250-300 m. altitude, on September 16, 1954, and is deposited in the herbarium of the Missouri Botanical Garden at St. Louis. The corollas are described as having been yellowish-white and the plant as a shrub 2--2.5 m. tall.

AEGIPHILA PENDULA var. *PERUVIANA* Mold., var. nov.

Haec varietas a forma typica speciei recedit laminis foliorum distincte subcoriaceis utrinque glaberrimis, calyce fructifero distincte marginaliter truncato.

This variety differs from the typical form of the species chiefly in its leaf-blades being distinctly subcoriaceous (at least at the time of fruiting), completely glabrous on both surfaces, with very prominent vein and veinlet reticulation, and the rim of the fruiting-calyx being distinctly and completely entire (truncate), not splitting even when the fruit is mature.

The type of the variety was collected by Al Gentry, C. Diaz, J. Aronson, and N. Jaramillo (no. 26028) in an upland forest on white sand, at about 150 m. altitude, at Mishana on the Rio Nanay, halfway between Iquitos and Santa María de Nanay, Maynas, Loreto, Peru, on March 22, 1979, and is deposited in my personal herbarium. The collectors describe the plant as a tree, 5 m. tall, the fruits orange in color.

A NEW SPECIES OF *UNXIA*.

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

The genus *Unxia* has been known on the basis of two species, *U. camphorata* L.f., a herbaceous annual widely distributed in northern South America, and *U. suffruticosa* (Baker) Stuessy, a perennial subshrub from a restricted area in southern Venezuela. Both species have functionally male disk flowers and have been commonly associated with the genera *Melampodium* and *Polymnia*. The genus *Unxia* was resurrected and monographed in 1969 by Stuessy. A new collection from a white sand area in amazonian Brasil has now been seen which represents a third, previously undescribed, species of *Unxia*, and which present characters that clearly indicate the relationship of the genus.

The new species is a shrub with narrowly elliptical opposite leaves having nearly longitudinal secondary veins. The heads are in a small terminal group, and the lower "dichotomies" of the plant probably represent previous flowering stages. The species is most like *U. suffruticosa*, but has large, prominent, distinctly trilobed limbs on the rays, and has longer pubescence on the stems and leaves. The cells on the surface of the ray achenes are distinctive in each of the three species of the genus (Figs. 1-3). The type species, *U. camphorata*, has small smooth cells in a regular continuous pattern, *U. suffruticosa* has cells in distinctive fusiform groups with some cells bearing a distinct papilla, and the new species has cells in a more continuous pattern and bearing a distinct papilla.

The new species of *Unxia* is especially valuable for the insight it provides into the relationship of the genus. The species has the aspect of a *Calea*, and the appearance is reenforced by the large, yellow, strongly trilobed rays. Closer examination shows that the species shares other features that distinguish the natural group which includes *Calea* L., *Brasilia* Barroso, and *Tyleropappus* Greenm., yellowish anther thecae, radially symmetrical achenes, non-striate carbonized achene walls, non-papillose inner surfaces of the disk corolla lobes, numerous parallel resin ducts in the involucre bracts, single resin ducts along the veins of the disk corolla throats, and resin ducts inside the veins in the shaft of the disk corolla styles. On this basis, *Unxia* is regarded here as a close relative of *Calea* in the Neurolaeninae.

The new species is named for the principal collector, Dr. Klaus Kubitzki of the University of Hamburg, Germany. The material has been made available for study by Dr. Cleo Calderon, the co-collector.

UNXIA KUBITZKII H. Robinson, sp. nov.

Plantae fruticosae erectae ad 0.8 m altae dichotome ramosae. Caules brunnescentes teretes vel leniter striati dense hirsuti, internodiis plerumque 5-12 mm longis, nodis prominentibus. Folia opposita, petiolis brevibus ca. 2 mm longis; laminae anguste ellipticae plerumque 4-7 cm longae et 0.7-10.0 cm latae base et apice acutae margine remote serrulatae anguste recurvatae supra villosae subtus densius longe villosae, nervis secundariis paucis sublongitudinalibus. Inflorescentiae terminales 1-3-capitatae, pedicellis 5-12 mm longis dense hirsutis. Capitula late campanulata ca. 9 mm alta et 10 mm lata; squamae involucri ca. 16-18 ca. 3-seriatae ovatae vel late oblongae 7-8 mm longae et 4-5 mm latae, exteriores herbaceae extus et margine dense puberulae vel breviter villosae apice breviter acutae margine superne anguste reflexae, interiores scariosae rubro-flavae apice obtusi vel anguste rotundati extus glabrae vel in medio dense hispidulae, canales resiniferi longitudinales rubri numerosi; paleae minutae breviter triangulares ca. 1 mm longae et 0.5 mm latae. Flores radii feminei ca. 10; corollae flavae 7 mm longae, tubis ca. 2.5 mm longis cylindraceis inferne leniter latiores extus pilosulis, limbis late oblongis ca. 4.5 mm longis et ad 3 mm latis apice valde trilobatis intus leniter mamillosis extus multo glandulopunctatis base pauca pilosulis. Achaenia radii obovata leniter arcuata ca. 3 mm longa et 1.5 mm lata non striata extus in cellulis distincte papillosa; carpodia late irregulariter annuliformia, cellulis isodiametricis vel latioribus quam longioribus ca. 25-30 μ m latis, parietibus leniter incrassatis; callus annuliformis; pappus nullus. Flores disci ca. 8; corollae sordide flavae ca. 5 mm longae extus glabrae vel inferne sparse pilosulae 5-lobatae, tubis cylindraceis 1.5-2.0 mm longis, faucibus anguste infundibularibus 2.0-2.3 mm longis, lobis triangularibus 1.0-1.2 mm longis et ca. 0.8 mm latis intus laevibus; canales resiniferi in faucibus ad nervos solitarii in lobis marginales interdum inter nervos praesentii; filamenta in partibus inferioribus laevibus in partibus superioribus ca. 0.20-0.25 mm longa base ad 0.15 mm lata; thecae antherarum flavae 1.6-1.8 mm longae, cellulis endothelialibus breviter ellipticus vel subquadratis in parietibus transversalibus 1-2 noduliferis, appendices antherarum ovatae 0.25-0.30 mm longae et 0.20-0.2? mm latae extus concavae et dense glanduliferae; nectaria cylindrica ca. 0.5 mm alta breviter 5-lobata; basi stylosum submaturi non noduliferi; styli apice non ramosi subtruncati subapice dense obtuse papillosi, canales resiniferi e nervos interiores. Achaenia disci sterilia cylindrica vel in basis valde obliqua extus laevia vel raro pauca papillosa; carpodia prominentia annuliformia, pappus nullus. Grana pollinis in diametro 27-30 μ m valde breviter spinosa.

TYPE: BRASIL: Amazonas: Rio Negro, Temedaui, right river bank, 2 hours below Tapuruquara (Santa Isabel do Rio Negro). Shrubs up to 0.8 m, dichotomously branched, flowers yellow; in

campina. Sept. 1979. *K. Kubitzki, C.E. Calderon & H.-H. Poppendieck* K.-79-103 (Holotype, INPA; isotypes, HBG, US).

Literature Cited

Stuessy, T. F. 1969. Re-establishment of the genus *Unxia* (Compositae-Heliantheae). *Brittonia* 21 (4): 314-321.

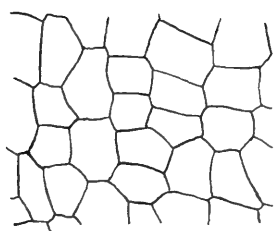


Fig. 1. Achene wall of *Unxia camphorata*.

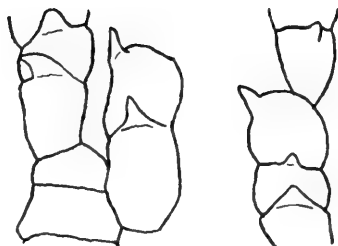


Fig. 2. Achene wall of *Unxia suffruticosa*.



Fig. 3. Achene wall of *Unxia kubitzkii*.



2530951

Unxia kubitzkii H. Robinson, with enlargement of heads.
Isotype, United States National Herbarium. Photos by Victor E.
Krantz, Staff Photographer, National Museum of Natural History.

STUDIES IN THE SENECTIONEAE (ASTERACEAE). X.

A NEW SPECIES OF *SENECIO* FROM BRASIL.

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

Recent collections from the State of Bahia in Brasil include the following previously undescribed member of the genus *Senecio*. In the treatment of *Senecio* from Brasil by Cabrera (1957) the new species would key to Sect. *Cacaliastrum* because of the lack of ray flowers in the heads, but in general appearance it resembles more closely some members of Sect. *Myriocephalus*. The petiolate sharply dentate leaves of the new species seem particularly distinctive. The species name given here is a latin genitive honoring the collector, R. M. King.

SENECIO REGIS H. Robinson, sp. nov.

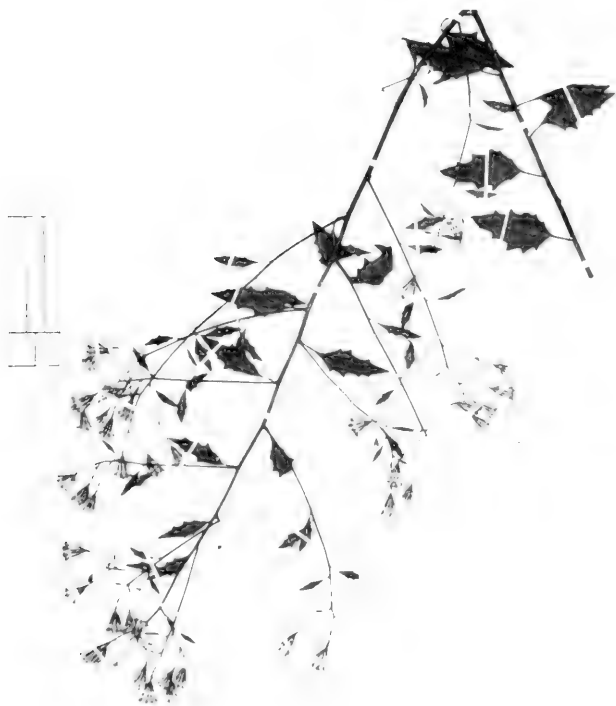
Plantae suffruticosae erectae $\frac{1}{2}$ m altae pauca ramosae. Caules teretes laeves sparse arachnoideo-puberuli vel subglabri. Folia alterna, petiolis 4-10 mm longis; laminae ovatae plerumque 2.0-3.5 cm longae et 1.1-2.0 cm latae base late cuneatae margine utrinque valde argute 3-5-dentatae apice argute breviter acutae vel minute apiculatae supra persparse arachnoideo-puberulae subtus in partibus densius arachnoideo-puberulae, nervis primariis subtus valde prominentibus, nervis secundariis pinnatis utrinque prominulis. Inflorescentiae thyrsoidae-paniculatae in ramis laxae corymbosae, pedicellis subglabris distaliter sparse arachnoideo-puberulis plerumque 10-20 mm longis minute multi-bracteiferis, bracteis linearibus 2-3 mm longis. Capitula ca. 10 mm alta ca. 4-5 mm lata; squamae involucri 8 ca. 6 mm longae et ca. 1.5 mm latae extus subglabrae in partibus obscure sparse breviter puberulae apice breviter acutae; receptacula glabra. Flores 10-13 in capitulo omnino disciformes; corollae albae ca. 6 mm longae extus glabrae, tubis angustis ca. 3 mm longis, faucibus anguste infundibularibus ca. 2 mm longis, lobis oblongo-ovatis ca. 1 mm longis, canalis resiniferus in medio loborum distinctus; filamenta antherarum in partibus superioribus ca. 0.4 mm longa, cellulis inferna plerumque isodiametricis in parietibus tenuibus; thecae antherarum ca. 1.2 mm longis, cellulis endothelialibus elongatis radialiter noduliferis; appendices antherarum ca. 0.3 mm longae et 0.2 mm latae; rami stylorum flavi apice non penicillati, lineis stigmataeis binis. Achaenia submatura ca. 2.5 mm longa 10-costata superne distincte setifera; setae pappi ca. 100 bi-tri-seriatae 6-7 mm longae apice non latiores. Grana pollinis in diametro ca. 37 μ m.

TYPE: BRASIL: Bahia: Município de Rio Contas. Base de Pico

das Almas, a 18 km ao NW de Rio de Contas. Elev. ca. 1300 meters. Shrub $\frac{1}{2}$ meter tall, corollas white, style branches yellow. July 24, 1979. Robert M. King, Scott A. Mori, T. S. dos Santos & J. L. Hage 8723 (Holotype, CEPEC; isotype, US).

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Cabrera, A. L. 1957. El genero *Senecio* (Compositae) en Brasil, Paraguay y Uruguay. Arquivos do Jardim Botânico, Rio de Janeiro. 15: 163-269, fig. 1-32, pl. 1-24.



ASTERACEAE of BAHIA BRAZIL

Senecio regis H. Robinson, Isotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXCI.

VARIOUS NEW SPECIES FROM BRASIL.

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

It is necessary to name a number of new species of Eupatorieae from Brasil belonging to the genera *Campuloclinium*, *Dasycondylus*, *Disynaphia*, *Koanophyllon*, *Lasiolaena* and *Stevia*.

CAMPULOCLINIUM EITENIORUM R. M. King & H. Robinson, sp. nov.

Plantae herbaceae annuae? erectae ad 2 m altae inferne in axillis tenuiter ramosae. Caules flavescentes vel fuscescentes teretes distincte striati dense laxe hirsuti et glandulo-punctati. Folia opposita breviter petiolata, petiolis 2-5 mm longis; laminae oblong-ovatae plerumque 3-7 cm longae et 1.5-4.0 cm latae base breviter cuneatae vel truncatae breviter acuminatae margine multo crenato-serratae apice obtusae vel breviter acutae supra sparse pilosae subtus plerumque in nervis et nervulis pilosae utrinque dense glandulo-punctatae fere ad basem trinervatae. Inflorescentiae terminales late corymboso-paniculatae, ramis primariis suboppositis dense pilosis et glandulo-punctatis, ramis ultimis plerumque 5-15 mm longis. Capitula anguste campanulata ca. 10 mm alta et 5-6 mm lata; squamae involucri ca. 17 leniter inaequales obovatae vel anguste oblongae plerumque 6-8 mm longae et 1.0-2.5 mm latae 4-6-costatae fere ad basem exaratae apice obtusae vel breviter acutae margine superne in bracteis interioribus minute laciniatae extus dense breviter pilosae et glandulo-punctatae. Flores ca. 30 in capitulo; corollae albae 3.5-4.0 mm longae extus glanduliferae, tubis distinctis 1.5-1.7 mm longis, faucibus campanulatis ca. 1.5 mm longis, lobis aequilateraliter triangularibus ca. 0.7 mm longis extus densius glanduliferis non setiferis; thecae antherarum infuscaetae ca. 1.3 mm longae; appendices antherarum truncatae vel leniter retusae latiores quam longiores ca. 0.2 mm longae et 0.25 mm latae; basi stylorum noduliferi puberuli. Achaenia ca. 5 mm longa inferne attenuata laterale sparse glandulifera plerumque in costis setifera, costis albis; setae pappi ca. 30 plerumque 3.0-3.5 mm longae. Grana pollinis in diametro ca. 25 μ m spinulifera.

TYPE: BRASIL: Sao Paulo: Municipio de Moji-Guaçu: "Campos das Sete Lagôas" Fazenda Campininha just north of Rio Moji-Guaçu. About 10 km north of river & village of Padua Sales. 22° 15'S, 47° 8'W. (About 30 km NW of city of Moji-Mirim). Alt. 625 m. Habitat: dense campo cerrado. Small scrubby trees with crowns touching to separated by a distance of 1-3 crown diameters. Dappled shade and scattered small openings of a few square meters. Many shrubs, ground cover of grasses and herbs. Soil poor,

reddish-brown fine sand with a little clay. Erect single stem, 2 m tall. Fl. white. 14 April 1961. *George Eiten & Liene T. Eiten 2592* (Holotype, UB; isotype, US).

The new species is closely related to *C. hirsutum* Gardn., found to the north in Goias and Minas Geraes. The new species is initially distinguishable by the more distinctly petiolate, more pointed, non-arched or conduplicate leaves. The stems and leaves are less hirsute, the pedicels are longer and narrower, and the heads are more narrowly campanulate. The corolla is particularly distinctive in the long narrow basal tube, and the lobes have no hairs, only numerous glands.

DASYCONDYLUS SANTOSII R. M. King & H. Robinson, sp. nov.

Plantae suffrutescentes mediocriter ramosae ca. 1 m altae? Caules teretes distincte striati hirsuti, pilis rufescentibus. Folia opposita, petiolis 5-9 mm longis; laminae ovatae plerumque 5.0-8.5 cm longae et 2.5-4.0 cm latae base obtusae et breviter acuminatae margine valde crenato-serratae apice argute acutae vix acuminatae supra longe pilosae subtus dense pilosae vel subtomentosae fere ad basem distincte trinervatae. Inflorescentiae terminales laxae corymbosae vel subcymosae, ramis tenuibus hirsutis, ramis ultimis 0-5 mm longis. Capitula campanulata ca. 9 mm alta et 6-7 mm lata; squamae involucri ca. 18 obovatae vel lineares 6-8 mm longae et 1-2 mm latae inferne bicostatae apice acutae vel breviter acuminatae extus dense pilosae. Flores ca. 20 in capitulo; corollae albae anguste infundibulares ca. 6 mm longae inferne glabrae superne sensim glandulo-punctatae, tubis ca. 3 mm longis indistinctis, lobis 0.8-0.9 mm longis et 0.5-0.6 mm latis margine superne extus distincte papillosis; filamenta in parte superiore ca. 0.4 mm longa; thecae antherarum infuscatae ca. 1 mm longae; appendices antherarum oblongo-ovatae ca. 0.35 mm longae et 0.23 mm latae. Achaenia ca. 2.5 mm longa superne sparse setifera; setae pappi ca. 40 plerumque 5.0-5.5 mm longae. Grana pollinis in diametro ca. 25 μ m minute spinuliferae.

TYPE: BRASIL: Bahia: Acaraí estrada ao lado S. Planta ramosa, fl. branca envoloco verde. Capoeira. 1.7.71. *T.S. dos Santos 1713* (Holotype, CEPEC; isotype, US).

In the key to *Dasycondylus* provided by King and Robinson (1972), *D. santosii* would run generally to couplet 5 containing *D. regnellii* K. & R. and *D. riedelii* K. & R. because of the cuneate leaf bases, the ca. 20 flowers per head, and the narrow corolla lobes. The new species is easily distinguished, however, by the hirsute stems. Additional differences include the lack of setae on the corolla lobes, the densely pilose but not tomentose pubescence on the leaf undersurface, the strongly crenate-serrate margins of the leaves, and the acute to acuminate tips of the involucrel bracts.

DISYNAPHIA MINUTIFLORA R. M. King & H. Robinson, sp. nov.

Plantae herbaceae vel suffrutescentes ca. 50 cm altae multo

ramosae. Caules rufo-brunnescentes teretes vel irregulariter corrugati sparse puberuli et glandulo-punctati. Folia laxe spiraliter inserta sessilia perangustata subteretia plerumque ca. 1 cm longa subcarnosa multo glandulo-punctata, fasciculis axillaribus parvis indistinctis. Inflorescentiae terminales laxe corymboso-paniculatae, ramis purpurascences dense puberulis et sparse glandulo-punctatis, ramis ultimis plerumque 0-2 mm longis, capitulis in glomerulis parvis numerosis aggregatis. Capitula submatura ca. 3 mm alta et 2 mm lata; squamae involucri herbaceae plerumque virides apice purpureotinctae 10-12 subimbricatae ca. 3-seriatae anguste oblongae 1.0-2.5 mm longae et 0.5-1.0 mm latae apice rotundatae et dense pilosulo-fimbriatae extus multo glandulo-punctatae et sparse puberulae. Flores 5 in capitulo. Corollae albae? submaturae ca. 2 mm longae subcylindratae in tubis brevibus leniter angustiores inferne extus glabrae, lobis oblongis ca. 1 mm longis et 0.45 mm latis extus glandulo-punctatis apice papillosis; filamenta in partibus superioribus 0.25 mm longa, cellulis dense annulate ornatis; thecae lavandulae ca. 1 mm longae base acutae; appendices breviter oblongae ad 0.15 mm longae et ca. 0.18 mm latae; basi stylorum glabri; appendices stylorum alte dense papillosae. Achaenia immatura ca. 1 mm longa plerumque glabra subapice dense breviter setifera et glandulo-punctata; setae pappi ca. 20 inaequilongae ad 1.2 mm longae irregulariter scabrae vel barbellatae inferne latiores, cellulis apicalibus acutis. Grana pollinis in diametro 20-22 μ m breviter spinulifera.

TYPE: BRASIL: Minas Gerais: Serra do Espinhaço: Serra do Itabirito, ca. 45 km S.E. of Belo Horizonte, ca. 1500 m elev. Grazed campo and cerrado, upland valley. Herb or subshrub ca. 50 cm tall. Heads white. 8 Feb. 1968. *H.S. Irwin, H. Maxwell & D. Wasshausen 19573* (Holotype, UB; isotype, US).

The new species seems to have the smallest heads and the most lax inflorescences of any member of the genus even taking into account the somewhat immature status of the type specimen. The leaves also seem less densely inserted and more glabrous than in most other members of the genus.

KOANOPHYLLON ANDERSONII R. M. King & H. Robinson, sp. nov.

Plantae herbaceae ca. 1 m altae erectae paucae ramosae. Caules flavo-virides teretes striati dense pilosuli. Folia opposita, petiolis 5-16 mm longis; laminae ovatae 4-8 cm longae et 1.5-4.5 cm latae base late rotundatae trinervatae margine in partibus latioribus irregulariter serratae superne serrulatae apice distincte acuminatae supra pilosulae et sparse glandulo-punctatae subtus dense glandulo-punctatae plerumque in nervis et nervulis dense pilosulae. Inflorescentiae late laxe corymboso-paniculatae vel leniter cymosae, ramis ultimis 7-27 mm longis dense puberulis. Capitula ca. 5 mm alta et ad 10 mm lata; squamae involucri a. 16 lineares ca. 4 mm longae et 0.5 mm latae apice anguste attenuatae extus dense puberulae et sparse glandulo-

punctatae. Flores 50-75 in capitulo; corollae albae ca. 3 mm longae, tubis ca. 1 mm longis, faucibus ca. 1.4 mm longis, tubis et faucibus extus pauce glanduliferis, lobis late triangularibus ca. 0.6 mm longis et 0.4 mm latis extus dense glandulo-punctatis; filamenta in parte superiore ca. 0.23 mm longa; thecae ca. 1 mm longae; appendices antherarum ca. 0.15 mm longae et 0.17 mm latae late rotundatae; nectaria ca. 0.35 mm alta. Achaenia 2.0-2.5 mm longa dense breviter setifera; setae pappi ca. 25 ca. 2 mm longae apice non vel vix latiores. Grana pollinis in diametro 20-22 μ m.

TYPE: BRASIL: Goias: Chapada dos Veadeiros. 1 km E of Alto Paraíso on road to Nova Roma; elev. ca. 1300 m; region of mesophytic forest along stream and on hill above, changing to cerrado on higher, drier slopes. Herb 1 m tall; flowers white; in forest. 5 March 1973. *W.R. Anderson, M.T. Kalin Arroyo, S.R. Hill, R. Reis dos Santos & R. Souza 6344* (Holotype, UB).

The new species has a general habit and form of inflorescence most like *K. consanguineum* among the Brazilian species. The latter species from areas near Rio de Janeiro differs by its more finely and evenly pubescent stems and leaves, by the longer petioles and acute to scarcely acuminate shallowly crenate-serrate leaf blades, and by the sparser more glandular pubescence of the achenes.

LASIOILAENA PEREIRAE R. M. King & H. Robinson, sp. nov.

Plantae fruticosae 0.5-1.0 m altae? Caules teretes striati dense puberuli vel tomentelli. Folia spiraliter inserta sessilia; laminae anguste obovatae vel oblanceolatae plerumque 1.7 cm longae et 0.5 cm latae inferne anguste oblongae et base abrupte leniter constrictae margine superne saepe pauce subserrulatae apice breviter acutae supra glabrae subtus in nervis et nervulis prominentiter vel subprominentiter dense reticulatis dense puberulae inter nervulas dense glandulo-punctatae, nervis secundariis paucis valde ascendentibus. Inflorescentiae in ramis terminales dense corymbosae inferne in ramis brevibus foliosae, ramis ultimis ca. 5 mm longis dense puberulis vel tomentellis. Capitula in ramis solitaria late campanulata ca. 7 mm alta et 7-10 mm lata; squamae involucri ca. 15 leniter subimbricatae ca. 2-seriatae lanceolatae vel linear-lanceolatae 4.0-5.5 mm longae 0.7-1.0 mm latae superne saepe pallide virescentes apice acutae non vel vix acuminatae extus dense puberulae et sparse luteo-glandulo-punctatae; receptacula distincte conica puberula. Flores ca. 20 in capitulo; corollae lavandulae vel violaceae ca. 4 mm longae extus sparse vel in lobis densius luteo-glandulo-punctatae, tubis ca. 1.3 mm longis, faucibus ca. 2 mm longis, lobis ca. 0.6 mm longis et latis; thecae antherarum ca. 1.4 mm longae; appendices antherarum late oblongae ca. 0.26 mm longae et 0.24 mm latae margine integrae. Achaenia ca. 2 mm longa sparse minute glandulifera plerumque in costis multo ascendentiter setifera; setae pappi ca. 35 plerumque 2.5-3.5 mm longae, cellulosis apicalibus argute acutis non deformibus. Grana pollinis in

diametro ca. 22 μm .

TYPE: BRASIL: Bahia: Entre Palmeiras e Lençóis. 900 m alt. fl. violaceas. 14-9-1956. *Edmundo Pereira 2081* (Holotype, RB).

The type specimen of the new species has been determined previously as *Stylotrichum corymbosum* (DC.) Mattf. which it resembles in habit, the colored glands, and in the initial aspect of the pubescence. The species can readily be rejected from *Stylotrichum*, however, on the basis of the well-developed basally winged pappus setae, the conical and puberulous receptacle, the lack of hieracioid hairs, the violet corollas, and the glabrous shaft of the style. All cited characters agree with a placement of the species in the genus *Lasiolaena*. Among the four species recognized in the recent revision of *Lasiolaena* (King & Robinson, 1979) *L. santosii* K. & R. seems closest, also having narrow more pointed leaves, entire margins on the anther appendages, and thinner pubescence on the leaves. The new species is distinct by the lack of petioles on the leaves, the puberulous rather than flaccidly tomentellous undersurfaces of the leaves, the restriction of glandular punctations to areas between the veins, and the few slight serrulations near the leaf tips.

STEVIA MORII R. M. King & H. Robinson, sp. nov.

Plantae herbaceae ad 1 m altae erectae pauce ramosae. Caules brunnescentes teretes leniter striati pilosi et minute puberuli. Folia opposita, petiolis ad 15 mm longis; laminae ovatae plerumque 1.5-4.0 cm longae et 0.8-2.7 cm latae base anguste cuneatae vel acuminatae margine utrinque 4-8-crenato-serrulatae vel duplo-crenatae apice obtusae vel breviter acutae supra pilosae subtus pallidiores parum carnosae distincte immerse glandulo-punctatae plerumque in nervis et nervulis pilosae fere ad basem distinctae trinervatae. Inflorescentiae laxae cymosae in ramis secundariis ca. 45° divaricatae, pedicellis plerumque 10-18 mm longis glandulis stipitatis dense obsitis. Capitula anguste cylindrica 10-12 mm alta et 2-3 mm lata; squamae involucri 5 omnino herbaceae 6-7 mm longae ad 1.5 mm latae apice breviter acutae extus glandulis stipitatis dense obsitae. Flores 5 in capitulo; corollae plerumque lavandulae in lobis pallidae ca. 8 mm longae extus omnino puberulae et glanduliferae, tubis ca. 1 mm longis, faucibus ca. 4.5 mm longis anguste infundibularibus superne intus dense puberulis, lobis aequalibus vel subaequalibus oblongis 2.0-2.5 mm longis ca. 0.8-1.0 mm latis; filamenta in parte superiore ca. 0.25 mm longa; thecae ca. 2 mm longae; appendices antherarum oblongo-ellipticae ca. 0.6 mm longae et 0.2 mm latae margine distincte crenulatae apice irregulariter lobatae; basi stylorum leniter nodiformes glabri. Achaenia anguste prismatica ca. 4 mm longa dense scabrida sparse minute glandulifera; aristae pappi adelphocarporum ca. 10 plerumque 5-6 mm longae rubrae ad basem vix alatae, aristae pappi idiocarporum 1, squamae pappi idiocarporum ca. 9 ca. 0.3-1.0 mm longae. Grana pollinis in diametro ca. 25 μm (Type I).

TYPE: BRASIL: Bahia: Municipio de Rio de Contas, a 10 km ao NW de Rio de Contas. Elev. ca. 1000 m. Common herbs one meter tall, flowers lavender. July 21, 1979. R.M.King, Scott A.Mori, T.S. dos Santos & J.L.Hage 8075 (Holotype, CEPEC; isotype, US).

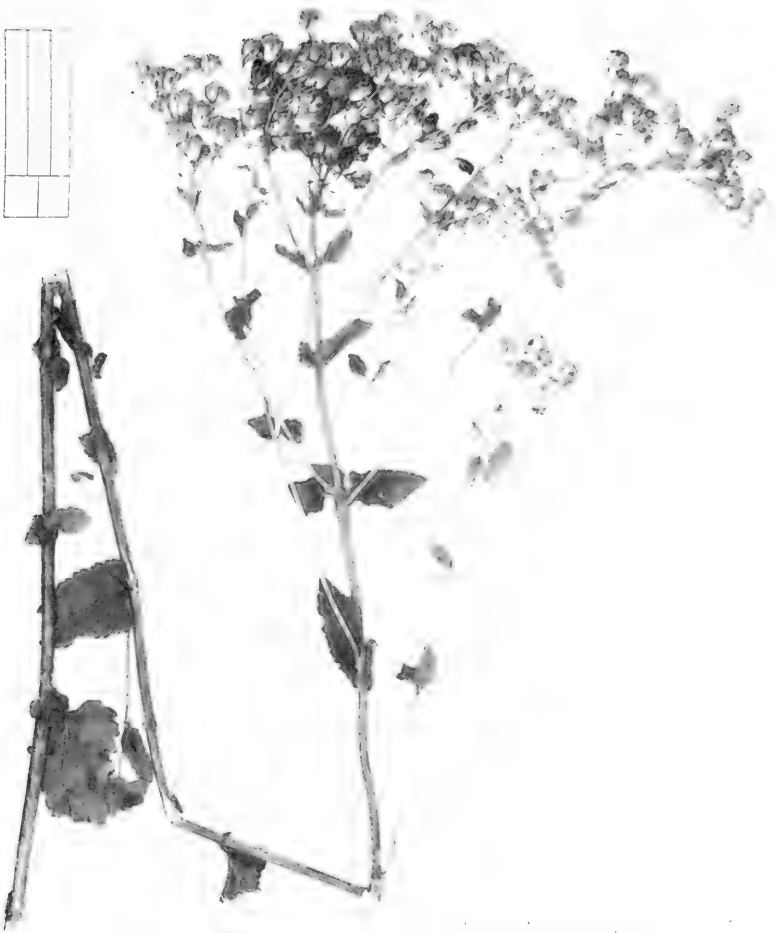
Recent efforts to identify specimens have indicated that many undescribed species of *Stevia* occur in Brasil. The present new species is particularly distinct, having a habit like that of *S. heptachaeta* DC. of the Goias region, but lacking the uniformly 7-8-aristate achenes of that species.

MORITHAMNUS GANOPHYLLUS (Mattfeld) R. M. King & H. Robinson, comb. nov. *Eupatorium ganophyllum* Mattfeld ex Pilger, Notizblatt botanischen Gart. Mus. Berlin 9: 379. 1925.

At the time of establishment, the genus *Morithamnus* (King, Robinson and Barroso, 1979) was monotypic, containing only *M. crassus* K.R. & B., which has spirally inserted leaves. The present species was then known only from description and type photographs which clearly indicated its opposite-leaved nature. Since then, type material of the Mattfeld species has been received on loan through the kindness of the Botanische Staatssammlung in München. Details of the species, especially the paired resin ducts in the leaves and in the throats of the corollas, the oblanceolate, fleshy, viscid leaves, the smooth inner surfaces of the corolla lobes, the more regular toothing of the pappus bristles, and the setae on the upper part of the achene ribs, all emphasize the relationship to *Morithamnus crassus*. The two species differ in pappus size, but such variation seems common in Gyptoid genera, and structural details are the same. The leaf insertion remains the most significant difference, but in view of other indications of close relationship, we do not wish to elevate this to an a priori generic character. The common characters of the two species of *Morithamnus* help to reinforce the isolation of that genus from the closely related *Bahianthus*.

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- King, R. M., H. Robinson and G. M. Barroso 1979. Studies in the Eupatorieae (Asteraceae). CLXXVII. A new genus, *Morithamnus*. *Phytologia* 44 (7): 451-454.



Campuloclinium eiteniorum R.M.King & H.Robinson, Holotype, Herbário Universidade de Brasilia. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



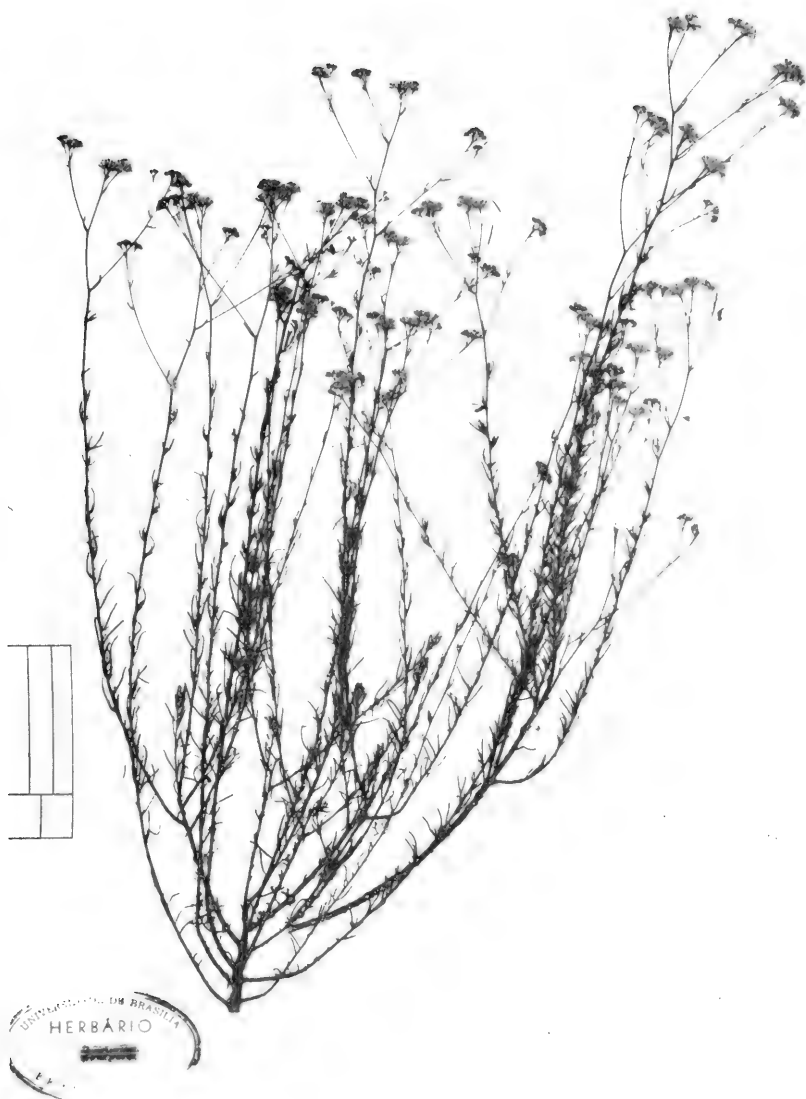
HERBÁRIO CENTRO DE PESQUISAS DO CACAU
s.n. - Bahia

C. SANTOS

2847136

NATIONAL

Dasycondylus santosii R.M.King & H.Robinson, Isotype, United States National Herbarium.



Disynaphia minutiflora R.M.King & H.Robinson, Holotype,
Herbário Universidade de Brasília.



Koanophyllon andersonii R.M.King & H.Robinson, Holotype,
Herbário Universidade de Brasília.



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Lasiolaena pereirae R.M.King & H.Robinson, Holotype,
 Jardim Botânico, Rio de Janeiro.



ASTERACEAE of BAHIA BRAZIL

285 020

Stevia morii R.M.King & H.Robinson, Isotype, United States National Herbarium.



Enlargements of heads. Top left: *Campuloclinium eiteniorum*. Top right: *Dasycondylus santosii*. Middle left: *Disynaphia minutiflora*. Middle right: *Koanophyllon andersonii*. Bottom left: *Lasiolaena pereirae*. Bottom right: *Stevia morii*.

ADDITIONAL NOTES ON THE GENUS *AVICENNIA*. XV

Harold N. Moldenke

AVICENNIA L.

Additional bibliography: Erickson, George, Marchant, & Morcombe, Flow. Pl. West. Austr., ed. 2, 13, 213, 215, & 222. 1979; Mold., Phytologia 46: 226--228. 1980.

AVICENNIA GERMINANS (L.) L.

Additional bibliography: V. J. Chapm., Mangr. Veg. 3, 20, 24, 125, 134, 139, 144, 271, 390, & 393, fig. 11. 1976; Mold., Phytologia 46: 226--228. 1980.

Additional illustrations: Carlton in Pritchard, Rare Endang. Biota Fla. 5: 167, fig. 89. 1978; Fournet, Fl. Illust. Phan. Guad. Mart. 1409, fig. 671. 1978; Schnetter, Beitr. Biol. Pfl. 54: 19, 20, 22, & 23, fig. 1--13. 1978.

Crutchfield refers to this plant as a 2--3 foot shrub growing in clay soil submerged during high tide, the corollas "white". The corollas are said to have been "creamy-white" on *Luteyn* & *Lebrón-Luteyn* 5144.

Lugo & Zucca (1978) have investigated the impact of a frost of -2.8 to -5.5° C. on a forest of *Avicennia germinans* in Florida. They report that "Leaf area index decreased from 2.5 to 1.5 in 63 days and was back to normal after 103 days. The energy drain of this event was conservatively calculated as 3570 kcal/m², and it was estimated that it would take the forest over 200 days to recover the energy loss. Since leaf biomass returned to normal in half the estimated time, it must be assumed that the forest partially recovered with energy from its reserves. Soil salinities averaged 31.4 percent. The mangrove [here at 29°08' latitude].... survive lower temperatures and develop as much structure as mangroves that grow at lower latitudes. In addition to acclimation to frost, this development may be due to the subsity of a mesic (1201 mm annual rainfall), low salinity environment. The lower energy drains of the environment probably account for higher energy stores and a greater tolerance to occasional low temperature stress. Mangrove growing under higher soil salinity stress in lower latitudes appear to be less tolerant to low temperature stress. Those that are exposed to moisture stress show comparable structural complexity at lower latitudes to mangroves growing at higher latitudes but under the influence of only 1 stress (low temperature). Review of the literature and measurements.....suggest that mangroves respond to stress by decreasing structural complexity (lower species richness, lower tree height, lower leaf area index, high tree density) and by decreasing the size of leaves. The decrease in species richness was linear and the decreases in tree height was exponential in the mangroves of the Gulf Coast of Mexico where low temperature, high temperature amplitude and low rainfall stressed mangroves along an increasing latitudinal gradient."

Schnetter (1978) studied material of this species from 5 sites in Magdalena, Colombia, differing in water and salt content of the soil and density and composition of the vegetation. The epidermal features were especially affected by the different environments. High salt concentration alone or together with relatively low water content of soil correspond to a thick external wall and cuticle and a cutinization of all walls in the upper epidermis; hairs were common. Under the same conditions the lower epidermis was always covered with trichomes and the number of cells per gland was higher than in the upper epidermis. When the salt content of the soil was low, no difference in size of glands could be noted. Moreover the thickness of the external wall and cuticle and the number of hairs on the upper epidermis decreased. Extremely shaded plants grown in sites with low salt content of soil possessed large, nearly hairless leaves with very thin external walls and low palisade tissue. In comparison, solitary trees showed small, narrow leaves.

Gunn & Dennis (1976) assert that "Black mangrove disseminules are amazingly hardy, as Guppy (1917) discovered when he dried some mature fruits for 25 days at room temperature. The fruits lost 50 percent of their weight during the drying process, yet they germinated when placed in fresh water. In our buoyance tests the fruits and seedlings often became soft and rotted, indicating that not all of them are as seaworthy as disseminules protected by a bony fruit or seed wall."

If it is true that the west African black mangrove was introduced (by man) from the New World, then *A. africana* P. Beauv. must represent the African population of the larger-leaved New World *A. germinans* var. *guayaquilensis* (H.B.K.) Mold. or perhaps the latter taxon should be divided into two separate taxa, only the larger-leaved form representing in the New World the west African plant and which very well include the similar-leaved *A. tonduzii* Mold.

Woodbury & Little (1976) record *A. germinans* from Buck Island in the Virgin Islands.

The Dorantes collection, cited below, consists only of seedlings. Russell (1963) and Mound & Halsey (1978) assert that the whitefly, *Trialeurodes vaporariorum* (Westwood) Quaint. & Bak. sometimes infests *Avicennia germinans*. Chapman (1976) lists the following marine fungi as attacking this species: *Buellia haliotrepha* J. & E. Kohlm., *Culcitalna achyasporea* Meyers & Moore, *Didymosphaeria enalia* Kohlm., *Hydronectria tethys* J. & E. Kohlm., *Lulworthia* sp., *Metasphaeria pneumatophorae* Kohlm., *Paraliomyces lentiferus* Kohlm., *Phoma* sp., and *Torpedospora radiata* Meyers. He also notes that the wood is sometimes used to make charcoal. Perkins & Payne (1978) report that the species is "reported to be toxic".

Little (1978), calling this species "black-mangrove", gives its natural distribution in Florida (USA) and beyond as "Silt shores of coasts and islands of n. to s. Fla. incl. Fla. Keys, n. locally to St. Johns Co. on e. coast and to t. Miss., s. La., and s. Tex. Also widely distributed on coasts of tropical America from Bermuda and Bahamas through West Indies incl. P. R. and V. I. From n. Mex.

(Temps., Son. and B. C. Norte) s. on Atlantic coast to Brazil and on Pacific coast to Ecuador incl. Galapagos Is. and n.w. Peru. The same or a very closely related sp. on coasts of w. Africa."

Knuth (1927) cites *Pittier s.n.* from Zulia and *Johnston 139* from Margarita Island, Venezuela. He records the vernacular name there of "mangle prieto".

The *Breteler 5174*, *Idrobo & Weber 1424*, and *Philcox & Raynal 7850*, distributed as typical *A. germinans*, represent, instead, the large-leaved (perhaps *A. tonduzii*) form of var. *guayaquilensis* (H.B.K.) Mold.

Additional citations: TEXAS: Cameron Co.: *Crutchfield 2985* (N); *Richardson 2487* (Au). Galveston Island: *Waller & Bauml 2930* (Au). MEXICO: Veracruz: *Dorantes & al. 5132* (N); *Novelo 356* (N), *408* (N). GUATEMALA: San José: *Kellerman s.n.* (Me--125422). BELIZE: *Wiley 178* (W--2846919). EL SALVADOR: La Libertad: *González & Pérez 193* (Me--186769, Me--186843). NICARAGUA: Rivas: *F. C. Seymour 1269* (N). BAHAMA ISLANDS: Tonay: *B. Dunn s.n.* [17 July 1977] (W--2942087). PUERTO RICO: *Luteyn & Lebrón-Luteyn 5144* (N). VENEZUELA: Zulia: *Mocquerys 829* (N).

AVICENNIA GERMINANS var. *CUMANENSIS* (H.B.K.) Mold.

Additional synonymy: *Avicennia tomentosa* var. *cumanensis* Humb. & Bonpl. apud Steud., *Nom. Bot. Phan.*, ed. 1, 96. 1821.

Additional bibliography: Steud., *Nom. Bot. Phan.*, ed. 1, 96. 1821; Mold., *Phytologia* 40: 410. 1978.

AVICENNIA GERMINANS var. *GUAYAQUILENSIS* (H.B.K.) Mold.

Additional synonymy: *Avicennia tomentosa* var. *guayaquilensis* Humb. & Bonpl. apud Steud., *Nom. Bot. Phan.*, ed. 1, 96. 1821.

Additional bibliography: Steud., *Nom. Bot. Phan.*, ed. 1, 96. 1821; Mold., *Phytologia* 40: 409 & 410. 1978.

Recent collectors describe this plant as a frequent tree, 1.5--15 m. tall, the leaves gray-green beneath and the flowers slightly fragrant, and have found it growing on riverbanks, flowering in September. The corollas are said to have been "white" on *Araujo & al. 2207 & 3194* and *Idrobo & Weber 1424*, "yellowish" on *Lescure 223*, and "cream, the throat yellow, the anthers dull-purple" on *Philcox & Raynal 7850*. *Idrobo & Weber 1424* is accompanied by 3 excellent in situ photographs, one showing a very dense growth of sponges on each of the many pneumatophores depicted in the photograph.

Additional citations: TRINIDAD AND TOBAGO: Tobago: *Philcox & Raynal 7850* (N). COLOMBIA: Atlántico: *Plowman 3540* (W--2838856). Nariño: *Idrobo & Weber 1424* (W--2844577). VENEZUELA: Sucre: *Breteler 5174* (N). FRENCH GUIANA: *Lescure 223* (N, N). BRAZIL: Rio de Janeiro: *Araujo, Oliveira. & Vianna 2207* [Herb. FEEMA 14629] (Z). Criminosa Island: *Araujo & Maciel 3194* (Ld).

AVICENNIA LANATA Ridl.

Additional bibliography: Worsdell. *Ind. Lond. Suppl.* 1: 111. 1941; Walsh in Reimold & Queen, *Ecol. Haloph.* 59. 1974; V. J.

Chapm., Mangr. Veg. fig. 61, 62, 105a, & 106a. 1976; Mold., Phytologia 40: 410. 1978.

AVICENNIA MARINA (Forsk.) Vierh.

Additional & emended bibliography: Roxb., Hort. Beng. 46. 1814; Kurz, Forest Fl. Brit. Burma 2: 275 & 276. 1877; Wight, Illust. Ind. Bot. 2: pl. 173 bis. 1850; Peters, Naturwiss. Reise Mossamb. 6 (1): Bot. 266. 1861; Blanco, Fl. Filip., ed. 3, 2: 289, pl. 73. 1878; Balf. f., Trans. Roy. Soc. Edinb. 31 [Bot. Socotra] 237 & 414. 1888; Baill., Hist. Pl. 11: 88. 1891; Koord. & Valet., Meded. Lands Plant. Bat. 42 [Bijd. Booms. Java 7]: 216. 1900; Gamble in King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 869. 1908; Chiov., Fl. Somala [1]: 65 & 274--275. 1929; E. D. Merr., Univ. Calif. Publ. Bot. 15: 268. 1929; Stapf, Ind. Lond. 1: 370. 1929; Dop in Lecomte, Fl. Gén. Indo-chine 4: 892 & 897, fig. 92 (5--8) & 93 (1). 1935; Kirtikar & Basu, Indian Med. Pl., ed. 2, imp. 1, 1952 & 1954--1955. 1935; Bedevian, Illust. Polyglott. Dict. 99. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 407, 443, & 444. 1938; Worsdell, Ind. Lond. Suppl. 1: 111. 1941; H. N. & A. L. Mold., Pl. Life]: 49, 69, & 80. 1948; Perez-Arbelaez, Pl. Util. Colomb., ed. 2, 740. 1956; McMillan in Reimold & Queen, Ecol. Haloph. 389. 1974; Napp-Zinn, Anat. Blatt. A (1): 395, fig. 134. 1974; Walsh in Reimold & Queen, Ecol. Haloph. 59, 83--86, 96, 99, 103, 104, 106, 117, 139, & 156. 1974; Kirtikar & Basu, Indian Med. Pl., ed. 2, imp. 2, 3: 1952 & 1954--1955. 1975; Albright, N. Zeal. Journ. Freshw. Res. 10: 385--389. 1976; V. J. Chapm., Mangr. Veg. 19, 20, 24--27, 48, 76, 87--92, 94, 96, 97, 100, 101, 103--105, 107--109, 111--114, 118, 123, 125, 127--130, 132, 134, 136, 139, 144, 147--149, 151, 153--156, 158--163, 168, 169, 172, 174, 199, 234--236, 253, 257, 261--266, 268, 269, 271, 281, 300, 305, 306, 316, 338, 345, 369, 373, 375, 376, 378, 390, 393, 394, & 407, fig. 11, 53, 61--63, 65, 68, 71, 74, 83, 84, 91, 94--99, 105a, 106a, & 122. 1976; Albright, Biol. Abstr. 63: 1938. 1977; Bird & Barsom, Mar. Res. Indones. 18: 73--80. 1977; Hutchings & Recher, Mar. Res. Indones. 18: 1--11. 1977; Lewis & Elvin-Lewis, Med. Bot. 324. 1977; Mathias, Mar. Res. Indones. 18: 17. 1977; Bird & Barsom, Biores. Ind. 15: 848. 1978; Edlin & Nimmo, Illustr. Encycl. Trees 226, 227, & 250. 1978; Hsiao, Fl. Taiwan 4: 411 & 412, pl. 1055. 1978; Hutchings & Recher, Biores. Ind. 18: 1--11. 1978; Mathias, Biores. Ind. 15: 17. 1978; Mold., Phytologia 40: 407, 408, & 410--411. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 51. 1978; Rabinowitz, Biotropica 10: 54, 56, & 57. 1978; Erickson, George, Marchant, & Morcombe, Flow. Pl. West. Austr., ed. 2, 13, 213, 215, & 222. 1979; J. & E. Kohlmeyer, Marine Mycol. 93, 95, 243, 244, 301, 317, 370, & 529. 1979; Pemadasa, Balasub., Wijewansa, & Amarsinghe, Journ. Ecol. [Brit.] 67: 45. 1979; Steinke, Biol. Abstr. 68: 7294. 1979; Steinke, Journ. A. Afr. Bot. 45: 133--138. 1979; Mold., Phytologia 46: 197 & 199. 1980; R. Moran, Environ. Southw. 488: [10]--12. 1980.

Additional illustrations: Dop in Lecomte, Fl. Gén. Indo-chine 4: 892, fig. 92 (5--8). 1935; Napp-Zinn, Anat. Blatt. A (1): 395,

fig. 134. 1974; Edlin & Nimmo, *Illustr. Encycl. Trees* 226 (in color). 1978; Hsiao, *Fl. Taiwan* 4: 412, pl. 1055. 1978.

Lewis & Elvin-Lewis (1977) report that the aromatic bitter juice of this species is used as an abortive in tropical Asia and Africa.

Recent collectors describe this species as a small tree, 5--10 m. tall, with vertical pneumatophores, the outer bark smooth and white, the immature fruit green, the mature fruit light-green, and have encountered it among mangroves in secondary forests along the seashore, at sealevel, flowering in August and September, and fruiting in January. They report the vernacular name, "api-api". The corollas are said to have been "yellow" on *Nicholson 19126* and *Stoddart 932*, but "4-lobed, orange" on *Cramer 4326*. Cramer report the plant "occasional" on tidal flats

Material of this species has been widely misidentified and distributed in herbaria as *A. alba* Blume and as *A. officinalis* L.

The Napp-Zinn (1974) reference in the bibliography of this species (above) is incorrectly listed in the book's index as occurring on page "394".

Steinke (1979) used the potometric method to investigate the apparent transpirational rhythms in this species and found an increase in transpiration rate to a maximum at 1000 h followed by a steady decrease, but inundation by a spring tide did not reverse the decrease in rate during the late afternoon. Mangroves growing in a dry area inundated only during spring tides and in a wet area in which moisture was freely available to the trees showed no difference in apparent transpirational rhythm.

The *Shimizo & al. T.7658*, collected in sunny places on a wet moor in Thailand, is obviously the *A. intermedia* type of the species which, it would appear to me now, probably deserves at least form recognition. *Frazier 43* is said to have had no pneumatophores. Ridgeway reports the local vernacular name, "manglier blanc", on Astove island. Hsiao (1978) cites *Mori s.n.* and *Morimoto s.n.* from Taiwan and notes that the species occurs on that island's west coast only.

For *A. sphaerocarpa* Stapf Fletcher (1938) cites only *Collins 1028*, *Kerr 2095*, *8162*, *11017*, *15702*, & *18861* and *Marcan 855* from Thailand. He notes that the type of the "species" is from Penang and claims that the plant occurs also in the Philippines and China. He asserts that its fruit is not beaked, the flowers are in small heads, and the leaves are ovate to elliptic -- all characters which would seem to apply also to *A. marina*.

It should be noted here that the sterile *Fosberg & Frazier 49758* collection from Astove island bears extremely close resemblance to some collections of *A. alba* -- without fruit its exact identity cannot be established.

Additional citations: TANZANIA: Tanga: *Balslev 327* (Ac), *328* (Ac). COMORO ISLANDS: Aldabra: *F. R. Fosberg 48678* (W--2836693). Euphrates: *F. R. Fosberg 48779* (W--2836686); *Renvoize 762* (W--2835418). Main: *Stoddart 760* (W--2835391). Moustiques: *F. R. Fosberg 48674* (W--2836685), *48675* (W--2836684). South: *F. R. Fos-*

berg 49034 (W--2836687). West: Rhyne 880 (W--2834352); Stoddart 932 (W--2835378). Wizard: Fosberg & Grubb 49825 (W--2836692). SEYCHELLES ISLANDS: Astove: Fosberg & Frazier 49758 (W--2836691); Frazier 43 (W--2834335); T. Ridgway 67 (W--2834353). ARABIA: Oman: Pettitt 25060 (W--2859151). SRI LANKA: Cramer 4326 (W--2808322); Davidse 7561 (W--2778545); Fosberg & Jayasuriya 52773 (N). THAILAND: Shimizu, Fukuoka, & Nalampoon T₄7658 (Ac). GREATER SUNDA ISLANDS: Sabah: Meijer SAN.27653 (Sn--40602); D. I. Nicholson 19126 (Sn--40601).

AVICENNIA MARINA var. *ACUTISSIMA* Stapf & Mold.

Additional bibliography: Jafri, Fl. Karachi 290 & 351. 1966; V. J. Chapm., Mangr. Veg. 105, 390, & 394. 1976; Mold., Phytologia 40: 411. 1978.

AVICENNIA MARINA var. *ANOMALA* Mold.

Additional bibliography: V. J. Chapm., Mangr. Veg. 394. 1976; Mold., Phytologia 34: 169. 1976.

AVICENNIA MARINA var. *RESINIFERA* (Forst. f.) Bakh.

Additional bibliography: Jack, Descr. Malay. Pl., imp. 1, 58. 1822; Jack, Malay. Misc., imp. 1, 2: 58--59. 1822; D. Dietr., Syn. Pl. 3: 619. 1843; Jack, Calc. Journ. Nat. Hist. 4: 194--195. 1843; Gamble in King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 868 & 869. 1908; H. Hallier, Meded. Rijks Herb. Leid. 37: 88 & 91. 1918; Stapf, Ind. Lond. 1: 370. 1929; Rotherham, Briggs, Vlixell, & Carolin, Flow. Pl. N. S. Wales 18 & 185, pl. 2 & 3. 1975; Albright, N. Zeal. Journ. Freshw. Res. 10: 385--389. 1976; V. J. Chapm., Mangr. Veg. 3, 9, 11, 14, 17, 25, 27, 48, 146, 148, 149, 151, 154--156, 159--161, 163--165, 169, 180, 192, 193, 195, 201, 208, 212, 217, 222, 227, 230--232, 234--236, 269, 305, 306, 308, 316, 345, 390, 394, & 422, fig. 91, 94--102, 113, 120, 124, 136, 137, 139--142, & 208. 1976; Albright, Biol. Abstr. 63: 1938. 1977; Jack, Descr. Malay. Pl., imp. 2, 58. 1977; Jack, Malay. Misc., imp. 2, 2: 58--59. 1977; A. E. Wight, TANE 23: 17. 1977; Mold., Phytologia 40: 411. 1978; J. & E. Kohlmeyer, Marine Mycol. 93, 95, 243, 244, 301, 317, 370, 412, & 529. 1979; Zamski, Biol. Abstr. 68: 4387. 1979; Zamski, Bot. Gaz. 140: 67--76. 1979; R. Moran, Environ. Southw. 488: [10]--12. 1980.

Additional illustrations: Rotherham, Briggs, Blaxell, & Carolin, Flow. Pl. N. S. Wales 18, pl. 2 (in color) & 3 (in color). 1975; V. J. Chapm., Mangr. Veg. fig. 101 (a & b), 102, & 208. 1976; R. Moran, Environ. Southw. 488: [10] & 12. 1980.

Wight (1977) lists this plant from Whale Island, an island in the Moturva Islands off North Island, New Zealand. Chapman (1976) records it from Low and Magnetic Islands, Queensland. He lists the following marine fungi that are known to attack it: *Gnomonia longirostris* G. & G., *G. marina* G. & G., *Halosphaeria quadricornuta* G. & G., *Metasphaeria australiensis* G. & G., *Ophiobolus australiensis* Johns. & Sparr., *Phialophorophoma litoralis* Linder, and *Phytophthora* spp. He also notes that the gall-wasp, *Eriophyes avicenniae*,

may distort its leaves.

Regarding the most interesting Moran collection, cited below, from "in salt marsh with *Suaeda*, *Salicornia*, *Batis*, and *Spartina* at Kendall Ecological Reserve, northeast side of Mission Bay, San Diego, [California], about sealevel, near 38°48' N., 117°13 1/4' W, 9 September 1979, shrubs 2.3 m. tall.....perhaps 100 or more flowering size plus many seedlings", Dr. Moran, in a letter to me dated September 20, 1979, says, in part: "Apparently a single specimen was planted about 1966-69 by a biologist at Scripps Institution of Oceanography; it is now spreading rather aggressively. Also, there is a single small plant of *Aegiceras corniculatum*, which was flowering this month; but there seem to be no seedlings. The Kendall/Frost marsh, the only marsh remaining in Mission Bay, is a wildlife reserve. An endangered Clapper Rail (*Rallus longirostris levipes*) nests in the native marsh vegetation; and the *Avicennia* is considered an undesirable weed, which should be eliminated. I'd like to see some maintained as a botanical exhibit if they could be kept in bounds; but I guess that isn't practical: it's either all or nothing." He suggest that this may be the only record of the variety growing in the Northern Hemisphere, as it certainly is the first record of it from the New World.

Additional citations: CALIFORNIA: San Diego Co.: R. Moran 28024 (Ld).

AVICENNIA MARINA var. *RUMPHIANA* (H. Hallier) Bakh.

Additional bibliography: Dop in Lecomte, Fl. G n. Indo-chine 4: 895. 1935; V. J. Chapm., Mangr. Veg. 3, 134, 281, 282, & 390, fig. 176d. 1976; Mold., Phytologia 40: 411 (1978) and 46: 197. 1980.

Additional illustrations: V. J. Chapm., Mangr. Veg. 282, fig. 176d. 1976.

Recent collectors report this plant from sandy shores and list the vernacular name, "api api".

Herbarium material has been widely misidentified and distributed in herbaria as *A. officinalis* L., from which its smaller flowers at once serve to distinguish it.

Additional citations: GREATER SUNDA ISLANDS: Sabah: Meijer SAN. 19910 (Sn--40603).

AVICENNIA OFFICINALIS L.

Additional synonymy: *Avicennia officinalis* L. ex Sonohara, Tawada, & Amano, Fl. Okin. 131, sphalm. 1952. *Avecinia alba* Lantoh, in herb.

Additional & emended bibliography: L. in Stickm., Herb. Amb. 13. 1754; Roxb., Hort. Beng. 46. 1814; Jack, Descr. Malay. Pl., imp. 1, 2: 59. 1822; Jack, Malay. Misc., imp. 1, 2: 59. 1822; D. Dietr., Syn. Pl. 3: 619. 1843; Jack, Calc. Journ. Nat. Hist. 4: 195. 1843; P ters, Naturwiss. Reise Mossamb. 6 (1): Bot. 266. 1861; Kurz, Rep. Veg. Andam. App. A: 45. 1870; F. Muell., Descr. Notes Pap. Pl., imp. 1, 1: 91 & 110. 1875; Blanco, Fl. Filip., ed. 3, 2: 289, pl. 73. 1878; Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 62. 1880; Vidal, Sin. Fam. Gen. Pl. Le n. Filip. [Introd. Fl. For. Filip.] 1: 201, 206, & 336 (1883) and 2 [Atlas]: 36, pl. 75, fig. G. 1883;

Koord. & Valet., Meded. Lands Plant. Bat. 42 [Bijdr. Booms Java 7]: 216--221. 1900; F. N. Williams, Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Gamble in King & Gamble, Journ. Asiat. Soc. Beng. [2 extra]: 867--869. 1908; Sim, For. Fl. Cape Col. pl. 120. 1920; Bot. Congr. Brux. 2: pl. 12--14. 1910; Tobler, Engl. Bot. Jahrb. 50: Suppl. 398--404. 1914; Wangerin, Justs Bot. Jahresber. 40 (2): 862. 1914; B. L. Robins., Proc. Am. Acad. 5: 531. 1916; E. D. Merr., Sp. Blanc. 335--336. 1918; H. J. Lam, Verbenac. Malay. Arch. 340--344 & 349, pl. 3. 1919; Wangerin, Justs Bot. Jahresber. 42: 363 & 364. 1920; Haines, Bot. Bihar Oris., ed. 1, 4: 725. 1922; Fedde, Justs Bot. Jahresber. 42: 822. 1923; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 608. 1927; Stapf, Ind. Lond. 1: 370 (1929) and 6: 536. 1931; Dop in Lecomte, Fl. Gén. Indo-chine 4: 895--896. 1935; Kirtikar & Basu, Indian Med. Pl., ed. 2, imp. 1, 3: 1952--1953, pl. 748. 1935; Bedevian, Illust. Polyglot. Dict. 99. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 443, & 444. 1938; Worsdell, Ind. Lond. Suppl. 1: 111. 1941; Metcalfe & Chalk, Anat. Dicot. 2: 1031--1033, 1035, 1036, 1038, & 1041, fig. 248 A & I. 1950; Haines, Bot. Bihar Oris., ed. 2, 2: 760. 1961; Jafri, Fl. Karachi 290 & 351. 1966; Napp-Zinn, Anat. Blatt. A (1): 632. 1974; Walsh in Reimold & Queen, Ecol. Haloph. 59, 84, 86, 87, 89, 98, 102, 104, 106, 114, 123, 133, 139, 145, 149, 154, & 165. 1974; Kirtikar & Basu, Indian Med. Pl., ed. 2, imp. 2, 3: 1952--1953, pl. 748. 1975; V. J. Chapm., Mangr. Veg. 3, 14, 20, 24, 26, 27, 100, 105--109, 112, 114, 118, 125, 127, 134, [138], 139, 141, 144, 174, 177, 181, 182, 186--188, 192, 193, 217, 233, 250, 258, 259, 268, 279, 288, 289, 291, 296, 300, 304, 308, 310, 312, 313, 345, 346, 357, [361], 373, 393, 394, 413, 415, 417, 422, & 423, fig. 11, 74, 79, 84, 114, 117, 186a, 194, 213 (3), 260 (4), & 279. 1976; Jack, Descr. Malay. Pl., imp. 2, 2: 59. 1977; Jack, Malay. Misc., imp. 2, 2: 59. 1977; Lewis & Elvin-Lewis, Med. Bot. 352. 1977; Hsiao, Fl. Taiwan 4: 411. 1978; Mold., Phytologia 40: 407, 409, & 411--412. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 51 & 54. 1978; F. Muell., Descr. Notes Pap. Pl., imp. 2, 1: 91 & 110. 1979; Mold., Phytologia 46: 199. 1980.

Additional & emended illustrations: Kirtikar & Basu, Indian Med. Pl., ed. 2, imp. 1, pl. 748. 1935; Metcalfe & Chalk, Anat. Dicot. 2: 1036, fig. 248 A & I. 1950; Kirtikar & Basu, Indian Med. Pl., ed. 2, imp. 2, pl. 748. 1975; V. J. Chapm., Mangr. Veg. fig. 186a, 194, 213 (3), 260 (4), & 279. 1976.

Recent collectors describe this species as a tree, 20--25 feet tall, the trunk girth 4 feet, the outer bark "black and white", inner bark yellowish, sapwood white and yellow, and the fruit "brownish". They have encountered the species at altitude of sea-level to 10 feet. Bedevian (1936) lists the following vernacular names for the species, but undoubtedly most, if not all, of these apply, instead, to *A. marina*: "avicennia", "kurâm", "palêtuvier", "gurram", "Salzbaum", "shūrâ", "white mangrove", and an Arabic not-transliterated name.

Lewis & Elvin-Lewis (1977) report that a poultice made from the green fruits of this species is applied medicinally to boils in India.

Knuth (1927) cites *Humboldt & Bonpland s.n.* from Bermudez and Pittier 11011 from Miranda, Venezuela, and records the vernacular names, "mangle negro" and "mangle prieto", but, of course, these are palpable misidentifications, since *A. officinalis* does not occur in the New World.

Schumann & Lauterbach (1900) cite *Hellwig 212* from New Guinea and erroneously give the distribution of the species as "von Ostafrika bis Polynisien verbreitet". The species does not occur in Africa. Merrill (1918) cites *Merrill Sp. Blanc. 583* from Luzon, Philippines, as representative of the taxon. Fletcher (1938) notes that the type of the species came from India, lists the species also from Sri Lanka, Burma, Cochinchina, the Malay Peninsula, and Java, "eastwards to the Pacific", and cites from Thailand only *Bourke s.n.* and *Kerr 17474 & 18593*.

The illustrations given by Hayata (1912) as depicting *A. officinalis* do not depict that taxon at all, but represent *A. marina* instead and are cited by me under that taxon in this series of notes.

The *Cramer 4326*, *Meijer SAN.19910 & 27653*, and *Nicholson 19126*, distributed as *A. officinalis*, actually are *A. marina* (Forsk.) Vierh.

Additional citations: GREATER SUNDA ISLANDS: Timbun-mata: *Lantoh SAN.62376* (Sn--40604)

AVICENNIA SCHAUERIANA Stapf & Leechman

Additional synonymy: *Avicennia schauerana* Stapf ex Walsh in Reimold & Queen, *Ecol. Haloph.* 59. 1974. *Acicenia schaueriana* Stapf & Leechman ex Reitz, Klein, & Reis, *Proj. Madeira S. Catar.* 42. 1978.

Additional bibliography: Walsh in Reimold & Queen, *Ecol. Haloph.* 59. 1974; V. J. Chapm., *Mangr. Veg.* 3, 21, 24, 30, 65--67, 275, 276, & 281, fig. 11, 169a, & 175. 1976; Mold., *Biol. Abstr.* 63: 2452 & 3036. 1977; Fournet, *Fl. Illust. Phan. Guad. Mart.* 1408--1410. 1978; Hocking, *Excerpt. Bot. A.31:* 16. 1978; Mold., *Phytologia* 40: 409 & 412. 1978; Reitz, Klein, & Reis, *Proj. Madeira S. Catar.* 42. 1978; Rizzini, *Trat. Fitogeog. Bras.* 2: 242 & 258. 1979.

Additional illustrations: V. J. Chapm., *Mangr. Veg.* fig. 169a & 175. 1976.

Recent collectors describe this plant as a tree, 6--10 m. tall, frequent in praia arenosa, sandy soil, and "crescendo numa faixa estreita de mangue", and have found it in flower in May, June, August, and October. The corollas are described as "white" on *Araujo & Maciel 3093, 3135, & 3250*. On *Herb. FEEMA 15111* some of the leaves are canescent beneath or partly so, but most of them seem to be glabrous.

Reitz and his associates (1978) record "siriúba" as a vernacular name for this species in Brazil.

Additional citations: BRAZIL: Maranhão: *Maciel s.n.* [Herb. FEEMA 15111] (Ld). Rio de Janeiro: *Araujo 2261* [Herb. FEEMA 14735] (Fe); *Araujo & Maciel 3135* [Herb. FEEMA 15024] (Ld), 3250 [Herb. FEEMA 15437] (Ld). Grande Island: *Araujo & Maciel 3093* [Herb. FEEMA

AVICENNIA SCHAUERTIANA f. *CANDICANS* Mold.

Additional bibliography: Mold., Biol. Abstr. 63: 3036. 1977; Mold., Phytologia 40: 409 & 412. 1978.

Recent collectors refer to this plant as a common tree, 2 m. tall, and have found it in flower in February and October and in fruit in February. The corollas are said to have been "white" on Araujo 2260.

Additional citations: BRAZIL: Espirito Santo: Araujo 2221 [Herb. FEEMA 14604] (N). Rio de Janeiro: Araujo 2260 [Herb. FEEMA 14736] (Fe); Moura s.n. [Herb. FEEMA 14601] (Fe), s.n. [Herb. FEEMA 15666] (Ld).

AVICENNIA TONDUZII Mold.

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 86. 1948; Walsh in Reimold & Queen, Ecol. Haloph. 59. 1974; V. J. Champ., Mangr. Veg. 3, 21, 24, & 394, fig. 11. 1976; Mold., Phytologia 40: 409 & 413. 1978; Hocking, Excerpt. Bot. A.33: 89. 1979.

ADDITIONAL NOTES ON THE GENUS *AEGIPHILA*. XXVII

Harold N. Moldenke

For a detailed explanation of all herbarium acronyms used in this and all others in my series of notes on genera in this and other families see my Fifth Summary (1971), volume 2, pages 795 to 801.

Aegiphila Jacq.

Additional synonymy: *Aegiphica* Cordeiro, in herb.

Additional & emended bibliography: Jacq., Stirp. Amer. 16. 1763; J. A. MURR. in L., Syst. Veg., ed. 14, 160. 1784; Pers., Syst. 165. 1797; Vent., Tabl. 2: 318. 1799; Duchesne, Dict. 1: 267. 1804; St.-Hil., Expos. 1: 246. 1805; Pers., Sp. Pl. 1: 339, 340, & 342. 1817; Spreng. in L., Syst. Veg., ed. 16, 1: 29, 419, 421, 422, 647, & 648. 1825; Bartl., Ord. 180. 1830; Kunth, Syn. 2: 42. 1832; Spach, Hist. Nat. Vég. 9: 226 & 227. 1840; Endl., Ench. 312. 1841; Lemr. in Orbigny, Dict. Univ. Hist. Nat. 1: 142. 1841; Reichenb., Nom. 108. 1841; Hassk., Flora 25: Beibl. 26. 1842; Brongn., En. Genr. 65. 1843; Lindl., Veg. Kingd. 664. 1847; A. L. Juss. in Orbigny, Dict. Univ. Hist. Nat. 13: 185. 1849; Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 218--220. 1863; Pfeiffer, Nom. Bot. 1 (1): 64 (1873), 1 (2): 1834 (1874), 2 (1): 6 (1874), and 2 (2): 1569, 1570, & 1593. 1874; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 143 & 164--166 (1894) and ed. 1, 4 (3a): [381]. 1897; J. C. Willis, Dict. Flow. Pl., ed. 2, 226. 1903; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 432. 1904; J. C. Willis, Dict. Flow. Pl., ed. 3, 224. 1908; Fedde & Schust., Justs Bot. Jahresber. 39 (2): 319. 1913; Fedde,

Justs Bot. Jahresber. 39 (2): 1294. 1916; Fedde & Schust., Justs Bot. Jahresber. 43: 158. 1922; Herzog in Engl. & Drude, Veget. Erde 15: 130. 1923; J. C. Willis, Dict. Flow. Pl., ed. 5, 19. 1925; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 606--607. 1927; Stapf, Ind. Lond. 1: 16, 79, 167, 478, 525, & 526. 1929; Worsdell, Ind. Lond. Suppl. 1: 20. 1941; H. N. & A. L. Mold., Pl. Life 2: 18, 20--24, 28, 32, 43, 44, 46, 49--52, 54, 56--58, 61--70, 73--75, 78, 79, 81--85, & 87. 1948; Metcalfe & Chalk, Anat. Dicot. 2: 1033, 1035, 1037, 1040, & 1041. 1950; Lawrence, Taxon. Vasc. Pl., imp. 1, 687 & 777. 1951; J. C. Willis, Dict. Flow. Pl., ed. 6, 19. 1951; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 280 & 309--310, fig. 132. 1957; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 432 (1958) and imp. 3, 432. 1963; Rouleau, Guide Ind. Kew. 7 & 352. 1970; Lawrence, Taxon. Vasc. Pl., imp. 2, 687 & 777. 1971; Mukhopadhyay, Pollen Morph. Verb. [thesis]. 1971; Valle, Introd. Dendrol. 275. 1972; Serbanescu-Jitariu & Mitroiu, Act. Bot. Hort. Bucurest. 1972-73: 107--109, pl. 1, fig. 2. 1973; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 12 (2): 5 (1973) and 13: 9 & 328. 1976; Anon., Roy. Bot. Gard. Kew Lib. Curr. Awaren. 9: 22 (1978), 10: 27 (1978), and 11: 20. 1978; Carauta, Araujo, Vianna, & Oliveira, Bradea 2: 305. 1978; Croat, Fl. Barro Colorado 7, 40, 43, 732, 733, 870, 872, & 875. 1978; Dodson & Gentry, Selbyana 4: xxiii, 576, 578, 579, 605, & 612, pl. 271A. 1978; Mold., Phytologia 40: 393--401, 504, 505, 507, & 510. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40, 41, 44, 45, 47, 50, 53, & 57. 1978; Reitz, Klein, & Reis, Proj. Madeira S. Catar. 42. 1978; R. F. Sm., Act. Bot. Venez. 13: 193, 204, & 262, fig. 147. 1978; Steyerl. & Huber, Fl. Avila 44, 861, & 864. 1978; Kummrow, Bol. Mus. Bot. Munic. 38: 14. 1979; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 10--15 & 34. 1979; Mold., Phytologia 42: 503 (1979), 43: 196 & 294 (1979), and 44: 215, 489, & 505. 1979; Øllgaard & Balslev, Rep. Bot. Inst. Univ. Aarhus 4: 16. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 151 & 285. 1979; Rogerson, Becker, & Prince, Bull. Torrey Bot. Club 106: 62. 1979; Mold., Phytologia 45: 40, 468, & 503. 1980; Mold. & Bromley in Harley & Mayo, Towards Checklist Fl. Bahia 188. 1980.

Croat (1978) states that most species of this genus are probably bird-dispersed and probably also dispersed to some extent by other animals.

AEGIPHILA ALBA Mold.

Additional bibliography: Dodson & Gentry, Selbyana 4: xxiii, 576, 578, 579, 605, & 612, pl. 271A. 1978; Mold., Phytologia 40: 317. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 10--11. 1979; Øllgaard & Balslev, Rep. Bot. Inst. Univ. Aarhus 4: 16. 1979.

Illustrations: Dodson & Gentry, Selbyana 4: 579, pl. 271A.

Recent collectors describe this species as a large tree, 10--12 m. tall, and have found it growing in wet forests and forest edges and in woods dominated by *Gonzalagunia*, at 50--1450 m. al-

titude, flowering in July, September, and October. The corollas are said to have been "white" on *Dodson & al. 8987*, *Gentry & Shupp 26370*, *Gentry & al. 12174*, and *Øllgaard & Balslev 7540*. It has been reported that the "flowers fall off rapidly", probably referring to the corollas and androecium. *Dodson & Gentry (1978)* cite *Dodson & al. 5172* and *A. H. Gentry 9521 & 12027* from Los Rios, Ecuador, and report the vernacular name. "lulu", from there.

Additional citations: ECUADOR: Carchi *Gentry & Shupp 26370* (Ld). Guayas: *Øllgaard & Balslev 7540* (Ac). Los Ríos: *Dodson, Gentry, & Shupp 8987* (N); *A. Gentry 12027* (Go). Pichincha: *Gentry, Ortiz-Crespo, & Narváez 12174* (Go).

AEGIPHILA AMAZONICA Mold.

Additional bibliography: Mold., *Phytologia* 40: 208. 1978.

Recent collectors describe this plant as a shrub, 2--4 m. tall, few-branched or nearly unbranched, the "inflorescence and calyx" light gray-green, and the mature fruit vermilion, and have found it growing in sandy soil of *caatinga* and in woods on *terra firme*, at 450 m. altitude, in anthesis in September and November and in fruit in October. The corollas are said to have been "white" on *Nascimento 701* and *Silva 4461* and "dirty-white" on *Maas & Westra 3984*.

Additional citations: GUYANA: *Maas & Westra 3984* (Ld). BRAZIL: *Amazõnas: Nascimento 701* (N); *N. T. Silva 4461* (N).

AEGIPHILA ANOMALA Pittier

Additional bibliography: Mold., *Phytologia* 40: 317. 1978; *López-Palacios, Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA ARCTA Mold.

Additional bibliography: Mold., *Phytologia* 40: 317. 1978; *López-Palacios, Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA BOGOTENSIS (Spreng.) Mold.

Additional bibliography: Mold., *Phytologia* 40: 317, 318, 330, & 332. 1978; *López-Palacios, Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA BOGOTENSIS var. *AEQUINOCTIALIS* Mold.

Additional bibliography: Mold., *Phytologia* 40: 318 & 330. 1978; *López-Palacios, Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Espinal encountered this plant at 2800--2900 meters altitude, flowering in February.

Additional citations: COLOMBIA: Cundinamarca: *García-Barriga & Jaramillo Mejía 20518* (W--2844197). Nariño: *Espinal T. 925* (Ld).

AEGIPHILA BOGOTENSIS f. *TERNATA* Mold.

Additional synonymy: *Aegiphila bracteolosa* f. *ternata* Mold. ex *López-Palacios, Revist. Fac. Farm. Univ. Andes* 20: 11, sphalm. 1979.

Additional bibliography: Mold., *Phytologia* 40: 318. 1978; *López-*

Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA BRACHIATA Vell.

Additional bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 61. 1948; Mold., *Phytologia* 40: 210--211 & 225. 1978; Kummrow, *Bol. Mus. Bot. Munic.* 38: 14. 1979.

Kummrow (1979) cites *Hatschbach 35152* from Paran , Brazil.

Additional citations: BRAZIL: Paran : *Hatschbach 37343* (W--2839410).

AEGIPHILA BRACTEOLOSA Mold.

Additional bibliography: Mold., *Phytologia* 40: 211, 228, & 394. 1978; L pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Recent collectors refer to this plant as a shrub, 1.5--2 m. tall, the calyx pale-green, and the fruit turning orange in color when mature, and have encountered it in secondary growth along roadsides and at the edge of forests on terra firme, at 200 m. altitude, flowering in March. The corollas are said to have been "white" on *Zarucchi 2433*.

The *A. bracteolosa* f. *ternata* Mold. listed by L pez-Palacios (1979) is a typographic error for *A. bogotensis* f. *ternata* Mold.

Additional citations: COLOMBIA: Vaup s: *Zarucchi 2433* (Ld). BRAZIL: Rond nia: *W. R. Anderson 12318* (N).

AEGIPHILA BUCHTIENII Mold.

Additional bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 52. 1948; Mold., *Phytologia* 40: 211. 1978.

AEGIPHILA CATATUMBENSIS Mold., *Phytologia* 43: 294. 1979.

Bibliography: Mold., *Phytologia* 43: 294. 1979.

Citations: VENEZUELA: Zulia: *DeBruijn 1431* (N--isotype, W--2837787--type).

AEGIPHILA CAUCENSIS Mold.

Additional bibliography: Mold., *Phytologia* 40: 212. 1978; L pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Schunke refers to this plant as a shrub, 4 m. tall, the corollas "10Y9/9 on the color chart", the leaves "toxic" but used to cure ulcers, and found it growing at 210 m. altitude in low forests, flowering in October. He records the vernacular name, "ocuero blanca". His collection was misidentified and distributed as the closely related and very similar *A. peruviana* Turcz.

Additional citations: PERU: Loreto: *Schunke Vigo 936* (W--2865202).

AEGIPHILA CEPHALOPHORA Standl.

Additional bibliography: Croat, *Fl. Barro Color.* 40 & 732. 1978; Mold., *Phytologia* 40: 212. 1978.

Croat (1978) asserts that this species flowers and fruits during the wet season on Barro Colorado Island and that it is common there, "normally growing high in the canopy, but occasionally flowering near the ground in tree-fall areas....Flowers from late June to September (sometimes to December). The fruits mature from September

to December. [It is] Apparently endemic to the Canal Zone in the tropical moist forest." He cites *Croat 12543 & 16511*. Liesner refers to it as a liana with yellowish fruit in February and encountered it in secondary forests at 0--300 m. altitude.

Additional citations: COSTA RICA: Puntarenas: *Liesner 2100* (W--2846421).

AEGIPHILA CHRYSANTHA Hayek

Additional synonymy: *Aegiphila chrysantha* Mold. ex López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11, sphalm. 1979.

Additional bibliography: Mold., *Phytologia* 40: 213 & 232. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Recent collectors describe this plant as a vine-like branched shrub or "frequent semi-scandent heliophile", 2--3 m. tall, the flower-buds green, and the fruit at first green but vermilion when mature, and have found it growing in non-inundated (terra firme) lowland forests, at 50--120 m. altitude, flowering in May and July, in fruit in May. The corollas are said to have been "yellow" on *Solomon 3622* and "light-green, anthers exserted" on *Dodson & Gentry 9854*.

Additional citations: ECUADOR: Los Ríos: *Dodson & Gentry 9854* (N). PERU: Loreto: *Gentry, Ayala, Diaz, & Jaramillo 21722* (Ld); *Solomon 3622* (E--2679860). BRAZIL: Bahia: *Mattos Silva & Ribeiro 407* (Ld); *T. S. Santos 767* (Ld). Rio de Janeiro: *Araujo & Maciel 3067* [Herb. FEEMA 14919] (Fe).

AEGIPHILA CORDATA Poepp.

Additional bibliography: Mold., *Phytologia* 40: 213--214, 218, & 318. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

The *Schunke Vigo 1697*, distributed as typical *A. cordata*, seems better regarded as representing var. *villosissima* (Mold.) Mold.

AEGIPHILA CORDATA var. *COLOMBIANA* Mold.

Additional bibliography: Mold., *Phytologia* 40: 318. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Vargas describes this plant as a shrub, 4--5 m. tall, and found it growing at 350 m. altitude, flowering in January.

Additional citations: PERU: Madre de Días: *Vargas C. 18823* (W--2702697).

AEGIPHILA CORDATA var. *VILLOSISSIMA* (Mold.) Mold.

Additional bibliography: J. A. Clark, *Card-Ind. Gen. Sp. Var. Pl.* 1933; Mold., *Geogr. Distrib. Avicenn.* 25. 1939; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 36 & 85. 1942; H. N. & A. L. Mold., *Pl. Life* 2: 46. 1948; Mold., *Alph. List Cit.* 2: 621. 1948; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 75 & 175. 1949; Mold., *Résumé* 86 & 442. 1959; *Angely, Ind. Ang.* 10. 1959; Mold., *Phytologia* 40: 214. 1978.

Schunke refers to this plant as a shrub, 2--3 m. tall, with pale-yellow corollas, and found it growing at 300--400 m. altitude,

flowering in February. His collection was identified and distributed as typical *A. cordata* Poepp.

Additional citations: PERU: Huánuco: *Schunke Vigo 1697* (W--2865168).

AEGIPHILA CORDIFOLIA (Ruiz & Pav.) Mold.

Additional bibliography: Mold., *Phytologia* 40: 214. 1978.

The *Schunke Vigo 906* & *1300*, distributed as *A. cordifolia*, actually are *A. spicata* (Rusby) Mold.

AEGIPHILA COSTARICENSIS Mold.

Additional bibliography: Mold., *Phytologia* 40: 318. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA COWANI Mold.

Additional bibliography: Mold., *Phytologia* 40: 393. 1978; Hocking, *Excerpt. Bot. A.33*: 89. 1979.

AEGIPHILA CUATRECASASI Mold.

Additional bibliography: Mold., *Phytologia* 40: 215 & 222. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA CUATRECASASI var. *NITIDA* Mold.

Synonymy: *Aegiphila cuatrecasasi* var. *nítida* Mold. ex López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979

Additional bibliography: Mold., *Phytologia* 40: 215. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

AEGIPHILA CUNEATA Mold.

Additional bibliography: Mold., *Phytologia* 40: 215 & 399. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

The *Schunke Vigo 3493*, distributed as *A. cuneata*, is not verbenaceous.

AEGIPHILA DEPPEANA Steud.

Additional & emended bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 50 & 56. 1948; Mold., *Phytologia* 40: 318--319, 322, & 393. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Stevens encountered this species in secondgrowth on riverbanks, at 90--110 m. altitude, flowering in April, and describes the corollas as "creamy-white" when fresh.

Additional citations: NICARAGUA: Zelaya: W. D. Stevens 7954 (Ld).

AEGIPHILA DUCKEI Mold.

Additional bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 57. 1948; Mold., *Phytologia* 25: 303. 1973.

AEGIPHILA ELATA Sw.

Additional & emended bibliography: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 309 & 310, fig. 132 (1957) and imp. 2, 2: 309 & 310, fig. 132. 1974; Croat, Fl. Barro Colorado. 40 & 732. 1978; Fournet, Fl. Illust. Phan. Guad. Mart. 1410. 1978; Mold., Phytologia 40: 319, 321, & 339. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 53. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 11. 1979.

Emended illustrations: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 310, fig. 132 (1957) and imp. 2, 2: 310, fig. 132. 1974.

Recent collectors describe this plant as growing to 10 feet tall and have found it growing at the edge of "bush" along roadsides, from sealevel to 1000 m. altitude, flowering in August and fruiting in February. The corollas are said to have been "lemon-yellow" on Dwyer & Dieckman 13040. Croat (1978) asserts that it flowers and fruits during the wet season on Barro Colorado Island and states that on that island its occurrence is "Infrequent in the forest. Some flowers have been seen in May and old fruits in September. A few plants showed the calyx to be merely split and essentially bilobed, with one of the lobes bearing two minute teeth." He gives its overall distribution as "Mexico to Colombia, Venezuela, and the Guianas; West Indies. In Panama [it is] known from tropical moist forest in the Canal Zone, Panamá, and Darién and from tropical wet forest in Colón."

Additional citations: MEXICO: Veracruz: Chavelas S., Zamora S., & Soria R. ES.4209 (Me--176843). BELIZE: Dwyer & Dieckman 13040 (Au); Wiley 3 (W--2846923). COSTA RICA: Heredia: Harts-horn 1405 (Id). COLOMBIA: Valle: Forero, Gentry, Sugden, & Daly 3577 (E--2603002).

AEGIPHILA ELATA var. *MACROPHYLLA* (H.B.K.) López-Palacios

Emended synonymy: *Aegiphila macrophylla* Humb. ex Mold., Prelim. Alph. List Inv. Names 2, in syn. 1940.

Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 606. 1927; Mold., Phytologia 40: 319, 321, & 394. 1978; Lopez-Palacios, Revist. Fac. Farm. Univ. Andes 20: 11. 1979.

Recent collectors describe this plant as sprawling, liana-like, the leaves firmly membranous, deep-green above, dull-green beneath. The corollas are said to have been "creamy-greenish" on Steyermark, Bunting, & Blanco 101487. López-Palacios (1979) records the vernacular name, "Juan grande", for this plant. Knuth (1927) cites only the type collection, Humboldt & Bonpland s.n. [Herb. Willd. 2831], from Venezuela.

It should be noted that the *Aegiphila macrophylla* Humb., cited by me in a previous publication as having been published by Roemer & Schultes (1818), actually was not published by them in the reference cited, but seems to start with my 1940 publication as cited in the present paper. The "*A. macrophylla*" of Roemer & Schultes is the same as that of Desfontaines (1829) and belongs in the synonymy of *A. martinicensis* Jacq.

AEGIPHILA ELEGANS Mold.

Additional bibliography: Mold., *Phytologia* 40: 217. 1978; L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Recent collectors describe this species as a slender shrub, 2--3 m. tall, the immature fruit green, and the ripe fruit orange, and have found the plant in thick undergrowth of secondgrowth in somewhat logged-out rainforest much overgrown with lianas, at 180 m. altitude. in anthesis in May, in fruit in May and November.

Additional citations: PERU: Loreto: F. R. Fosberg 28927 (E--2603063). BRAZIL: Bahia: Mattos Silva, Ribeiro, Brito, & Aquino 366 (Ld).

AEGIPHILA FALCATA Donn. Sm.

Additional synonymy: *Aegiphila flucata* Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 41, sphalm. 1978.

Additional bibliography: Mold., *Phytologia* 40: 319. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 41. 1978.

Recent collectors describe this plant as 3 m. tall, the stems strongly 4-angled, and the inflorescence lax, and have found it growing at the edges of pastures, in open sites in evergreen tropical moist forests, in secondgrowth, and on wet shaded slopes in cloud-forests, at 10--k665 m. altitude, flowering in August. The corollas are said to have been "yellow" on Burger, Visconti, & Gentry 10417 and "pale-greenish" on Raven 21789.

Additional citations: COSTA RICA: Heredia: Hartshorn 967 (Z). Lim6n: Burger, Visconti, & Gentry 10417 (N). Puntarenas: Raven 21789 (Go).

AEGIPHILA FASCICULATA Donn. Sm.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 43: 158. 1922; Worsdell, *Ind. Lond. Suppl.* 1: 20. 1941; Mold., *Phytologia* 40: 218. 1978.

Illustrations: Standl., *Field Columb. Mus. Publ. Bot.* 10: pl. 56. 1931.

AEGIPHILA FENDLERI Mold.

Synonymy: *Aegiphila fenfleri* Mold. ex L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11, sphalm. 1979.

Additional bibliography: Mold., *Phytologia* 40: 318 & 320. 1978; Steyer. & Huber, *Fl. Avila* 44, 861, & 864. 1978; L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11. 1979.

Recent collectors describe this plant as "vining, the calyx pale-green" and have encountered it on forested ridges, at 1550 m. altitude, fruiting in September.

Additional citations: VENEZUELA: Aragua: Steyermark & Huber 114243 (N).

AEGIPHILA FERRUGINEA Hayek & Spruce

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 39 (2): 319. 1913; H. N. & A. L. Mold., *Pl. Life* 2: 44. 1948; Mold., *Phytologia* 40: 218. 1978; L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

Recent collectors describe this species as a tree, 2.5--3 m. tall, the leaves deep-green above, bright yellowish-green beneath, the calyx green or pale-green, and the fruit yellowish with a pink tinge, juicy, somewhat pyriform, about 1.5 cm. in diameter, 1.8--2 cm. long, and have encountered it at 9000--10,000 feet altitude, in flower and fruit in June and August. The corollas are said to have been "white" on *Camp E.3952* and "cream" on *Zarucchi 2320*. Zarucchi reports the vernacular name, "balso", and affirms that the plant is said to be toxic, "eating 1 or 2 fruits gives one a headache".

Additional citations: ECUADOR: Azuay: *Giler & Prieto s.n.* [Camp E.3952] (N). Carchi: *Zarucchi 2320* (W--2869258).

AEGIPHILA FILIPES Mart. & Schau.

Additional bibliography: Mold., *Phytologia* 40: 320 & 329. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

Recent collectors describe this plant as a vine, the calyx green, and the corolla white, and have found it growing in sandy soil of secondary forests, fruiting in December.

The *Tillet 672-145*, distributed as *A. filipes*, actually is *A. peruviana* Turcz.

Additional citations: BRAZIL: Amazonas: *Cordeiro 1330* (N).

AEGIPHILA FLORIBUNDA Moritz & Mold.

Additional bibliography: Mold., *Phytologia* 40: 320--321. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

Recent collectors describe the leaves of this plant as submembranous, rich-green above, dull beneath, and have found it growing at 1900 meters altitude, flowering in May. The corollas are said to have been "white" on *Steyermark & al. 98250*.

Additional citations: VENEZUELA: Federal District: *Steyermark, Bunting, & Dressler 98250* (N).

AEGIPHILA FLUMINENSIS Vell.

Additional bibliography: Mold., *Phytologia* 40: 219--220. 1978; Illustrations: Vell., *Fl. Flum. Icon.* 1: pl. 95. 1827.

Hatschbach describes this plant as a woody vine, "floresce alto das arvores", in rainforests, the corollas "cream"-color when fresh.

Additional citations: BRAZIL: Bahia: *T. S. Santos 2653* (Ld). Espirito Santo: *Pinheiro & Santos 2335* (Ld). Paraná: *Hatschbach 41829* (Ld).

AEGIPHILA GLANDULIFERA Mold.

Additional bibliography: Mold., *Phytologia* 40: 321--322, 333, & 341. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11--12. 1979.

Recent collectors refer to this species as a small tree, shrub, or scandent shrub, 3--4 m. tall, the trunk with a circumference of up to 20 cm., the leaves deep-green, the flower-buds yellow-green, and the fruit vermilion, reporting the vernacular name, "chirapa

sacha". They have encountered it in sandy soil of woods on terra firme and in degraded cloud-forests, at 800--2150 m. altitude, flowering and fruiting in February and April, flowering also in July and fruiting also in June, the fruit yellowish-green or yellow. The corollas are described as having been "white" on *Kirkbride & Chamba R. 4169* and "yellow" on *Dodson & al. 8521*. A wood sample accompanies *Rosa 2412*.

Materia of this species has been misidentified and distributed in some herbaria as "*Aegiphilla cuspidata* Mart."

Additional citations: COLOMBIA: Valle del Cauca: *Cuatrecasas 16356* (W--2816493). ECUADOR: Napo: *Kirkbride & Chamba R. 4169* (N, W--2849320), *4256* (N, W--2849321). Pichincha: *Dodson, Morgan, & Dodson 8521* (N). PERU: San Martín: *Schunke Vigo 6073* (Ld, N). BRAZIL: Para: *Rosa 2412* (N); *Silva & Bahia 3100* (N).

AEGIPHILA GLANDULIFERA var. *PERUVIANA* Mold., *Phytologia* 46: 1980.

Bibliography: Mold., *Phytologia* 46: 288. 1980.

Citations: PERU: San Martín: *Ferreya 10091* (E--2658074--type).

AEGIPHILA GLANDULIFERA var. *PYRAMIDATA* L. C. Rich. & Mold.

Additional bibliography: Mold., *Phytologia* 40: 321--322. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11 & 12. 1979.

Pittier records to vernacular name, "tabaquero", for this plant.

AEGIPHILA GLOMERATA Benth.

Additional bibliography: Mold., *Phytologia* 40: 322. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA GLORIOSA Mold.

Additional bibliography: Mold., *Phytologia* 40: 221. 1978.

Recent collectors describe this plant as a vine, the stamens white, and the anthers cream-color, and have encountered it in wet forests, at 25--100 m. altitude, flowering in March and July.

The *Harley 17836*, distributed as typical *A. gloriosa*, actually represents var. *paraënsis* Mold.

Additional citations: BRAZIL: Bahia: *Mori, King, Carvalho, & Euponino 12083* (Ld, W--2854250); *Mori, Mattos Silva, Kallunki, Santos, & Santos 9723* (Ld); *T. S. Santos 3016* (Ld).

AEGIPHILA GLORIOSA var. *PARAËNSIS* Mold.

Additional synonymy: *Aegiphila gloriosa* var. *paraensis* Mold. ex Mold. & Bromley in *Harley & Mayo, Towards Checklist Fl. Bahia* 188. 1980.

Additional bibliography: Mold., *Phytologia* 40: 221. 1978; Mold. & Bromley in *Harley & Mayo, Towards Checklist Fl. Bahia* 188. 1980.

Recent collectors describe this plant as a climber to 3 m., the leaves soft, mid-green above, paler beneath, the flowers slightly scented, and have encountered it in secondary vegetation along roadsides and in disturbed evergreen rainforests in the coastal zone,

at altitudes of 100--200 m., flowering in January. The corollas are said to have been "yellowish-cream" on *Harley 17836*, a collection originally distributed as typical *A. gloriosa* Mold.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 17836* (K).

AEGIPHILA GOUDOTIANA Mold.

This taxon is to be excluded from the genus; it appears to be a species of *Ehretia* in the *Ehretiaceae*.

AEGIPHILA GRANDIS Mold.

Additional bibliography: Mold., *Phytologia* 40: 322, 323, 336, 395, & 399. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 10 & 12. 1979.

AEGIPHILA GRANDIS var. *CUATRECASASI* (Mold.) López-Palacios

Additional bibliography: Mold., *Phytologia* 40: 222 & 395. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA GRANDIS var. *SESSILIFLORA* (Mold.) Mold.

Additional bibliography: Mold., *Phytologia* 40: 323 & 395. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA GRAVEOLENS Mart. & Schau.

Additional synonymy: *Aegiphila graveolens* Mart. & Gal., in herb.

Additional bibliography: Mold., *Phytologia* 40: 224. 1978.

Recent collectors describe this plant as a shrub, 1--3 m. tall, the fruit at first green, turning yellow, finally orange in color, and have found it growing "in brushy cerrado with few trees and no open campo" and in much disturbed mata de cipó, at 800 m. altitude, flowering in February and March, fruiting in March and November. The corollas are said to have been "yellow-green" on *Anderson & al. 36779* and "esverdeadas" on *Santos & al. 3441*.

Additional citations: BRAZIL: Bahia: *Anderson, Stieber, & Kirkbride 36779* (N); *Mori, Santos, & Thompson 11155* (Ld); *T. S. Santos 2507* (Ld); *Santos, Mattos Silva, & Brito 3441* (Ld).

AEGIPHILA HAUGHTII Mold.

Additional bibliography: Mold., *Phytologia* 40: 225--226. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA HIRSUTA Mold.

Additional bibliography: Mold., *Phytologia* 40: 393. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA HIRSUTA var. *COLOMBIANA* Mold.

Additional bibliography: Mold., *Phytologia* 40: 226. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

Recent collectors have encountered this plant in "mature forest being selectively logged", at 300 m. altitude, and describe it as a scandent shrub, with orange-colored fruit which dries purplish,

in September.

Additional citations: COLOMBIA: Santander: *Gentry & Renteria 20085*

AEGIPHILA HIRSUTISSIMA Mold.

Additional bibliography: Pittier, Supl. Pl. Usual. Venez. 54. 1939; Mold., *Phytologia* 40: 226 & 323. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

Mori refers to this plant as a tree, 4 m. tall, with pendent inflorescences, and found it growing in tropical wet forests at 250 m. altitude.

Material of this taxon has been misidentified and distributed in some herbaria as *Psychotria* sp.

Additional citations: PANAMA: Darién: *Mori 7051* (W--2846422).

AEGIPHILA HOEHNEI Mold.

Additional bibliography: Mold., *Phytologia* 40: 212 & 226 (1978) and 43: 196. 1979; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12 & 34. 1979.

AEGIPHILA HOEHNEI var. *PUYENSIS* Mold.

Additional bibliography: Mold., *Phytologia* 40: 226. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA HOEHNEI var. *SPECTABILIS* Mold.

Additional bibliography: Mold., *Phytologia* 40: 212 & 226. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA HOEHNEI var. *VENEZUELENSIS* Mold., *Phytologia* 43: 196. 1979.

Bibliography: López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 34. 1979; Mold., *Phytologia* 43: 196. 1979.

Liesner describes this plant as a liana, the leaves pale yellowish-green beneath, darker above, the calyx green, and the fruit yellowish or greenish-orange, and found it growing along roadsides in low wet areas at the edge of forests and in mostly white sandy soil along forest streams, at 120 m. altitude, fruiting in November and December. He reports the local vernacular names, "laurel de orihero" and "mereco".

Citations: VENEZUELA: Amazonas: *Liesner 3626* (Ld), *4083* (Z-- type).

AEGIPHILA INTEGRIFOLIA (Jacq.) Jacq.

Additional & emended bibliography: Pers., *Sp. Pl.* 1: 339 & 343. 1817; Herzog in Engl. & Drude, *Veget. Erde* 15: 130. 1923; Knuth, *Feddes Repert. Spec. Nov. Beih.* 43: [Init. Fl. Venez.] 606. 1927; Worsdell, *Ind. Lond. Suppl.* 1: 20. 1941; Mold., *Phytologia* 40: 323--325. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 40. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 11 & 12. 1979.

Additional illustrations: Herzog in Engl. & Drude, *Veget. Erde*

15: 130. 1923.

Recent collectors describe this species as a shrub, 0.3--6 m. tall, or a tree, 3--20 m. tall, the inflorescences corymbose or congested, the fruits at first green, becoming orange in color when ripe, and have found it growing in lateritic soil, in primary or upland forests, in open areas in secondary forests, along riversides, and on road embankments, reporting the local vernacular names, "macudeni" and "macuren". They have encountered the plant at 120--700 m. altitude, flowering in March and from May to August, in fruit in July and November. The corollas are said to have been "yellowish-white" on *Steinbach 776*, "cream-color" on *Liesner 3840*, "white" on *Aristeguieta 4714*, *Aristeguieta & al. 7189*, *Gentry & al. 25482*, *Schunke Vigo 1796*, & *Solomon 3405*, and "yellow" on *Krapovickas & Schinini 32182*.

Knuth (1927) cites from Venezuela only *Humboldt & Bonpland s. n.* [Herb. Willd. 2857] and *Pittier 10626*, the former from Bolívar and the latter from Zulia. The *Bruijn 1015*, distributed as typical *A. integrifolia*, actually represents var. *guianensis* (Mold.) López-Palacios.

Additional citations: VENEZUELA: Amazonas: *Liesner 3590* (Ld), *3840* (Ld). Anzoátegui: *Aristeguieta 4714* (W--2882094). Monagas: *Aristeguieta, Liogier, & Cardenas de Guevara 7189* (W--2861101). PERU: Amazonas: *Boeke 2075* (N); *Kujikat 105* (Ld). Cuzco: *Vargas C. 18843* (W--2702691). Huánuco: *Schunke Vigo 1796* (W--2865173); *Solomon 3405* (E--2640812). Loreto: *Gentry, Diaz, & Jaramillo 2192* (Ld), *21993* (Ld); *Gentry, Schunke, & Aronson 25482* (Ld). BRAZIL: Matto Grosso: *Hatschbach 34084* (W--2839441). BOLIVIA: Santa Cruz: *Krapovickas & Schinini 32182* (W--2854648); *R. F. Steinbach 776* (Ut--354305b).

AEGIPHILA INTEGRIFOLIA var. *GUIANENSIS* (Mold.) López-Palacios

Additional bibliography: Mold., *Phytologia* 40: 323 & 324. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12--13. 1979.

Recent collectors describe this plant as a shrub, 2 m. tall, a treelet, 4 m. tall, or a tree, 5 m. tall, with a trunk diameter of 10 cm., the leaf-blades "papery, dull medium-green above, paler green beneath, calyx green" or pale-green, and have encountered it in high forests on terra firme, at 100--300 m. altitude, in anthesis in May, July, August, and November. The corollas are said to have been "white" on *Bruijn 1015* and "cream-color" on *Silva & Santos 4602*.

Material of this taxon has been misidentified and distributed in some herbaria as the typical form of the species and as *Euphorbiaceae*.

Additional citations: VENEZUELA: Sucre: *Steyermark, Carreño Espinoza, & Manara 107806* (N). Zulia: *Bruijn 1015* (W--2837357). BRAZIL: Amazonas: *Prance, Hill, Coelho, & Ramos 24334* (Ld, Ut--355114b). Pará: *Silva & Santos 4602* (N).

AEGIPHILA INTEGRIFOLIA var. *LOPEZ-PALACII* Mold.

Synonymy: *Aegiphila integrifolia* var. *lopez-palacii* Mold. ex

López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

Additional bibliography: Mold., *Phytologia* 40: 230--231. 1978;

López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

The leaf-blades on some specimens of *Boeke 2209* are practically entire, with just an occasional very obscure tooth.

Additional citations: ECUADOR: Napo: *Boeke 2209* (N).

AEGIPHILA INTERMEDIA Mold.

Additional bibliography: Mold., *Phytologia* 40: 324--325. 1978;

López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 12. 1979.

AEGIPHILA KILLIPII Mold.

Additional & emended bibliography: H. N. & A. L. Mold., *Pl.*

Life 2: 44 & 66. 1948; Mold., *Phytologia* 25: 410. 1978; López-

Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

AEGIPHILA LAETA H.B.K.

Additional & emended bibliography: Steud., *Nom. Bot. Phan.*, ed.

1, 16. 1821; Mold., *Phytologia* 40: 325 & 327. 1978; Steyerl. &

Huber, *Fl. Avila* 864, fig. 22b. 1978; López-Palacios, *Revist.*

Fac. Farm. Univ. Andes 20: 13. 1979.

Additional illustrations: Steyerl. & Huber, *Fl. Avila* 864, fig. 22b. 1978.

Recent collectors describe this species as a shrub, 2.5--3 m. tall, with orange-colored fruit, in anthesis in August and November, and in fruit in November, growing at altitudes of 50--130 m. The corollas are said to have been "cream-color" on *Aristeguieta 6295* and *D'Arcy 9346*. Material has been misidentified and distributed in some herbaria as *A. panamensis* Mold.

Additional citations: PANAMA: Canal Zone: *D'Arcy 9232* (W--2846404). Colón: *D'Arcy 9346* (W--2846406). COLOMBIA: Chocó: *H. Leon 599* (N). VENEZUELA: Guárico: *Aristeguieta 6295* (N).

AEGIPHILA LAEVIS (Aubl.) Gmel.

Additional & emended bibliography: Pers., *Sp. Pl.* 1: 339 & 342.

1817; Bocq., *Rev. Verbenac.* 117 & 190. pl. 9. 1863; Knuth, *Feddes*

Repert. Spec. Nov. Beih. 43: [Init. *Fl. Venez.*] 606. 1927; Mold.,

Phytologia 40: 325. 1978; López-Palacios, *Revist. Fac. Farm. Univ.*

Andes 20: 13. 1979; Mold. & Bromley in *Harley & Mayo, Towards*

Checklist Fl. Bahia 188. 1980.

Additional illustrations: Lam., *Tabl. Encycl. Meth. Bot.* 1:

pl. 70, fig. 3. 1791; Bocq., *Rev. Verbenac.* pl. 9. 1863.

Recent collectors describe this plant as a shrub, 3 m. tall, the leaves coriaceous, bright-green, and the calyx green, and have encountered it in disturbed evergreen rainforest, at 100--200 m. altitude, in flower in January. The corollas are said to have been "pale-yellow" on *Harley 17910*.

Knuth (1927) cites only *Otto 1092*, with a question, from the Federal District of Venezuela.

Additional citations: COLOMBIA: Valle del Cauca: *Cuatrecasas 17705* (W--2819151). BRAZIL: Bahia: *Harley, Mayo, Storr, Santos,*

& Pinheiro in Harley 17910 (Ld, N); Pinheiro 1728 (Ld), 1797 (Ld).

AEGIPHILA LANCEOLATA Mold.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 39 (2): 319. 1913; Mold., Phytologia 40: 213 & 232. 1978.

AEGIPHILA LAXICUPULIS Mold.

Additional bibliography: Mold., Phytologia 40: 232--233 & 339. 1978.

Additional citations: MEXICO: Chiapas: Miranda 7632 (Me--74227).

AEGIPHILA LAXIFLORA Benth.

Additional bibliography: Mold., Phytologia 40: 325--326, 343, & 393. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 13. 1979.

AEGIPHILA LEHMANNII Mold.

Additional bibliography: Mold., Phytologia 40: 326. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 13. 1979.

AEGIPHILA LEWISIANA Mold.

Additional bibliography: Mold., Phytologia 40: 326. 1978; R. F. Sm., Act. Bot. Venez. 13: 193, 204, & 262, fig. 147. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 13. 1979.

Additional illustrations: R. F. Sm., Act. Bot. Venez. 13: 262, fig. 147. 1978.

Recent collectors describe this species as a tree, 4 m. tall, the fruit orange-color, conic-pyriform, narrowed at the apex, and have found it growing in cloud-forests, at 1300--1500 m. altitude, in fruit in March. Smith (1978) describes it as follows: "Tallos sub-opuesto, verde claro en la superficie inferior. Arbustos primarios zona templada", citing it from Lara, Venezuela.

Additional citations: VENEZUELA: Lara: Steyermark, Smith, & Espinoza 111545 (N).

AEGIPHILA LHOTZKIANA Cham.

Additional synonymy: *Aegiphila lhotzskyana* Rizzini, Trat. Fitogeog. Bras. 2: 151. 1979. *Aegiphila lhozkyana* Cham., in herb.

Additional bibliography: Mold., Phytologia 40: 233--234. 1978.

Recent collectors describe this species as a shrub, treelet, or small tree, 2--3 m. tall, the trunk to 6 cm. in diameter, with corky bark, the calyx green, the fruit (immature) green in January, and have found it growing in cerrado, at 900 m. altitude, in anthesis in March and November. Goodland refers to it as "occasional" or "rare". The corollas are said to have been "white" on Mori & al. 9655.

Additional citations: BRAZIL: Bahia: Mori, Mattos Silva, Kal-lunki, Santos, & Santos 9655 (Ld). Goiás: Irwin, Onishi, Fonseca, Souza, Reis dos Santos, & Ramos 25325 (N, N). Minas Gerais:

Goodland 82 (N), 132 (N), 133 (N), 834 (N, N).

AEGIPHILA LOPEZ-PALACII Mold.

Synonymy: *Aegiphila lópez-palacii* Mold. ex López-Palacios. *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

Additional bibliography: Mold., *Phytologia* 40: 234. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

AEGIPHILA LOPEZ-PALACII var. *PUBESCENS* Mold.

Synonymy: *Aegiphila lópez-palacii* var. *pubescens* Mold. ex López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

Additional bibliography: Mold., *Phytologia* 40: 234. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

AEGIPHILA LUSCHNATHI Schau.

Additional bibliography: Mold., *Phytologia* 40: 234. 1978.

Araujo & Carauta refer to this plant as a tree, 7 m. tall, a "heliophile, orla da mata", with orange-colored fruit in April.

Additional citations: BRAZIL: Boa Vista Island (Rio de Janeiro): Araujo & Carauta 3061 [Herb. FEEMA 14903] (Fe, Z).

AEGIPHILA MACRANTHA Ducke

Additional bibliography: Mold., *Phytologia* 40: 326. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979; Mold. & Bromley in Harley & Mayo, *Towards Checklist Fl. Bahia* 188. 1980.

Recent collectors describe this plant as a scrambling shrub, vine, or shrubby climber, clambering over other vegetation, to 4 m. long, the "young stems bright yellowish-green", the leaves rather bright-green or bright yellowish-green, the calyx yellowish-green, the stamens protruding, and the (immature?) fruit dark-green, and have found it growing in wet woods and in disturbed forest margins, as well as in high coastal evergreen rainforests and their margins on heavy loam, from sealevel to 100 m. altitude, in anthesis in January and in fruit in January and May. The corollas are said to have been "dull-yellow" on Harley 18312.

Additional citations: BRAZIL: Bahia: Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18312 (Ld, N), 18369 (Ld, N); Mori, Santos, Euponino, & Langenheim 11862 (Ld).

AEGIPHILA MAGNIFICA Mold.

Synonymy: *Aegiphila laticupulis* Neill, in herb.

Additional bibliography: Mold., *Phytologia* 40: 235 & 332. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 40. 1978.

Neill describes this plant as a tree, 10 feet tall, with yellow fruit, and encountered it in a forest at 500 m. altitude, fruiting in November. Material has been misidentified and distributed in some herbaria as *A. panamensis* Mold.

Additional citations: NICARAGUA: Masaya: Neill 2948 (Z).

AEGIPHILA MARTINICENSIS Jacq.

Additional synonymy: *Aegiphila manabea* "Sw. non Aubl." apud Fournet, *Fl. Illust. Phan. Guad. Mart.* 1410, in syn. 1978.

Additional & emended bibliography: H. Hallier, *Meded. Rijks Herb. Leid.* 37: 34. 1918; Knuth, *Feddes Repert. Spec. Nov. Beih.* 43: [Init. Fl. Venez.] 606. 1927; Alain in Leon & Alain, *Fl. Cuba*, imp. 1, 4: 309 & 310. 1957; Serbanescu-Jitariu & Mitroiu, *Act. Bot. Hort. Bucurest.* 1972-73: 107--109, pl. 1, fig. 2. 1973; Alain in Leon & Alain, *Fl. Cuba*, imp. 2, 2: 309 & 310. 1974; Croat, *Fl. Barro Color.* 733. 1978; Fournet, *Fl. Illust. Phan. Guad. Mart.* 1410 & 1411, fig. 672. 1978; Mold., *Phytologia* 40: 326--329. 1978; Hocking, *Excerpt. Bot. A.* 33: 88. 1979; L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

Additional illustrations: Serbanescu-Jitariu & Mitroiu, *Act. Bot. Hort. Bucurest.* 1972-73: 109, pl. 1, fig. 2. 1973; Fournet, *Fl. Illust. Phan. Guad. Mart.* 1411, fig. 672. 1978.

Serbanescu-Jitariu & Mitroiu (1973), on the basis of *Herb. Univ. Cluj 85771*, describe the pollen of this species as: "prolat; 3-colporat; v6zut apical 36,4--49,4 mu în diam., din profil înalt 44,2--54,6 mu, lat. 28,6--39 mu. Polenul scuturat din antere și v6zut cu ochiul liber este portocaliu, în apă, la microscop, portocaliu brun, iar în chloralhidrat galben-portocaliu. Sporoderma crassisexinata; în sect. optic6 exina este tegilat scurt baculată; suprafata sporodermei spinuloas6, adic6 prev6zut6 cu numeroși spini scurți (spinuli), neuniform distribuiți, iar între aceștia este fin granular6; grosimea sporodermei 2,6 mu. Colpii sânt scurți (circa 1/4 din raza granulului de polen) și relativ înguști, cu suprafața fin verucoas6."

Fournet (1978) seems to say that the species has been subdivided into "many" segregates, but I have not as yet been able to ascertain where this was done. His statement is "Maz6 et Ballet aient cru devoir distinguer plusieurs esp6ces".

Knuth (1927) cites from Carabobo, Venezuela, only *Pittier 8806*.

Additional citations: PUERTO RICO: *Woodbury s.n.* [Nov. 6, 1965] (W--2942183). WINDWARD ISLANDS: Saint Vincent: *C. V. Morton 6275* (W--1884801), *6291* (W--1884813).

AEGIPHILA MEDITERRANEA Vell.

Additional bibliography: Mold., *Phytologia* 40: 328 & 395. 1978.

Illustrations: Vell., *Fl. Flum. Icon.* 1: pl. 94. 1827.

AEGIPHILA MEMBRANACEA Turcz.

Additional synonymy: *Aegiphila membranaceae* (Turez) L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13, sphalm. 1979.

Additional bibliography: Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 40. 1978; Mold., *Phytologia* 40: 326--328, 333, & 344 (1978) and 44: 215. 1979; L6pez-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

AEGIPHILA MEMBRANACEA var. *BOLIVIANA* Mold., *Phytologia* 44: 215. 1979.

Bibliography: Mold., *Phytologia* 44: 215. 1979.

Citations: BOLIVIA: El Beni: *W. R. Anderson 11929* (N--type).

AEGIPHILA MOLDENKEANA López-Palacios

Additional bibliography: Mold., *Phytologia* 40: 322 & 329. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

AEGIPHILA MOLLIS H.B.K.

Additional & emended bibliography: Steud., *Nom. Bot. Phan.*, ed. 1, 16. 1821; Knuth, *Feddes Repert. Spec. Nov. Beih.* 43: [Init. Fl. Venez.] 606--607. 1927; H. N. & A. L. Mold., *Pl. Life* 2: 46 & 73. 1948; Mold., *Phytologia* 40: 329--334 & 338. 1978; Steyermark & Huber, *Fl. Avila* 864, fig. 22a. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 13. 1979.

Additional illustrations: Baill., *Hist. Pl.* 11: 87. 1891; Steyermark & Huber, *Fl. Avila* 864, fig. 22a. 1978.

Recent collectors have describes this plant as a low shrub or treelet, 3 m. tall, "with elongating branch-tips", the leaves "soft-membranous", pale-green, and the corollas 4-lobed. They have encountered it in secondary growth and in tropophilous woods on forested slopes, at altitudes of 600--1300 m., in anthesis in July and August. The corollas are said to have been "creamy" on Steyermark & al. 113992, "greenish-yellow" on Steyermark & al. 107735, and "light-green" on Lent 2716.

Knuth (1927) records the common vernacular names, "contra-culebra" and "totumillo", and cites from Venezuela only the following collections: Bolívar: *Humboldt & Bonpland s.n.* [Herb. Willd. 2834] and *s.n.* [in *sylvis Orinocensibus?*]. Carabobo: *Pittier 7910*. Federal District: *Otto 856; Pittier 7855*.

Additional citations: COSTA RICA: Puntarenas: *Lent 2716 (Go)*. VENEZUELA: Miranda: *Steyermark, Brizual, Mondolfi, & Cabrera 113992 (N)*. Sucre: *Steyermark, Carreño Espinoza, & Manara 107735 (N)*.

AEGIPHILA MOLLIS var. *INTERMEDIA* Mold.

Additional bibliography: Mold., *Phytologia* 40: 329 & 332--333. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA MOLLIS var. *LONGIFOLIA* (Turcz.) López-Palacios

Additional bibliography: Mold., *Phytologia* 40: 333. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA MOLLIS var. *PUBERULENTA* (Mold.) López-Palacios

Additional bibliography: Mold., *Phytologia* 40: 333. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA MOLLIS var. *SURFACEANA* (Mold.) Mold.

Additional bibliography: Mold., *Phytologia* 40: 333--334. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA MONSTROSA Mold.

Additional bibliography: Mold., *Phytologia* 40: 334 & 401. 1978.

Recent collectors report for this plant the vernacular name,

"tabaquillo blanco". for this plant.

Additional citations: MEXICO: Chiapas: *Breedlove & Thorne 20944* (Ld); *Miranda 7890* (Me--730941). Tabasco: *González L. & Hernández P. GH.308* (Me--177204).

AEGIPHILA MONTANA Mold.

Additional bibliography: Mold., *Phytologia* 27: 157. 1973; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA MONTICOLA Mold.

Additional bibliography: Mold., *Phytologia* 40: 334. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA MORTONI Mold.

Synonymy: *Aegiphila mortonii* Mold., in herb.

Additional bibliography: Mold., *Phytologia* 40: 334--335. 1978.

Additional citations: PERU: Cuzco: *Plowman & Davis 4914* (W--2838752).

AEGIPHILA MULTIFLORA Ruiz & Pav.

Additional bibliography: Mold., *Phytologia* 40: 335. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

AEGIPHILA NOVOGRANATENSIS

Additional bibliography: Mold., *Phytologia* 40: 330 & 335--336. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14. 1979.

Recent collectors have encountered this plant at 2500 m. altitude, fruiting in February.

Additional citations: COLOMBIA: Antioquia: *Espinal T. & Villegas 4187* (Ld).

AEGIPHILA OBDUCTA Vell.

Additional bibliography: Mold., *Phytologia* 40: 336--337. 1978.

Illustrations: Vell., *Fl. Flum. Icon.* 1: pl. 97. 1827; Mold., *Phytologia* 2: 439, fig. 3. 1948.

Recent collectors describe this species as a tall ascending shrub.

Additional citations: BRAZIL: Guanabara: *Duarte 4964* [Herb. *Jard. Bot. Rio Jan.* 110272] (W--2839760). Minas Gerais: *Irwin, Harley, & Onishi 29168* (N).

AEGIPHILA OBOVATA Andr.

Additional bibliography: Mold., *Phytologia* 40: 337. 1978.

Illustrations: Andr., *Bot. Rep.* 9: pl. 578 (in color). 1809.

AEGIPHILA ODONTOPHYLLA Donn. Sm.

Additional bibliography: Mold., *Phytologia* 40: 330 & 336--338. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 14--15. 1979.

Recent collectors describe this plant as a reclining shrub or as a tree, 10 m. tall, and have found it growing on brooksides

and in riverside woods, at 1635--2800 m. altitude, flowering from October to December. The corollas are said to have been "white" on *Lent 2191* & *2300*.

Additional citations: COSTA RICA: Cartago: *Lent 2191* (Go). San José: *Lent 2300* (Go). PANAMA: Chiriquí: *D'Arcy s.n.* [22 Nov. 1975] (W--2846405).

AEGIPHILA PANAMENSIS Mold.

Additional bibliography: Croat, Fl. Barro Color. 7, 43, 732, [734], 735, 870, & 875, fig. 478. 1978; Mold., Phytologia 40: 327 & 338--339. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 15. 1979.

Additional illustrations: Croat, Fl. Barro Color. [734], fig. 478. 1978.

Croat (1978) reports that on Barro Colorado Island this species is "Occasional, as a shrub in clearings and open areas or as a tree in the younger forest. Flowers from July to December (sometimes from April). The fruits mature from October to January. The species is similar to *A. martinicensis* Jacq." He gives its distribution as "Southern Mexico, Costa Rica, and Panama. In Panama, known from tropical moist forest in the Canal Zone, Bocas del Toro, San Blas, Panamá, and Darién, from premontane moist forest in the Canal Zone and Panamá, from premontane wet forest in Chiriquí, and from tropical wet forest in Coclé." In general it flowers and fruits there in the wet to the dry season. Lent calls it a "trailside treelet, 6 m. tall, flowers cream" and encountered it at 220 m. altitude.

The *D'Arcy 9346*, distributed as *A. panamensis*, actually is *A. laeta* H.B.K., while *Neill 2948* is *A. magnifica* Mold.

Additional citations: COSTA RICA: Heredia: *Lent 2122* (Go).

AEGIPHILA PARVIFLORA Mold.

Synonymy: *Aegiphila paraviflora* Mold. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 15, sphalm. 1979.

Additional bibliography: Mold., Phytologia 40: 323 & 340--341. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 15. 1979.

AEGIPHILA PAVONIANA Mold.

Additional bibliography: Mold., Phytologia 27: 298. 1973; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 15. 1979.

AEGIPHILA PENDULA Mold.

Additional bibliography: Mold., Phytologia 40: 321, 339, & 341. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 15. 1979; Mold., Phytologia 46: 288. 1980.

Recent collectors describe this species as a tree, 5 m. tall, and have found it growing in mature forests, at 530 m. altitude, in anthesis in February. The corollas are said to have been "cream-color" when fresh on *Dodson & al. 7572*.

Additional citations: ECUADOR: Pichincha: *Dodson, Gentry, & Duke 7572* (Ld).

AEGIPHILA PENDULA var. *PERUVIANA* Mold., *Phytologia* 46: 288. 1980.

Bibliography: Mold., *Phytologia* 46: 288. 1980.

Citations: PERU: Loreto: *Gentry, Díaz, Aronson, & Jaramillo 26028* (Z--type).

AEGIPHILA PENNELLII Mold.

Additional bibliography: Mold., *Phytologia* 27: 299. 1973; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 15. 1979.

AEGIPHILA PERNAMBUCENSIS Mold.

Additional bibliography: Mold., *Phytologia* 40: 341 & 343. 1978; Mold. & Bromley in Harley & Mayo, *Towards Checklist Fl. Bahia* 188. 1980.

Recent collectors have found this plant growing in cutover woodland and on dry quartzite hillsides with scrub.

AEGIPHILA PERPLEXA Mold.

Additional bibliography: Mold., *Phytologia* 40: 325 & 343. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 15. 1979.

AEGIPHILA PERUVIANA Turcz.

Additional bibliography: Mold., *Phytologia* 40: 343. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 15. 1979.

Material of this species has been misidentified and distributed in some herbaria as *A. filipes* Mart. & Schau., *Oleaceae*, and *Solanaceae*. The *Schunke Vigo 936*, distributed as *A. peruviana*, is actually *A. caucensis* Mold.

AEGIPHILA PURPURASCENS Mold.

Additional bibliography: Mold., *Phytologia* 27: 356 (1973) and 40: 336. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 15. 1979.

AEGIPHILA QUINDUENSIS (H.B.K.) Mold.

Additional bibliography: Knuth, *Feddes Repert. Spec. Nov. Beih.* 43: [Init. Fl. Venez.] 606. 1927; H. N. & A. L. Mold., *Pl. Life* 2: 65. 1948; Mold., *Phytologia* 40: 321, 327, 329, & 344. 1978; Steyermark & Huber, *Fl. Avila* 44 & 864, fig. 22b. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 15. 1979.

Recent collectors describe this species as a shrub or small tree 2--5 m. tall, the leaf-blades membranous, dark-green above, paler beneath, the inflorescence pendent, the calyx, pedicels, and rachis rich-green, and the "madera bastante quebradiza", and have found it growing in virgin forests and on dry, rocky, forested slopes, at 500--1100 m. altitude, in anthesis in January, June, and October. The corolla are said to have been "creamy" in color on *Steyermark & Espinoza 112655*, "cream" on *Aristeguieta 3840 & 4854*, and "creamy-white" on *Steyermark 105391*.

Knuth (1927) cites *Karsten 11* from Carabobo, Venezuela.

Additional citations: VENEZUELA: Federal District: *Steyermark & Espinoza 112655* (N). Miranda: *Aristeguieta 4854* (W--2882099). Yaracuy: *Aristeguieta 3840* (N); *J. A. Steyermark 105391* (N).

[to be continued]

MITREOLA vs. CYNOCTONUM, AND A NEW COMBINATION

FOR THE SOUTHEASTERN UNITED STATES

John B. Nelson
Department of Biological Sciences
Florida State University
Tallahassee, Florida 32306

A series of communications between R. K. Godfrey and D. B. Ward (Florida State University and the University of Florida) concerning the usage of *Mitreola* vs. *Cynoctonum* was begun following their notation of Adam's (1972) treatment of the Loganiaceae in Flora of Jamaica. In this work, the widespread southeastern United States species customarily designated as *Cynoctonum mitreola* (L.) Britton was circumscribed under *Mitreola petiolata* (J. F. Gmelin) T. & G. prompting the question of which generic name is to be applied, and why.

Prior to 1753, Linnaeus used *Mitreola* as a genus (for instance, in Hortus Cliffortianus). Within Species Plantarum (1753) this genus was treated as *Ophiorrhiza*, containing *O. Mungos* (serving as the type species for *Ophiorrhiza*), and *O. Mitreola* (the later transfer of *Ophiorrhiza* to the Rubiaceae has precluded any subsequent use of this genus within the Loganiaceae). The fifth edition of Genera Plantarum (1754) again made use of *Ophiorrhiza*, with the spelling thus changed; Linnaeus here treated *Mitreola* as a generic synonym. Clearly, *Mitreola* was at this point not considered as the correct genus name by Linnaeus.

Carroll E. Wood, Jr. was able to supply some useful information to Ward concerning this problem. In a note to Ward, attention was brought to Linnaeus' Opera Varia (1758), in which the generic name *Mitreola* is published. Linnaeus merely changed his mind as to which generic name should be used, and at the same time, validly published the generic name. In his notes concerning this matter, Ward refers to this Linnaean "momentary whim" as a "sorry" way in which to publish a genus, and yet an acceptable one.

Walter's publication (1788) of *Anonymos petiolata* provided the basionym for *Cynoctonum petiolata* of J. F. Gmelin (1791). Britton retained Gmelin's genus, treating the species as *C. mitreola* (L.) Britton, unaware, too, of Linnaeus' 1758 publication. It is this last binomial which has been customarily applied to the wide-ranging species in the southeastern United States. Thus, the Linnaean genus *Mitreola* is applicable for the species, and the correct epithet originates with Walter's *Anonymos petiolata*. Torrey and Gray correctly published the combination (1841) as *M. petiolata* (J. F. Gmel.) T. & G.

A distinctive element of this genus has for some time been treated as *Cynoctonum sessilifolium* (Walter) J. F. Gmelin. In 1841, Torrey and Gray described var. *angustifolia* within this second Southeastern species. Small, in 1896, elevated this variety to specific rank under *Cynoctonum*. Recently, both Ward and Godfrey (Godfrey in particular) have suggested that *C. sessilifolium* (Walt.) Gmel. var. *angustifolium* T. & G. may indeed represent a form sufficiently distinct morphologically to warrant specific status, having the same opinion as did Small, some eighty years earlier. Godfrey has suggested that, on the basis of capsule and seed characters, this plant is more nearly allied with *M. petiolata* than with *M. sessilifolia* (= *Cynoctonum sessilifolium*). Since the effective combination for this taxon under *Mitreola* has not been made, it is here so presented, representing a distinctive element of the flora of southeastern Georgia and much of Florida.

Mitreola angustifolia (T. & G.) J. Nelson, *comb. nov.*

Cynoctonum sessilifolium (Walt.) Gmel.

var. *angustifolium* T. & G., Fl. N. Am. 2: 45. 1841.

Cynoctonum angustifolium (T. & G.) Small,

Bull. Torr. Bot. Club 23: 129. 1896.

ACKNOWLEDGEMENTS

Appreciation is expressed to R. K. Godfrey who graciously allowed me the use of his correspondence with D. B. Ward concerning this problem. Dr. Godfrey and Dr. L. C. Anderson provided helpful suggestions in the writing of this paper.

LITERATURE CITED

References to previous literature present in the notes of Godfrey and Ward are presented here in order to clarify the sources available for solving this nomenclatural problem.

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Gmelin, J. F. 1791. Systema Naturae. Leipzig. p. 443.

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Small, J. K. 1896. Studies in the botany of the southeastern United States. Part 5. Bull. Torr. Bot. Club 23: 129.

Torrey, John and Asa Gray. 1841. Flora of North America 2: 45.

Walter, Thomas. 1788. Flora Caroliniana. London. p. 108.

REDISCOVERY OF ORCUTTIA FRAGILIS (GRAMINEAE)

John R. Reeder & Charlotte G. Reeder
Herbarium, University of Arizona, Tucson 85721

In early January of 1939, H. S. Gentry, following the old road through the Magdalena Plain in Baja California Sur, crossed the Llanos de Hiray. Here he collected a grass which J. R. Swallen (J. Washington Acad. Sci. 34: 308. 1944) determined to be a species of Orcuttia new to science, naming it O. fragilis. There must have been unusually heavy rains during the previous months, for Gentry's label data are: "An abundant forage grass over the great flood plain following rain storage. Reported excellent for cattle." Apparently no collections of this species have been made since, as no specimens, other than those of the type collection, are to be found in herbaria. Inquiry of those botanists who have worked a great deal in Baja California (e.g. Annetta Carter, Duncan Porter, Reid Moran) elicited the information that none of them has seen the species in the field. It is noteworthy that I. L. Wiggins' new Flora of Baja California (1980) does not list the species as occurring on the peninsula, even though it was included by Shreve & Wiggins (Vegetation and Flora of the Sonoran Desert, 1964). In the latter publication, in which the treatment for the grasses was contributed by Swallen, the type locality is erroneously given as "Llano Datillare."

Orcuttia fragilis is one of eight taxa recognized in the genus. All are annuals, endemic to California and Baja California where they are characteristic of vernal pools. The seeds remain viable for many years, germinating only after their habitats have been flooded. A particular pool may have no Orcuttia for several dry years, but after sufficient rains may support a large population, sometimes an essentially pure stand, as the habitat dries. Except for its relationship to the monotypic California endemic, Neostapfia, Orcuttia appears to have no close relatives. For this reason a special tribe, the Orcuttieae, has been erected to accommodate these two genera (Reeder, J. R., Madroño 18: 18—28. 1965).

With assurances that the moisture conditions on the Peninsula were exceptionally favorable that year, in late December, 1974, we planned a trip to the Llanos de Hiray in an attempt to determine whether or not Orcuttia fragilis still exists in nature, and to learn more about this rare species. We were able to locate the area (even though Gentry had given the locality on his label as "Llano Dirai"), but although the plain was green with vegetation, the only Orcuttia to be seen consisted of dry and weathered clumps, and there were great cracks in the soil. In subsequent visits between the years 1974 and 1978 we found no evidence of this grass. In fact, the entire llano area was dry and parched with little herbaceous vegetation. This led us to wonder whether the extensive development of irrigated agriculture slightly to the north, in the area of Cd. Constitución, had lowered the water table sufficiently



UNIVERSITY OF CALIFORNIA HERBARIUM
 BAJA CALIFORNIA, MEXICO

Orcuttia fragilis Swallen

BAJA CALIFORNIA SUR: Llano de Miray,
 an extensive open plain which may
 become flooded after infrequent heavy
 rains. Forming a pure stand for a
 distance of 5 miles, this collection
 from the western end. Plants freely
 branching, the resulting clumps as
 much as 50 cm across.
 Chromosome no.: 2n = 40
 Elevation 20 m May 11, 1979
 John R. Heeder 7151
 Charlotte G. Heeder

Orcuttia fragilis Swallen

to render the Llanos an unsuitable habitat for *Orcuttia fragilis*.

During the winter and spring of 1979, it may be recalled, the entire Baja California peninsula was subjected to particularly heavy rainstorms. Those who attempted to travel the new trans-peninsular highway during that period will remember the washed out bridges and generally poor condition of the roadbed. With this information, and the hope that 1979 might be the year for *Orcuttia*, in May we were again at the Llanos de Hiray. This time the aspect was unbelievable. *Orcuttia fragilis* was there, and in abundance. Hundreds of acres were covered with this grass, which was in full flower and forming an essentially pure stand. These llanos are extensive, and *Orcuttia* was abundant throughout the area—a distance of some five miles west to east. We were greatly excited to see this magnificent stand of a plant which for 40 years had been known to botanists only from the type collection. A. C. Smith (J. Arnold Arb. 30: 2. 1949) has expressed one's feelings under such circumstances so well that we can scarcely improve on his statement: "Collectors will agree with me that the rediscovery of a rare plant gives an emotional pleasure incomparably greater than its original discovery, at which time it is unexpected and usually unrecognized." This area is rangeland, and a number of cattle were on the Llanos. Although Gentry had indicated: "Reported excellent for cattle," we noted that none of the plants had been cropped. It appeared that grazing animals avoid *Orcuttia* if there is anything else available.

In September, 1979, there were again heavy rains on the Baja California peninsula. The Llanos de Hiray were flooded even more extensively than they had been during the previous winter and spring. When we visited the area in early June, 1980, we found a lake covering much of the Llanos. The flooding was so extensive that the old road crossing the plain was unusable and in places under water. The *Orcuttia* was again abundant, as it had been the year before, covering the lake margins with an unbroken greensward. In contrast to 1979, however, this time the area was swarming with cattle, and numerous "vacero" camps dotted the Llanos' edge. There seemed little vegetation other than *Orcuttia*, and this time it was evident that the grass was being grazed. The animals were thin, and appeared not to relish the forage, but rather to tolerate it since there was little else.

Orcuttia fragilis is not yet extinct! It flourishes on the Llanos de Hiray, but apparently nowhere else. One of the "rancheros" told us that this area may not be flooded for a period as long as 30 years. Is it possible that our *Orcuttia* has not been abundant here since Gentry found it in 1939? This interesting species will now be better represented in herbaria. We collected numerous specimens which will be distributed to important herbaria in this country and abroad. A revision of the genus *Orcuttia*, based on field work and chromosome counts for all taxa, is in the final stages of completion.

BOOK REVIEWS

Alma L. Moldenke

"MY LIFE IN THE WILD" by Ivan Tors, vi & 209 pp. & 37 b/w photo.
Houghton Mifflin Company, Boston, Massachusetts 02107. 1979.
\$10.95.

This is a fascinating, easy reading book for all ages with tales of the TV-movie famous dolphin Flipper, the bear Gentle Ben, the chimpanzee Judy, the killer whale Namu and the cross-eyed lion Clarence. It is also actually profound with the author's (1) descriptions of the intra- and inter-relations of the wild beasts of the African plains, (2) his "belief that baboons are closest to man in behavior patterns" and (3) his approval of Fuente's remark that "after humans muff chances, baboons will inherit the earth", and (4) "Among all animal life dolphins have contributed most to my better understanding of other kinds of intelligence. I have learned that an animal can possess a logic apart from Pavlovian conditioning and can have compassion and a cooperative spirit, not only towards his own species, but toward other species as well -- and that includes us.

His dolphin studies are much influenced by Dr. John Lilly. There is much, much more here that many people may like to know or to have effectively affirmed.

"THE KINDLY FRUITS OF THE EARTH -- Recollections of an Embryo Ecologist" by G. Evelyn Hutchinson, xiii & 264 pp. & 17 b/w illus. Yale University Press, New Haven, Connecticut 06520. 1979. #18.50.

"This little book was written because several younger friends interested in the history of science wondered what it was like to learn biology fifty years ago." It is really a pleasurable treat to read of this famous author's early school and family life, of Cambridge University years in the '20s, subsequent "cultural" travels and a first post in the University of Witwatersrand, of his long professional life at Yale University and its Peabody Museum, and of his early naturalist interests that ultimately grew into his water-bug and other population ecology studies. Reading this memoir leads to appreciation of the author's nimble mind; reading its dedication lends appreciation of his humanity:

"In gratitude to all who have helped me
In affection for all those I have tried to help."

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MISCELLANEOUS NEW SPECIES IN
THE PLEUROTHALLIDINAE (ORCHIDACEAE)

Carlyle A. Luer*

Barbosella geminata Luer, sp. nov.

Species haec *B. longipedi* Schltr. affinis sed nodis rhizomatum elongatorum bifoliatis uniradicatisque, pedunculo brevior, flore minore et labello oblongo distinguitur.

Plant medium in size for the genus, epiphytic, scandent; rhizome stout, elongated, occasionally branching, 3-6 cm long between secondary stems, with a close, tubular sheath near the middle; roots slender, produced singly at the apex (or base) of a segment of rhizome. Secondary stems produced in pairs, each unifoliate, abbreviated, 3-8 mm long, enclosed by 1-2 thin, close, ribbed sheaths. Leaf thick, coriaceous, linear-obovate, the apex acute, tridenticulate, gradually narrowed below to the base, 25-28 mm long, 3-5 mm wide. Inflorescence a solitary, yellow flower produced by a slender, erect peduncle 4-5 cm long, from the apex of a secondary stem; floral bract oblique, acute, 4 mm long; pedicel 1 mm long, with a filament 3-4 mm long; ovary 2 mm long; dorsal sepal very narrowly ovate, acute, 12 mm long, 1.5 mm wide; lateral sepals connate into an ovate, retuse synsepal 11 mm long, concave below the middle, 5 mm wide spread out; petals narrowly ovate, 8 mm long, 1.25 mm wide, the apex attenuate, acute, the margins microscopically serrulate below the middle; lip oblong, 3 mm long, 1.2 mm wide, the apex obtuse, the base rounded, deeply concave to accommodate the bulbous apex of the column-foot, with an infolded pair of carinae extending forward to the distal third; column stout, 2 mm long, the foot 1 mm long.

ETYMOLOGY: From the Latin *geminatus*, "doubled, paired," in reference to the paired leaves.

TYPE: COSTA RICA: SAN JOSE: epiphytic in cloud forest above Division, alt. 2850 m, Dec. 1979, Kerry S. Walter 79-888 (HOLOTYPE: SEL), C. Luer illust. 4830.

DISTRIBUTION: Costa Rica.

This species is similar to the Colombian *B. longipes*, but *B. geminata* may be distinguished by the twice smaller leaves and flowers. A pair of leaves is present at the apex of each segment of elongated rhizome where only a solitary root emerges. Apparently the opposite occurs in *B. longipes*. The apex of each new rhizome is terminated by the development of a single secondary stem and leaf, but the next growth from the apex of the rhizome produces a secondary stem and leaf as well as another prolonged segment of rhizome. In this manner a long, loose mat of entangled, scandent rhizomes is evolved, with a pair of equal-sized leaves at each node of the rhizomes.

*The Marie Selby Botanical Gardens, 800 South Palm Avenue, Sarasota, FL 33577, U.S.A.

Cryptophoranthus cymbula Luer, sp. nov.

Species haec *C. pleurothallopsis* Krzl. affinis sed lamina labelli elliptica subacuta cymbiformi differt.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems slender, unifoliate, 1.5-2.5 cm long, enclosed by 2-3 thin, ribbed, tubular sheaths. Leaf erect, coriaceous, elliptical, 3.5-5 cm long including a 6-8 mm long petiole, 1.2-1.5 cm wide, the apex acute, acuminate, tridenticulate, the base acuminate into the petiole. Inflorescence a loose, successively few (3)-flowered raceme to 6.5 cm long including the filiform peduncle, from the apex of the secondary stem; floral bract 3-4 mm long; pedicel 6-9 mm long; ovary curved, 3 mm long; sepals greenish white, suffused with red-purple, glabrous externally, with short, red, glandular hairs within, the dorsal sepal narrowly ovate, acute, 11 mm long, 3.5 mm wide, free at the base, the margins adherent to the synsepal above the middle, forming lateral apertures in the lower half of the flower, the lateral sepals connate into a deeply concave, ovate, obtuse, bicarinate synsepal 11 mm long, 5 mm wide unspread; petals translucent yellow-white, suffused with rose, obovate-spatulate, 5 mm long, 2 mm wide, the apex acuminate, acute; lip white, red along the margins with glandular cells, three-lobed, 11 mm long, 4 mm wide spread, 10 mm long, 3 mm wide unspread, the blade elliptical, subacute, cymbiform, the truncate base concave, immovably attached to the column-foot, the lateral lobes above the base, erect, oblong, oblique, rounded, 1 mm long; column greenish white, suffused with purple, clavate, 4 mm long, the apex toothed, the base pedestal-like.

ETYMOLOGY. From the Latin *cymbula*, "a little boat," referring to the appearance of the lip.

TYPE: ECUADOR: PICHINCHA: epiphytic in cloud forest near Santo Domingo, alt. 530 m, 22 July 1979, C. H. Dodson, H. H. Morgan & T. Dodson 8551 (HOLOTYPE: SEL), cult. at SEL, flowered in cult. 10 Dec. 1979, C. Luer illust. 4817.

DISTRIBUTION: Eastern Ecuador.

This little species is superficially similar to *C. pleurothallopsis* but the non-spotted flowers are readily distinguished by the white, cymbiform lip with a red margin of glandular cells.

Dryadella hirtzii Luer, sp. nov.

Planta pro genere grandis scandens breviter repens, flore grandi solitario breviter pedunculato virescenti purpureo guttato ecaudato, sepalo dorsali breviter acuminato minute ciliato, sepalis lateralibus libris divergentibus ovatis verrucosis, petalis pentangulatis, lamina labelli reniformi basi bilobata bicallosaque.

Plant large for the genus, epiphytic, shortly repent, scandent, the primary stems ascending, 5-10 mm between secondary stems; roots coarse, flexuous. Secondary stems purple, 15-28 mm long, unifoliate, enclosed by 2-3 thin, loose, white, tubular sheaths. Leaf erect, green, coriaceous, narrowly obovate, 4.5-6.5 cm long, 5-6 mm wide, the apex acute, tridenticulate, the base gradually narrowed into a purple petiole. Inflorescence a succession of

solitary flowers borne by a peduncle 1 mm long from a node on the secondary stem; floral bract and pedicel each 5-6 mm long; ovary tri-lobed, 1.5-2 mm long; sepals light green, spotted with red-purple, the dorsal sepal broadly ovate subcarinate externally, shortly acuminate, acute, 9 mm long, 5 mm wide, connate to the lateral sepals for 1 mm, the margins minutely ciliate, the lateral sepals free, widespread, ovate, acute, 8 mm long, 3.5 mm wide unspread, the sides revolute, the surface sparsely verrucose, the base deflexed below the transverse callus; petals yellow, suffused with purple, obscurely oblong-pentangular, 2.5 mm long, 2 mm wide, the apex obliquely truncate, with a narrow, rounded lobule midway on the labellar margin above a curved thickening along the lower portion of margin; lip yellow, heavily marked with red, spatulate, 4 mm long, 3 mm wide, the deflexed blade reniform, 2.5 mm long, 3 mm wide, the margin broadly rounded, lightly repand, with a pair of erect, marginal angles near the junction with the 1.5 mm long claw, the disc with a pair of low, converging calli at the base, the claw 1.5 mm long, bi-auriculate at the base; column green, suffused with purple, semiterete, 3 mm long, longitudinally winged above the middle.

ETYMOLOGY: Named in honor of Alexander C. Hirtz of Quito, Ecuador, who discovered this species.

TYPE: *ECUADOR: PINCHINCHA:* epiphytic in cloud forest near Rio Solante, alt. ca. 2000 m, 28 Oct. 1979, cultivated at SEL 79-1015, flowered in cult. 21 Feb. 1980, *C. Luer, J. Luer & A. Hirtz 5199* (HOLOTYPE: SEL).

DISTRIBUTION: Western Ecuador.

This species is characterized by the ascending habit, large, coarse roots, and large, short-pedunculate flowers without tails. The dorsal sepal is minutely ciliate; the lateral sepals are verrucose; and the blade of the lip is broadly rounded with a pair of basal calli and lobules.

***Masdevallia alexandri* Luer, sp. nov.**

Species haec *M. heteropterae* Rchb. f. et affinitatibus cognata sed floribus parvis sepalis glabris brunneo fasciatis, petalis multangulis carinatis apiculatis basi lobulatis et labello arcuato subpandurato bicarinato apice rotundato distinguitur.

Plant small, epiphytic, caespitose; roots slender, fasciculate. Secondary stems ca. 1 cm long, unifoliate, enclosed by 2 thin, tubular sheaths. Leaf suberect, thinly coriaceous, elliptical, petiolate, 4-8 cm long including the 1.5-3 cm long petiole, 1.5-2 cm wide, the apex acute, tridenticulate, cuneate below into the conduplicate petiole. Inflorescence a single flower borne successively in a congested, 3- to 4-flowered raceme at the summit of a slender, erect peduncle 8.5-9 cm long, with a bract near the middle, embraced below the middle by the conduplicate leaf-petiole, from a node on the secondary stem; floral bracts imbricating, thin, tubular, 5-6 mm long; pedicels 7 mm long; ovary smooth, greenish brown, 3 mm long; sepals glabrous, light greenish brown with multiple minute bars of dark brown, the dorsal sepal sub-orbicular, concave, 7 mm long, 6.5 mm wide, connate to the lateral sepals for 1 mm, the apex rounded, contracted into a slender, erect, brown tail 23-25 mm long, the lateral sepals light yellow-brown toward the bases, obovate-oblong, 9 mm long, 3 mm wide, united to the column-foot to form a

rounded mentum, then deflexed, the rounded apices contracted into tails similar to that of the dorsal sepal, 22-27 mm long; petals yellow-green, suffused and marked with brown, oblong-multangular, 4 mm long, 2 mm wide, the obtuse apex apiculate, obscurely bi- or trilobed above the middle on the upper margin, dilated on the lower margin with a carina ending in a rounded lobule at the base; lip brown, oblong-subpandurate, arcuate, 4 mm long, 2.25 mm wide spread out, the apex rounded, the base subcordate, hinged beneath, the disc with a pair of low, parallel calli from near the middle to the apex; column yellow, dotted with purple-brown, semiterete, 3.5 mm long, with an equally long, curved column-foot.

ETYMOLOGY: Named in honor of Alexander C. Hirtz of Quito, Ecuador, who discovered this species.

TYPE: ECUADOR: PICHINCHA: epiphytic in cloud forest above Mindo, alt. 2200 m, 20 Oct. 1979, A. Hirtz & A. Andreetta s.n. (HOLOTYPE: SEL), C. Luer, illust. 4374.

DISTRIBUTION: Western Ecuador.

This small species is related to *M. heteroptera* and its allies, but may be distinguished by the small habit, glabrous sepals minutely banded in brown, multangular petals with a carina along the lower margin ending in a distinct lobule at the base, and a subpandurate, arcuate lip. Although these basically similar species form a unit or section within *Masdevallia*, in my opinion they are not generically distinct. The single characteristic of the hinge of the lip originating below the margin of the apex of the column-foot is found in other species of *Masdevallia*.

Masdevallia carolloi Luer & Andreetta, sp. nov.

Inter species sectionis *Alaticaulium* krzl. racemo congesto usque 6-floro, sepalis in tubum cylindricum satis connatis, sepalis lateralibus latissimis acuminatis brevicaudatis, petalis longitudine unicarinatis et labello ligulato apice minute verruculoso tricarinato distinguitur.

Plant medium in size, epiphytic, caespitose; roots coarse, flexuous. Secondary stems stout, unifoliate, 1-1.5 cm long, concealed by 2-3 loose, white, tubular sheaths. Leaf suberect, thickly coriaceous, narrowly obovate, 6-12 cm long, 1.5-2.1 cm wide, the apex subacute, tridenticulate, gradually narrowed below into an indistinct petiole. Inflorescence a congested 5- to 6-flowered raceme, 1-3 flowers produced simultaneously, at the apex of an erect, stout, sharply triquetrous peduncle 8-12.5 cm long, with a basal bract, from a node near the base of the secondary stem; floral bracts imbricating, broadly conduplicate, acute, 8-10 mm long; pedicel 4-6 mm long; ovary 5 mm long; dorsal sepal yellow-green, oblong, carinate, connate to the lateral sepals for 10 mm to form a gaping cylindrical tube, the free portion triangular, acute, acuminate into a suberect terete, green to purplish tail ca. 15 mm long, the total length of the dorsal sepal 27 mm, the width 9 mm; lateral sepals yellow-green, faintly to intensely suffused with purple, glandular-cellular within, connate 12 mm into a broadly ovate, bifid lamina 22 mm wide, 22 mm long, forming a deep mentum with the column-foot, the apices acute, acuminate into tails ca. 9 mm long; petals yellow, oblong, 9 mm long, 3 mm wide, the obtuse apex apiculate, the lower margin slightly dilated, with a low, longitudinal carina near the margin; lip red-purple, oblong-ligu-

late, 10 mm long, 4.5 mm wide, the disc with a pair of low carinae from above the middle extending to the minutely verrucose, obtuse apex, the carinae converging to either side of a central apical callus, the base subcordate, hinged beneath; column white with purple margins, semiterete, 8 mm long, the foot 4 mm long with an incurved extension.

ETYMOLOGY: Named in honor of Padre Luis Carollo, Salesian Missionary in the Oriente of Ecuador, co-discoverer of this species.

TYPE: *ECUADOR*: ZAMORA-CHINCHIPE: epiphytic in cloud forest near Rio San Bosco, alt. 1000 m, Oct. 1977, A. Andretta, L. Carollo & M. Portilla 1723, cult. in Cuenca by Padre Andretta, flowered in cult. Nov. 1979, *C. Luer 4693* (HOLOTYPE: SEL).

DISTRIBUTION: Southern Ecuador.

This species is similar to many of the species related to *M. bicolor* Poepp. & Endl., but *M. carolloi* differs in the larger number of flowers eventually produced in the raceme; the tail of the dorsal sepal that is proportionately longer compared to the short, acuminate tails of the lateral sepals; the apiculate petals with a longitudinal carina above the lower margin; and a lip with less prominent folds above the middle, represented merely by low carinae that extend to the apex to either side of a central callus.

The population of this recently discovered species is represented by both lightly and darkly colored forms.

Masdevallia chasei Luer, sp. nov.

Species haec *M. calurae* Rchb. f. affinis sed foliis angustioribus, pedunculo unifloro (interdum bifloro), floribus alboflavescentibus minoribus caudis brevioribus, petalis secus marginem inferiorem incrassatis et labello bilamellato distinguitur.

Plant medium-sized, epiphytic, caespitose; roots slender, flexuous. Secondary stems slender, unifoliate, 2-3 cm long, enclosed by a loose tubular sheath and another 1-2 at the base. Leaf erect, coriaceous, narrowly obovate, long-petiolate, 10-13 cm long including the 3-5 cm long petiole, 1.1-1.4 cm wide, the subacute apex tridenticulate, gradually narrowed below into the slender petiole. Inflorescence a solitary flower, occasionally followed by a second flower, produced by a suberect, slender peduncle 5-8 cm long, with a short bract near the base, from a node on the secondary stem; floral bract 10-12 mm long; pedicel 18-20 mm long; ovary 5-6 mm long; dorsal sepal yellowish white, veined in purple toward the base, oblong, 17 mm long, 7 mm wide, connate to the lateral sepals for 15 mm to form a curved cylindrical tube, the free portion transversely triangular, the apex contracted into a slender, yellow, forwardly directed tail; lateral sepals connate 18 mm into an elliptical, arcuate, bifid lamina 15 mm wide, the obtuse apices contracted into 8 mm long tails, the entire length of the lateral sepals 30 mm; petals dark rose, thick, oblong-elliptical, 4.5 mm long, 2 mm wide, the apex obtusely angled, the labellar margin slightly dilated and thicker; lip rose, oblong-ligulate to slightly pandurate, 5 mm long, 2 mm wide, the apex thickened centrally, obtuse with microscopically erose margins, the disc with a short pair of rounded lamellae just above the middle, the base shallowly subcordate; column rose, semiterete, 4 mm long, with a stout foot 2 mm long.

ETYMOLOGY: Named in honor of Mark Chase of the University of Michigan, co-discoverer of this species.

TYPE: COSTA RICA: PUNTARENAS: epiphytic near Monteverde, alt. 1500-1700 m, 15 Aug. 1979, K. S. Walter & M. Chase 79306 (HOLOTYPE: SEL; ISOTYPE: CR), C. Luer illust. 4832.

DISTRIBUTION: Costa Rica.

This species is related to several of the well-known Costa Rican species, most closely allied to *M. calura*, but *M. chasei* may be distinguished by the narrower leaves; smaller, yellowish white, usually solitary, flowers; petals thickened along the labellar margin without a distinct carina; and the lip with a short pair of erect lamellae. From *M. marginella* Rchb. f. it may be distinguished by the narrow leaves longer than the inflorescences and the smaller flowers with a non-denticulate lip.

Masdevallia humilis Luer, sp. nov.

Species haec *M. zahlbruckneri* Krzl. affinis sed flore minore cum caudis sepalorum lateralium brevioribus, petalis sine dente supra basim et labello non-verrucoso differt.

Plant small to medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems stout, unifoliate, 1-1.5 cm long, enclosed by 2 thin, close, tubular sheaths. Leaf suberect, light green, thickly coriaceous, narrowly obovate, 6-10 cm long, 1.4-2 cm wide, the apex obtuse to rounded, tridentate, gradually narrowed below into an indistinctly petiolate base. Inflorescence a horizontally creeping, successively and distantly few-flowered raceme 4-7 cm long including the purple peduncle, from a node low on the secondary stem; floral bract tubular, 4-5 mm long; pedicel 5-6 mm long; ovary light green, suffused with rose, 3 mm long; flowers small, glabrous; dorsal sepal light yellow, ovate, 12-14 mm long including the 6-8 mm long, suberect tail, 4 mm wide, connate to the lateral sepals for 3 mm to form a short, cylindrical tube, the free portion triangular, acute; lateral sepals pale yellow, lightly suffused with purple externally, minutely speckled with purple within, connate 8 mm into a bifid, elliptical lamina 7-8 mm wide, 12-13 mm long including the 3-4 mm long, diverging tails from the adjacent, acute apices; petals white, marked with red-purple on the labellar half, oblong, 4.5-5 mm long, 1.75 mm wide, the apex truncate, tridentate, the labellar margin thickened with a low callus; lip white, minutely speckled with purple, oblong, ligulate, 5 mm long, 2 mm wide, the apex smooth, rounded, the base subcordate, hinged beneath, the disc shallowly channeled between a pair of low carinae near the middle; column white, edged in purple, semiterete, 4 mm long, the foot 2 mm long with a short, incurved extension.

ETYMOLOGY: From the Latin *humilis*, "humble, or low," referring to qualities of the plant.

TYPE: BOLIVIA. COCHABAMBA: epiphytic in forest near Villa Tunari, alt. ca. 400 m, Dec. 1978, cultivated at SEL s.n., flowered in cult. 15 Jan. 1980, C. Luer, J. Luer et al. 4844 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This species is characterized by the purple, creeping peduncle that pro-

duces small, lusterless flowers. They are similar to those of *M. zahlbruckneri* but smaller with shorter tails, less colorful, petals without the basal tooth, and a smooth apex of the lip.

Masdevallia hydrae Luer, sp. nov.

Inter species sectionis *Polystictarum* Krzl. racemo secundo laxifloro, tubo sepalorum urceloato virescenti purpureo-punctato intus sparsim longipubescenti caudis aequilongo, petalis oblongis truncatis et labello purpureo oblongo arcuato bicristato antice flabellato distinguitur.

Plant small to medium in size, epiphytic, shortly repent, ascending to caespitose; roots slender, flexuous. Secondary stems slender, unifoliate, 1-1.5 cm long, concealed by 2-3 tubular sheaths. Leaf suberect to erect, coriaceous, narrowly obovate, long-petiolate, 4-9 cm long including the 2-3.5 cm long petiole, 0.6-1 cm wide, the apex subacute, tridenticulate, the base gradually narrowed into the slender petiole. Inflorescence a loose, few-flowered, subsecund raceme 12-18 cm long including the slender peduncle, from a node on the secondary stem; floral bract oblique, 4-5 mm long; pedicle 4-5 mm long; ovary green with purple dots, obscurely costate, 2 mm long; sepals light green, dotted with purple, especially along the veins, with a few long hairs within; dorsal sepal oblong, concave, 7 mm long, 4 mm wide, connate to the lateral sepals for 6 mm to form an urceolate, sepaline tube, the free portion transversely triangular, obtuse, abruptly contracted into an up-curved 7 mm long, purple-spotted tail; lateral sepals connate 5 mm into a subelliptical, concave synsepal 6.5 mm long, 5 mm wide, forming a rounded mentum with the column-foot at the base, the free apices subacute, contracted into tails similar to that of the dorsal sepal; petals translucent greenish white, oblong, slightly curved, 2.5 mm long, 0.75 mm wide, the truncate apex erose, with a slight thickening along the labellar margin; lip heavily marked with maroon, oblong, arcuate with erect margins, 2.5 mm long, 1.25 mm wide, narrowed above the middle, then expanded into a decurved, flabellate, broadly rounded, microscopically erose, microscopically papillose apex, the disc with a pair of denticulate carinae extending onto the expanded apical portion; column green, spotted with purple, semiterete, 3 mm long, the foot equally long.

ETYMOLOGY. From the Latin *hydrae*, "freshwater polyps, or hydrae," in allusion to the appearance of the inflorescence.

TYPE: ECUADOR: LOJA: epiphytic in cloud forests of the western slopes of the cordillera, alt. 2000 m, Dec. 1974, B. Malo s.n., cultivated near Cuenca, flowered in cult. 16 July 1977, C. Luer 1717 (HOLOTYPE: SEL).

DISTRIBUTION: Southern Ecuador.

This species of the *Polysticta* section may be recognized by the green, purple-dotted, urceolate sepaline tube. The tube is constricted above the middle with a stoma surrounded by spreading tails, in the manner of the tentacles of a marine polyp.

Masdevallia menatoi Luer & Vásquez, sp. nov.

Planta mediocris caespitosa, pedunculo guttato suberecto tereti paucifloro foliis anguste obovatis subaequilongo, floribus successivis parvis cam-

panulatis brunneolis caudis aurantiacis brevibus recurvis, sepalis rotundatis abrupte caudatis, petalis anguste oblongis apice tridentatis margine inferiore carinato, labello oblongo guttato supra medium obtusangulato apice obovato minutissime verruculoso denticulato.

Plant medium-sized, epiphytic, caespitose; roots slender, flexuous. Secondary stems slender, 3-4.5 cm long, unifoliate, enclosed by 3 loose, brown, tubular sheaths. Leaf erect, thickly coriaceous, narrowly obovate, petiolate, 10-15 cm long including the 3-4 cm long petiole, 1.8-2.2 cm wide, the apex subacute to obtuse, tridenticulate, gradually narrowed below into the petiole. Inflorescence a short raceme of 2-6 small flowers in rapid succession, borne by a suberect, terete peduncle speckled with purple, 8-10.5 cm long with a bract at the base, from a node low on the secondary stem; floral bract oblique, acute, dotted with purple, 10-14 mm long; pedicel dotted with purple, 10-12 mm long; ovary 3 mm long; dorsal sepal yellow, lightly suffused with rose, obovate, 10 mm long, 7 mm wide, connate to the lateral sepals for 7 mm to form a broad, cylindrical tube, the free portion broadly triangular, subacute, contracted into an erect, terete, orange, 10 mm long tail, slightly thickened toward the apex; lateral sepals brown or yellow, suffused with brownish purple, more or less obovate, connate 8 mm, each 14 mm long, the free portions rounded, revolute, 7 mm wide, cellular pubescent within, abruptly contracted into orange, recurved tails 5 mm long; petals yellowish white, narrowly oblong, 6 mm long, 1.5 mm wide, the apex tridenticulate, with a low carina along the labellar margin; lip yellow, dotted with purple-brown, more or less oblong, 6 mm long, 2.75 mm wide, with a pair of obtusely angled, lobe-like, marginal folds just above the middle, the anterior portion obovate, obtuse, minutely verrucose and denticulate, with broadly rounded, suberect margins below the middle, the base retuse, hinged beneath; column greenish white with purple margins, semiterete, 5 mm long, the foot 3 mm long with a short, incurved extension.

ETYMOLOGY: Named in honor of Sr. Dino Menato of Chulumani, Bolivia, who collected and has successfully cultivated this species.

TYPE: BOLIVIA: LA PAZ: Prov. of Sud Yungas, epiphytic in forest near Chulumani, ca. 1800 m, D. Menato s.n., cultivated in Chulumani, flowered in cult. 31 Jan. 1980, *C. Luer & R. Vasquez 5039* (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This species is readily recognized by the round, spotted peduncles nearly as long as the fleshy, obovate leaves. Some clones bear no more than three flowers on each peduncle, while others consistently bear five or six in succession. Two flowers are frequently produced simultaneously. The comparatively small flowers are brownish, wax-like in texture, with short, recurved, orange tails.

Masdevallia vasquezii Luer, sp. nov.

Planta parvula caespitosa, foliis ellipticis petiolis nigrescentibus, pedunculo gracili brevi unifloro, sepalis roseis atropurpureo costatis caudis gracilibus aequilongis, petalis oblongis apice tridentatis basi unidentatis, labello oblongo subacuto arcuato sulcato.

Plant very small, epiphytic, caespitose; roots slender, flexuous. Secondary stems slender, blackish, unifoliate, 0.5-1 cm long, with 1-2 loose, tubular, basal sheaths. Leaf erect, coriaceous, minutely dotted with black beneath, elliptical to narrowly obovate, petiolate, 3-3.5 cm long including the 1.2-1.3 cm long petiole, 9-10 mm wide, the apex subacute, tridenticulate, the base cuneate into the blackened petiole. Inflorescence a solitary flower borne by a suberect to transverse, filiform peduncle ca. 13 mm long, with a bract near the base, from a node low on the secondary stem; floral bract tubular, 5 mm long; pedicel 6 mm long; ovary purple, 4 mm long; sepals translucent rose, veined in dark purple, glabrous, the dorsal sepal obovate, carinate, 10 mm long, 4.5 mm wide, connate to the lateral sepals for 5 mm to form a curved sepaline tube, the acute apex of the free triangular portion contracted into a filiform tail 8 mm long, the lateral sepals obovate, oblique, connate 3 mm to form a mentum below the column-foot, the subacute, ovate, free portions contracted into tails similar to that of the dorsal sepal; petals white, marked with purple, oblong, 3.5-4 mm long, 1.5 mm wide, the truncate apex tridentate, the lower margin with a low, longitudinal carina ending in a short, retrorse tooth at the base; lip rose, marked with dark purple, especially in two longitudinal stripes, oblong, 5.5 mm long, 2.25 mm wide, arcuate, the recurved apex subacute, slightly dilated at the base with suberect margins, the margins recurved above the base, the disc sulcate; column white, semiterete, 3 mm long, with a foot 2.5 mm long.

ETYMOLOGY: Named in honor of its discoverer, Sr. Roberto Vásquez Ch., of Cochabamba, Bolivia, investigator of the Cactaceae and Orchidaceae of Bolivia.

TYPE: *BOLIVIA*: COCHABAMBA: PROV. of Chapare, epiphytic in cloud forest en route to Villa Tunari, alt. 2900 m, 22 Jan. 1980, C. Luer, J. Luer & R. Vásquez 4909 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This little species, found by Roberto Vásquez, was growing on the trunk of a small tree in a mossy forest in close association with *M. hajekii* Luer and *M. nebulina* Luer; all three species were in flower. In this particular area *M. hajekii* was infrequent, although it is abundant at slightly lower elevations. *Masdevallia nebulina* was frequent, but *M. vasquezii* was very rare.

The latter may be recognized by the little, purple-striped flowers with slender tails about as long as the sepals themselves. The petals are tridentate, and the striped lip is ligulate and arcuate.

Octomeria monetalis Luer, sp. nov.

Planta parva caespitosa, caulibus secundariis brevibus vaginis inflatis costatis scabrosis imbricatis obtectis, foliis crassis purpureis circularibus, floribus magnis carnosus solitariis successivis, sepalis petalisque libris ellipticis purpureo suffusis, labello trilobato infra medium bicalloso antice rotundato lobis basalibus obtusis.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems suberect, unifoliate, 15-25 mm long, concealed by 3-4 loose, imbricating, ribbed, scabrous, often evanescent sheaths. Leaf erect, coriaceous, orbicular, green, suffused and mottled with purple above, purple beneath,

25-30 mm long, 22-27 mm wide, the rounded apex notched, mucronate, the rounded base abruptly contracted into a twisted petiole 1.5 mm long. Inflorescence a succession of solitary, large, fleshy flowers held behind the leaf from the apex of the secondary stem, the spathe fugacious; peduncles 1-3 mm long; floral bract 4 mm long; pedicel 4 mm long with an equally long filament; ovary dark green, 4 mm long; sepals free, thick, dull yellow-green, suffused and veined in purple, elliptical, 11-16 mm long, 4.5-6 mm wide, subacute to obtuse at the apex; petals rose, elliptical, 8-11 mm long, 3 mm wide, the apex obtuse to rounded; lip yellow-green, marked with purple, obovate, 3-lobed, 7-7.5 mm long, 5.5 mm wide, the broadly rounded apex more or less retuse, the lateral lobes erect, obtuse, near the truncate base, the disc with a parallel pair of thick, rounded calli; column greenish white, semiterete, 4-5 mm long, with a short foot.

ETYMOLOGY: From the Latin *moneta*, "money, or a coin," in reference to the shape of the leaves.

TYPE: ECUADOR: ZAMORA-CHINCHIPE: epiphytic in cloud forest near Valladolid, alt. ca. 2000 m, collected by W. Teague & L. Figueroa, cultivated in San Francisco, flowered in cult. 21 April 1979, *C. Luer 3646* (HOLOTYPE: SEL).

ADDITIONAL MATERIAL EXAMINED: ECUADOR: ZAMORA-CHINCHIPE: epiphytic on the road to Zamora, alt. 1800 m, 11 June 1958, *C. H. Dodson 222* (SEL).

DISTRIBUTION: Southern Ecuador.

This species is readily recognized by the small circular leaves borne by short secondary stems clothed by loose, scabrous sheaths. The large flowers are fleshy with a lip not unlike that of many species in the genus.

Platystele altarica Luer, sp. nov.

Planta parva dense caespitosa, radicibus crassis, racemo paucifloro debili foliis obovatis duplolongiore, floribus successivis, sepalis petalisque ovatis longi-acuminatis transludicis flavis bruneonervis, labello ovato obtuso dense pubescenti pilis purpureis clavatis.

Plant small, epiphytic, densely caespitose; roots coarse, flexuous. Secondary stems 3-4 mm long, unifoliate, enclosed by 2 thin, white, tubular sheaths. Leaf erect, coriaceous, obovate, petiolate, 15-20 mm long including a petiole 3-5 mm long, 5-6 mm wide, the apex obtuse to rounded, notched and apiculate, cuneate below into the petiole. Inflorescence a delicate, loose raceme 3-5 cm long with up to 7 successive flowers, the peduncle and rachis filiform, from a node on the secondary stem; floral bract 1 mm long; pedicel 4 mm long; ovary 0.5 mm long; sepals and petals translucent yellow with a brown midvein; dorsal sepal ovate, glabrous, 3.5 mm long, 1 mm wide, the acute apex long-acuminate; lateral sepals ovate, oblique, glabrous, 3.25 mm long, 1 mm wide, the acute apex also long-acuminate; petals narrowly ovate 3 mm long, 0.5 mm wide, the margins with microscopically prominent cells, the apex acute, long-acuminate; lip ovate, narrowly obtuse, 1.3 mm long, 1 mm wide, with a large, transverse glenion above the truncate base, and a longitudinal, elliptical, glabrous, shallow depression above, all

the rest of the upper surface covered with a short, dense pubescence, the hairs clavate, purple, giving the lip a purple appearance, obscuring the dull white basic color; column stout, hooded, 1 mm long, 1 mm wide.

ETYMOLOGY: Named for Volcan Altar, below which the species was discovered.

TYPE: *ECUADOR*: CHIMBORAZO: epiphytic in cloud forest east of Riobamba near the base of Altar, alt. 3200 m, 14 Nov. 1979, cultivated at SEL 79-1817, flowered in cult. 15 Feb. 1980, C. Luer, J. Luer & A. Hirtz 5196 (HOLOTYPE: SEL).

DISTRIBUTION: Central Ecuador.

This little, high-altitude, successively flowered species is distinguished by the ovate, obtuse lip which is covered by a dense mat of short, purple, clavate hairs except for a large, transverse glenion and an elliptical, central depression.

Platystele alucitae Luer, sp. nov.

Planta perparva caespitosa, caulibus secundariis abbreviatis, racemo disticho plurifloro foliis anguste obovatis multilongiore, floribus successivis minutis flavo-virescentibus plus minusve purpureo suffusis, sepalis dorsali ovato concavo longicaudato, sepalis lateralibus anguste ovatis acuminatis, petalis filiformibus, labello atrobrunneo vel atropurpureo glanduloso ovato acuto basi excavato.

Plant very small, epiphytic, densely caespitose; roots comparatively thick, flexuous. Secondary stems abbreviated, unifoliate, 2-4 mm long, concealed by 2 loose, tubular sheaths. Leaf erect, coriaceous, narrowly obovate, petiolate, 8-18 mm long, 3-5 mm wide, the apex subacute, tridenticulate, gradually narrowed below into a slender petiole 3-7 mm long. Inflorescence an erect, distichous, several-flowered raceme up to 6.5 cm long bearing up to 15 minute flowers, 2-4 open simultaneously, the peduncle filiform, from a node on the secondary stem; floral bract oblique, acuminate, 1 mm long; pedicel 3-4 mm long; ovary 0.5 mm long; sepals and petals glabrous, translucent green or yellow, with or without purple suffusion; dorsal sepal ovate and concave in the lower third, 3-3.5 mm long, 0.5-1 mm wide, the apex acute, acuminate into a filiform tail; lateral sepals narrowly ovate, oblique, 3-4 mm long, 0.5-0.9 mm wide, connate at the bases, the apices narrowed into filiform tails; petals linear-capillary, 2.5-3 mm long, 0.1-0.3 mm wide; lip dark brown to dark purple, glandular-cellular, ovate, 0.75-1.5 mm long, 0.4-0.8 mm wide, the apex acute, the base truncate with a broad, depressed, semicircular area, shortly deflexed below; column hooded, 0.75 mm long and broad.

ETYMOLOGY: From the Latin plural of *alucita*, "a gnat," in allusion to the appearance of a flowering raceme.

TYPE: *ECUADOR*: IMBABURA: epiphytic in cloud forest above Apuela, alt. ca. 2500 m, 8 Feb. 1979, C. Luer, J. Luer, R. Escobar & A. Hirtz 3943 (HOLOTYPE: SEL).

DISTRIBUTION: Ecuador.

Numerous hair-like racemes, each bearing a succession of gnat-like flowers, tower above large tufts of leaves of this tiny species. The sepals are

long-caudate, the petals are capillary, and the little ovate lip is sharply acute with a curved excavation at the base.

Platystele microscopica Luer, sp. nov.

Inter species generis *Platysteles* Schltr. foliis parvis spatulatis, racemo longo multifloro leviter flexuoso floribus minutis, sepalis translucidis flavovirescentibus longiattenuatis, petalis capillaribus, labello atropurpureo lineari pubescenti cum callo basali subsphaeroideo dignoscenda.

Plant very small, epiphytic, caespitose; roots slender, fasciculate. Secondary stems 3-4 mm long, unifoliate, enclosed by 2 thin, loose, tubular sheaths. Leaf erect to suberect, thickly coriaceous, spatulate, 8-13 mm long including the 3-5 mm long petiole, 4-5 mm wide, the blade elliptical, obtuse, tridenticulate, cuneate below into the petiole. Inflorescence a gradually lengthening, loosely and successively many-flowered, lightly flexuous raceme up to 7 cm long including the filiform peduncle, bearing 2-3 minute flowers simultaneously, from a node on the secondary stem; floral bract 1 mm long; pedicel 4-5 mm long; ovary triquetrous, 0.4 mm long; sepals and petals translucent yellow-green; dorsal sepal ovate, the apex long-attenuate, 2.5 mm long, 0.5 mm wide; lateral sepals ovate, long-attenuate, 3 mm long, 0.6 mm wide; petals linear-ovate, long-attenuate, 2.2 mm long, 0.2 mm wide, the margins cellular-ciliate; lip purple, pubescent, linear, acute, 1.5 mm long, 0.2 mm wide, with a subspherical, pedunculated callus at the base beneath the column; column broadly cucullate, 0.5 mm long and wide, with an obsolescent foot.

ETYMOLOGY: From the Greek *microscopicos* (μικροσκοπικός), "microscopic," in reference to the size of the plant and flowers.

TYPE: COLOMBIA: NARINO: epiphytic in cloud forest above Ricaurte, alt. ca. 1600 m, 3 Nov. 1979, C. Luer, J. Luer & A. Hirtz 4608 (HOLOTYPE: SEL).

DISTRIBUTION: Southern Colombia.

This species may be identified by the small, spatulate leaves and hair-like racemes of nearly invisible flowers. The sepals and petals are extremely thin and translucent, and the purple lip is slender and pubescent.

Platystele spatulata Luer, sp. nov.

Planta parva caespitosa, racemo debili flexuoso filiformi multifloro foliis spatulatis multilongiore, floribus minutis, sepalis reflexis pallide flavovirescentibus ovatis, petalis reflexis attenuatis, labello purpureo suborbiculari crasso protrudenti.

Plant small, epiphytic, caespitose; roots coarse, flexuous. Secondary stems slender, unifoliate, 5-10 mm long, enclosed by 2-3 loose, ribbed, tubular sheaths. Leaf erect, thinly coriaceous, spatulate, long-petiolate, the blade suborbicular, 2-4 cm long including the 1-2 cm long petiole, 8-14 mm wide, the apex rounded, notched, with an apiculum in the sinus, cuneate below into the slender petiole. Inflorescence a progressively lengthening, weak, flexuous, many-flowered raceme producing 1 to 5 minute flowers simultan-

ously, the peduncle and rhachis capillary, 5-18 cm long, from a node on the secondary stem; floral bract 1-1.5 mm long; pedicel 4-7 mm long; ovary tricostrate, 0.5 mm long; sepals and petals reflexed, pale yellow-green, the dorsal sepal broadly ovate, obtuse, concave, 2 mm long, 1.5 mm wide, the lateral sepals oblique, ovate, subacute, reflexed with their back surfaces touching, the petals narrowly ovate, attenuate, acute, 2 mm long, 0.5 mm wide; lip red-purple, protruding forward, suborbicular, thick, with an obtuse, erect apex, 1.5 mm long, 1.25 mm wide, shallowly concave above, the sides involute beneath, the surface glandular-cellular and microscopically pubescent; column yellow-green with red stigmatic lobes, 0.5 mm long and wide, with an obsolescent foot.

ETYMOLOGY: From the Latin *spatulatus*, "shaped like a spoon," referring to the orbicular blades of the leaves borne by slender petioles.

TYPE: *ECUADOR:* PICHINCHA: epiphytic in cloud forest above Mindo, alt. 2200 m, 11 Nov. 1979, C. Luer, J. Luer & A. Hirtz 4751 (HOLOTYPE: SEL)

DISTRIBUTION: Western Ecuador.

This species may be distinguished by the spatulate leaves and a flexuous, filiform raceme of many, minute, yellow-green flowers with reflexed sepals and petals and a protruding round, red-purple lip.

***Pleurothallis ancora* Luer & Vásquez, sp. nov.**

Planta *P. setigeræ* Lindl. et affinitatibus similis sed labello base profunde uncinato distinguitur.

Plant very small, epiphytic, densely caespitose; roots slender, fasciculate. Secondary stems abbreviated, unifoliate, 4-8 mm long, enclosed by a thin, tubular, ribbed sheath. Leaf erect, coriaceous, narrowly obovate, petiolate, 20-35 mm long including the slender petiole 8-18 mm long, 3-5 mm wide, the apex subacute to obtuse, tridenticulate, gradually narrowed below into the petiole. Inflorescence a slender, loose, subracemose raceme of successive flowers, up to 9 cm long including the filiform peduncle, from a node on the secondary stem; floral bracts 0.75-1 mm long; pedicels 6 mm long below, to 2 mm long above; ovary 1 mm long; sepals and petals widespread, translucent, purple to pale green with purple midveins, glabrous; dorsal sepal ovate and concave in the lower third, carinate, the acute apex filamentous, 10 mm long, 1.75 mm wide; lateral sepals similar to the dorsal sepal, oblique, connate basally for 0.5 mm, 10 mm long, 2 mm wide; petals ovate and long-fimbriate in the lower third, the apex filamentous, 7 mm long, 1.5 mm wide; lip green below the middle, thick, obovate, 3-lobed, 3 mm long, 1.5 mm across the lateral lobes, the anterior lobe dark purple, convex, rounded, 1.2 mm wide, the margins long-ciliate, the lateral lobes erect, uncinately antrorse, 1.5 mm long, arising from near the base, the concave base extending forward into a deep, pubescent cleft formed by the thickened, touching sides of the lip; column slender, erect, curved, 2 mm long, with a thickened, bicallose foot.

ETYMOLOGY: From the Latin *ancora*, "an anchor," referring to the shape of the lip.

TYPE: *BOLIVIA:* COCHABAMBA: PROV. of Chapare, epiphytic in cloud forest along the road to Tablas, alt. 2300 m, 9 Feb. 1980, flowers green, C. Luer,

J. Luer & R. Vásquez 5172 (HOLOTYPE: SEL); flowers purple, *C. Luer, J. Luer & R. Vásquez 5168* (SEL).

DISTRIBUTION: Bolivia.

This little species is practically indistinguishable from those related to *P. setigera* until the lip is examined closely. As in *P. macroblepharis* Rchb. f., the anterior lobe of the lip is surrounded by a fringe of long, fine hairs, but arising from the base are a pair of large, forwardly directed uncinat lobes.

***Pleurothallis atacasana* Luer, sp. nov.**

Planta mediocris caespitosa, caulibus secundariis fasciculatis folio elliptico breviter petiolato aequilongis, racemis singularibus vel binis plurifloris, spatha parva, sepalis ciliatis flavis, sepalo dorsali libro ovato, petalis purpureis oblongis obtusis, labello purpureo ovato obscure trilobato, lobo antico obtuso concavo, lobis lateralibus rotundatis cum callis marginalibus.

Plant small to medium in size, epiphytic, caespitose, the rhizome ascending, shortly repent; roots slender, flexuous. Secondary stems erect, unifoliate, fasciculate, 4-8.5 cm long, mostly concealed by a long, loose, tubular sheath plus 2-3 imbricating sheaths at the base. Leaf erect, coriaceous, elliptical, 5-8 cm long including the 1-2 cm petiole, 1-1.4 cm wide, the obtuse apex tridenticulate, cuneate below into the petiole. Inflorescence racemose, 1-2 erect, subdensely several-flowered racemes 6-10 cm long including the slender peduncle 1-2 cm long, from a 5 mm long spathe at the base of the leaf-petiole; floral bract infundibular, 2.5-3 mm long; pedicel 2 mm long; ovary 2 mm long; sepals yellow, ciliate, lightly pubescent within, ovate, acute, the dorsal sepal free, concave, subcarinate, 5.5 mm long, 2.25 mm wide, the lateral sepals oblique, 5.25 mm long, 3.5 mm wide together, connate for 2 mm; petals purple, oblong, obtuse, concave, 3 mm long, 1.5 mm wide, 3-veined; lip purple, ovate obscurely 3-lobed, 2.5 mm long, 1.75 mm wide, the anterior lobe ovate, obtuse to rounded, concave, the lateral lobes erect, rounded, occupying the lower half of the lip, with a rounded callus along the anterior margins, the concave base fixed to the column-foot below a transverse carina; column stout, 1.5 mm long, with a short rounded foot.

ETYMOLOGY: Named for Mt. Atacaso where the species was discovered.

TYPE: ECUADOR: PICHINCHA: epiphytic in cloud forest on Atacaso, alt. 3500 m, 16 Feb. 1979, *A. Hirtz A-1* (HOLOTYPE: SEL), *C. Luer* illust. 3977A.

DISTRIBUTION: Central Ecuador.

This small species is similar to those larger species related to *P. elegans* (HBK) Lindl., but *P. atacasana* may be distinguished by the small habit, a small spathe, and a free dorsal sepal. The purple lip is similar to that of several of the related species.

***Pleurothallis calypso* Luer, sp. nov.**

Planta *P. dodsonii* Luer affinis sed habitu majore, foliis non-maculatis et spatha maxima differt.

Plant epiphytic, pendent, medium in size, to 40 cm in length, the pri-

mary stems dependent, 1.5-2.5 cm long between secondary stems, enclosed by 3 loose, white, conduplicate sheaths; roots slender, flexuous, from nodes of the primary stem. Secondary stems 1-1.5 cm long, unifoliate, enclosed by an inflated, conduplicate sheath. Leaf thinly coriaceous, unspotted, pendulous, elliptical, 4-6.5 cm long, 1.5-2.5 cm wide, the apex acute, tridenticulate, the base cuneate, sessile. Inflorescence a fascicle of successive, single flowers produced by 2- to 3- flowered congested racemes enclosed by 3-4 white, imbricating bracts ca. 3 mm long, the peduncles 1-2 mm long, the pedicels 2 mm long, the entire inflorescence concealed within a large, inflated, conduplicate, thin, papery spathe 2-4 cm long, 0.5-1.3 cm broad unfolded, minutely ciliate along the ribs and margins, from the axil of the leaf; ovary white suffused with purple, pubescent, 2.5 mm long; sepals triangular-ovate, acute, white, veined in bright rose, suffused with bright rose below the middle, the dorsal sepal connate to the lateral sepals for 1 mm, 7 mm long, 2.25 mm wide, the lateral sepals connate for 2 mm, 6.5 mm long, 2.5 mm wide, forming a mentum with the column-foot; petals white, suffused with bright rose below the middle, obovate-spatulate, subacute, 4 mm long, 1.5 mm wide; lip hastate-trilobed, 4 mm long, 3 mm wide across the lateral lobes, the lateral lobes erect, just above the base, suffused with dark purple, obtuse, oblique, each with a low carina extending onto the anterior lobe, the anterior lobe yellowish white, ovate, acute, minutely lacerate, the disc thickened at the base, the base hinged to the column-foot by a membranous strap; column white, suffused with rose, 2 mm long, winged at the apex, with a foot equally long.

ETYMOLOGY: Named for the classical mythological nymph Calypso who hid Ulysses, in allusion to the hidden flowers.

TYPE: *ECUADOR: ZAMORA-CHINCHIPE:* epiphytic in cloud forest between Loja and Zamora, alt. ca. 2000 m, Nov. 1979, *W. Teague, D. Welisch & L. Figueroa s.n.* (**HÖLOTYPE:** SEL), C. Luer illust. 4810.

DISTRIBUTION: Southern Ecuador.

This long, pendent plant is closely allied to *P. dodsonii*, but differs in the larger habit, unspotted leaves, and a large inflated spathe. Deep within the fold of the spathe, the free edges innermost, the little wooly flowers are produced on very short peduncles, even the ripening capsule never becoming exposed. The flowers are white and suffused with bright rose, the petals are spatulate, and the lip is hastate with an erose anterior lobe.

Pleurothallis capillifera Luer & Vásquez, sp. nov.

Species haec *P. fastidiosae* Luer similis sed racemo paucifloro stricto, sepalis petalis labelloque subulatis longioribus et petalis capillaribus differt.

Plant medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems suberect, slender, terete, 6-10 cm long, unifoliate, with a close, tubular sheath below the middle and another at the base. Leaf suberect, coriaceous, elliptical, 7-9 cm long including a 1 cm long, twisted petiole, 2.1-3 cm wide, the apex acuminate, acute, tridenticulate, the base cuneate into the petiole. Inflorescence an erect, straight, loose raceme of ca. 7 spindly, wide-spread flowers, 14-15 cm long including the slender peduncle, from a foliaceous spathe 3-4 cm long, 3-4 mm wide, from the apex of the

stem; floral bract tubular, 5 mm long, below the pedicel; pedicel 5-9 mm long; ovary 3 mm long; sepals translucent pale yellow with multiple small, pale red spots, glabrous, the dorsal sepal narrowly ovate-subulate, 15 mm long, 3.5 mm wide across the concave base, the lateral sepals completely connate into a narrowly ovate, narrowly obtuse synsepal 16 mm long, 4.5 mm wide near the base; petals dark red-purple with darker purple markings, narrowly ovate, subulate, oblique, the distal two thirds capillary, 15 mm long, 2 mm wide at the dilated biauriculate base; lip greenish white, dotted with red, narrowly ovate-subulate, 15 mm long, 2 mm wide, the truncate base immovably attached to the column-foot; column green, 1.5 mm long with an obsolescent foot.

ETYMOLOGY: From the Latin *capillus*, "a hair," and *-fer*, "-bearing," referring to the finely capillary petals.

TYPE: *BOLIVIA*: COCHABAMBA: Prov. of Chapare, epiphytic in cloud forest en route to Villa Tunari, alt. ca. 600 m, 24 Jan. 1980, cultivated at SEL 80-220, flowered in cult. 6 March 1980, C. Luer, J. Luer & R. Vásquez 5210 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This species is characterized by the long spathe subtending the erect, delicate inflorescence. The wide-spread, subulate flower-parts do not seem to be as sensitive or fragile as those of the closely related *P. fastidiosa* of Ecuador. The petals are long and hair-like, and the projecting lip is long and narrow.

Pleurothallis cerberus Luer & Vásquez, sp. nov.

Planta mediocris caespitosa, caulibus secundariis argute triquetris, racemis paucifloris folio elliptico sessili multibrevioribus, sepalis brunneis carnosius crassis breviter pubescentibus intus verrucosissimis lateralibus falcatis leviter cohaerentibus, petalis obovatis acutis serratis, labello oblongo obtuso bicarinato infra medium bilobato.

Plant medium-sized, epiphytic, caespitose; roots coarse, fasciculate. Secondary stems erect, terete at the base and concealed by 1-2 tubular sheaths, soon becoming sharply triquetrous, 10-17 cm long, 5 mm deep near the apex, unifoliate. Leaf erect, coriaceous, elliptical, 7-10 cm long, 2.5-3.2 cm wide, the apex subacute, tridenticulate, the base cuneate, sessile. Inflorescence racemose, 1-2, 1- to 4-flowered racemes 1-1.5 cm long, from the base of the leaf, with a spathe ca. 8 mm long; floral bract white, tubular, oblique, 3-4 mm long; pedicel shortly pubescent, 2 mm long; ovary shortly pubescent, 2 mm long; sepals brown, suffused with purple toward the base, thick fleshy, covered with a short, white pubescence, the internal surfaces markedly verrucose, the dorsal sepal obovate, subacute, 9.5 mm long, 2.5 mm wide, the lateral sepals falcate, subacute, lightly adherent to the apex, 6 mm long, 2.25 mm long; petals translucent white, suffused with purple, obovate, oblique, acute, 4 mm long, 1.5 mm wide, the margins serrate; lip dull yellow, suffused with purple, oblong 3 mm long, 1.25 mm wide, arcuate, the apex rounded with slightly irregular margins, with a pair of small, erect, denticulate marginal lobes below the middle, the base truncate, delicately hinged

between a pair of membranous lobules, the disc with a longitudinal pair of carinae from the lateral lobes to near the apex where they unite; column dark red-purple, semiterete, 2.5 mm long, obtusely winged above, the foot thick, pubescent, 2 mm long.

ETYMOLOGY. From the Latin *Cerberus*, a mythological, three-headed, dog-like monster, in allusion to the appearance of the few-flowered raceme.

TYPE: *BOLIVIA*: LA PAZ: Prov. Sud Yungas, without specific locality, collected near Chulumani by Dino Menato, flowered in cult. 1 Feb. 1980, C. Luer & R. Vásquez 5048 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This wing-stemmed species is characterized by the brown, fleshy, gaping flowers covered by a short, white pubescence. Within, the sepals are markedly verrucose, the petals are serrulate, and the oblong lip is bilobed below the middle.

***Pleurothallis chionopa* Luer, sp. nov.**

Planta parva longirepens, folio ovato caulibus secundariis erectis gracilibus brevioribus, racemo paucifloro brevissimo, floribus glabris niveis, sepalo dorsali anguste elliptico, synsepalo ovato, petalis subsigmoideis acutis erosis, labello oblongo crasso bicarinato cum angulis basalibus apiculatis.

Plant small, epiphytic, repent, the rhizome slender, 10-20 cm or more long, the segments of primary stem 1.5-4 cm long between secondary stems and with a short sheath at 2-4 internodes; roots few, slender, from nodes. Secondary stems erect, slender, laterally compressed above, unifoliate, 4-7.5 cm long, with 2-3 tubular sheaths near the base. Leaf coriaceous, suberect, ovate, 3.5 cm long, 1.5-2 cm wide, the acute apex tridentate, the rounded base sessile. Inflorescence a suberect to horizontal, 6- to 8-flowered raceme 1.5-2 cm long, from a spathe 4 mm long at the base of the leaf; floral bract 2 mm long; pedicel 1 mm long; ovary glabrous, 1.5 mm long; flowers snowwhite, glabrous; dorsal sepal erect, narrowly elliptical, 7 mm long, 2 mm wide, acute, apiculate; lateral sepals connate into an ovate lamina 6.5 mm long, 3.25 mm wide, the obtuse apex shortly acuminate; petals narrowly obovate-sigmoid, 2.25 mm long, 0.5 mm wide, the apex acute, the margins minutely erose; lip oblong, 2 mm long, 0.8 mm wide, with minutely subseriate margins, the apex obtuse, thickened below the middle with a pair of longitudinal calli merging into erect marginal angles at the base with minutely papillose, retrorse, apiculate apices, the base narrow, minutely bi-auriculate; column stout, 1.5 mm long, with a short foot.

ETYMOLOGY. From the Greek *chionopos* (χιονοπος), "snowwhite," in reference to the color (or absence of color) of the flowers.

TYPE: *ECUADOR*: NAPO: epiphytic in cloud forest north of Baeza, alt. 1650 m, 30 Oct. 1979, C. Luer, J. Luer & A. Hirtz 4494 (HOLOTYPE: SEL).

DISTRIBUTION: Eastern Ecuador.

This small species is distinctive in the long, creeping rhizome, erect secondary stems longer than the leaf they bear, and a short raceme of snowwhite flowers. The flowers reveal an alliance to those of *P. lanceana* Lodd.

Pleurothallis chloë Luer & Vásquez, sp. nov.

Species haec *P. scandenti* Ames similis sed flore majore, petalis longissimis supra medium teretibus et labello anguste oblongo bicarinato apice eroso differt.

Plant epiphytic, scandent, small to large, forming loose, pendent mats 1-2 meters long; roots slender, from the bases of secondary stems at the apices of previous secondary stems. Secondary stems slender, unifoliate, proliferating, 1-5 in a fascicle at the apex of another secondary stem, 1.5-6.5 cm long (or basally stout, to 20 cm or more long), enclosed by 2-4 close, tubular sheaths, the basal ones shortly hispid. Leaves erect, horizontal to pendent, coriaceous, narrowly elliptical, 4-11 cm long, 4-6 mm wide, the apex acute, tridenticulate, the base narrowly cuneate into an indistinct petiole 1-3 mm long. Inflorescence a dense fascicle of single, greenish white flowers produced 1-2 at a time, from the apex of a secondary stem; peduncles ca. 1 mm long; floral bract infundibular, engulfing the bases of the sepals, 3 mm long, hispid; pedicel ca. 1 mm long; ovary green, glabrous, 1 mm long; dorsal sepal ovate, acute, glabrous, 9 mm long, 3.5 mm wide, connate basally to the lateral sepals for 2 mm; lateral sepals ovate, oblong, oblique, subacute, 8 mm long, 3.25 mm wide, connate basally for 1-2 mm, shortly pubescent within near the base; petals oblong, 10 mm long, 2.25 mm wide, narrowed at the middle into a terete, apical half; lip greenish white, marked with purple, narrowly oblong, arcuate, 4 mm long, 1.5 mm wide, with short, erect, subacute lateral lobes in the lower third, with a pair of parallel lamellae in the middle third, the apical third oblong, thickened, rounded, with erose margins; column white, suffused with purple, semiterete, 3 mm long, the foot equally long with a pair of longitudinal lamellae.

ETYMOLOGY: From the Greek *chloë* (χλωη), "grass," in allusion to the appearance of the plant.

TYPE: BOLIVIA: COCHABAMBA: Prov. of Chapare, epiphytic in cloud forest along the road to Tablas, alt. ca. 2300 m, 9 Feb. 1980, *C. Luer, J. Luer & R. Vásquez 5200* (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

Although the individual secondary stems with their single leaves are relatively small, the prolific, branching, pendent habit creates large, loose, tangled mats of stems and leaves that hang as long as two meters from the shady boughs of large, mossy trees. *Pleurothallis chloë* is similar to the widespread and variable *P. scandens*, but the flowers are larger with petals with a long, terete apex, and a narrow lip.

Pleurothallis coripatae Luer & Vásquez, sp. nov.

Herba medicris caespitosa, caulibus secundariis gracilibus foliis ellipticis subpetiolatis leviter brevioribus, racemo duplo longiore flexuoso disticho plurifloro, floribus mediocris pellucidis flavovirescentibus, sepalis libris anguste ovatis intus minute papillois, petalis oblongis obtusis, labello pandurato trilamellato apice obtuso verrucoso.

Plant medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems suberect, slender, terete, 3.5-5 cm long, unifoliate, mostly

enclosed by 2 close, ribbed, tubular sheaths. Leaf erect, coriaceous, gray-green, smooth on both surfaces, elliptical, 5-6.5 cm long including an ill-defined petiole ca. 1 cm long, 1.6-1.9 cm wide, the apex subacute, tridenticulate, the base cuneate into the petiole. Inflorescence an erect, subfractiflex, distichous, densely flowered raceme to 14 cm long including the slender peduncle ca. 5 cm long, from a 1 cm spathe at the base of the leaf; floral bract thin, oblique, 2-3 mm long; pedicel 1-1.5 mm long; ovary 2 mm long; sepals free, translucent pale yellow-green, glabrous and carinate externally, cellular papillose within and along the margins, narrowly ovate, acute, the laterals oblique, 8 mm long, 2 mm wide, 3-veined; lip yellow, marked with purple, oblong-pandurate, 4.5 mm long, 1.5 mm wide, the middle narrowed with recurved margins, the margins expanded below the middle, the apical half dilated, obtuse to rounded, verrucose, the disc with a pair of tall, smooth marginal lamellae that curve inward at the base to meet and continue forward as a central, longitudinal carina ending in a verrucose callus near the apex; column greenish white, dotted with purple, semiterete, 2 mm long with a foot 1 mm long.

ETYMOLOGY: Named for Coripata, a town near the locality where this species was found.

TYPE: BOLIVIA: LA PAZ: Prov. of Nor Yungas, epiphytic in cloud forest. alt. 2000 m, between Coripata and Coroica, 3 Feb. 1980, C. Luer, J. Luer, R. Vásquez & R. Lara 5070 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This species is characterized by the gray-green, smooth, elliptical leaves and the twice longer raceme of translucent, yellow-green flowers. The narrowly acute sepals are minutely papillose within, the petals are obtuse, and the pandurate lip is triflamellate with a verrucose apex.

***Pleurothallis corynetes* Luer & Vásquez, sp. nov.**

Herba perpusilla caespitosa, racemo capillari laxifloro foliis ellipticis multilongiore, sepalis expansis pellucidis purpureo guttatis longi-acuminatis clavellatis, petalis ovatis apice setiformibus infra medium ciliatis et labello crasso ovato acuminato apice clavato echinato.

Plant very small, epiphytic, caespitose; roots fine, numerous, fasciculate. Secondary stems unifoliolate, abbreviated, 3-4 mm long, enclosed by 1-2 loose, white, ribbed sheaths. Leaf erect, coriaceous, narrowly elliptical, 15-27 cm long including a petiole 3-10 mm long, 3-4 mm wide, the apex shortly acuminate, acute, tridenticulate, the base cuneate into the petiole. Inflorescence a suberect to arching, successively flowering, lax raceme of 4-7 flowers, up to 8 cm long including the capillary peduncle, from a node on the secondary stem; floral bract ca. 1 mm long; pedicel 3-8 mm long; ovary triquetrous, 1-5 mm long; sepals widespread, translucent pale yellow, spotted with purple, glabrous, the dorsal sepal ovate and carinate in the lowest 2 mm, 16 mm long, 2 mm wide, the apex long-acuminate, terminating in a slight, orange thickening, the lateral sepals ovate, oblique, 16 mm long, 2 mm wide, connate basally for 1 mm, the apex long-acuminate, similar to the dorsal sepal; petals translucent yellow, dotted with purple, ovate, 7 mm long, 1.5 mm wide, the acute apex ending in a filiform process, the sides long-ciliate below

the middle; lip yellow, marked with purple, thick, ovate, 3.5 mm long, 1.7 mm wide, with erect, minutely serrated margins below the middle, cellular-glandular, the sides reflexed above the middle creating a narrow isthmus below the dark purple, verrucose, clavate apex, the base truncate, narrowly hinged to the column-foot, with a microscopic, capitate, hair-like appendage to either side; column yellow, marked with purple, slender, semiterete, 3.5 mm long with a short, swollen, pubescent foot.

ETYMOLOGY: From the Greek *korynetes*, (*κορυνητης*), "a club bearer" (from *koryne*, *κορυνη*, "a mace"), referring to the echinate, clubbed apex of the lip.

TYPE: *BOLIVIA*: LA PAZ: Prov. of Nor Yungas, epiphytic in cloud forest above the Río Unduavi, alt. 2450 m, 6 Feb. 1980, C. Luer, J. Luer, R. Vásquez & M. Manon 5131 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

The comparatively large flowers of this minute species are easily recognized by the deep purple, clavate, echinate apex of the lip. The apices of the sepals are filiform, and the long-attenuated apices of the sepals are slightly clavellate.

Pleurothallis costata Luer & Vásquez, sp. nov.

Planta parva caespitosa, caulibus secundariis gracilibus vaginatis folio anguste ovato longioribus, vaginis anguste tubulosis imbricantibus costatis laevis ostio obliquo dilatato, racemo paucifloro folio brevioris, floribus aureis venis rubris, sepalis glabris acutis lateralibus semiconnatis, petalis acutis, labello purpureo suffuso ligulato supra basim lobulato.

Plant small, epiphytic, caespitose; roots slender, fasciculate, Secondary stems slender, erect, monophyllous, 5-11 cm long, enclosed by a series of 5-8 close, imbricating tubular, non-ciliated, ribbed sheaths with oblique, dilated ostia. Leaf suberect, coriaceous, narrowly ovate, 3-5 cm long including a 3-4 mm long petiole, 7-9 mm wide, the acute apex tridenticulate, the base cuneate into the petiole. Inflorescence a suberect, 3- to 5-flowered raceme 2-4 cm long including the slender peduncle, from the apex of the secondary stem; floral bract oblique, acute, 2.5-3 mm long; pedicel 2-3 mm long; ovary 6-costate, green with the ribs brown, 1.5 mm long; sepals glabrous, yellow with red veins; dorsal sepal ovate, the apex acute, acuminate, 7.5 mm long, 3 mm wide, tricarinate; lateral sepals narrowly ovate, acute, connate for 2.5 mm, 8 mm long, 4 mm wide across the connate portion below the middle, each uncarinate; petals yellow with a red midvein, narrowly ovate, acute, 4 mm long, 1.2 mm wide; lip yellow, heavily suffused with red-purple, oblong-ligulate, 4 mm long, 1.9 mm wide, shallowly sulcate centrally, with a pair of erect, acute, marginal lobes above the base, the apex rounded; column green, semiterete, 2 mm long, with an orange foot equally long.

ETYMOLOGY: From the Latin *costatus* "ribbed," in reference to the costate sheaths of the secondary stems, the ribbed ovary, and the carinate sepals.

TYPE: *BOLIVIA*: LA PAZ: Prov. of Nor Yungas, epiphytic in cloud forest southeast of Coroico, alt. 2000 m, 3 Feb. 1980, cult. at SEL 80-211, flow-

ered in cult. 1 April 1980, *C. Luer, J. Luer, R. Vásquez & R. Lara 5231* (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

Although this species is a member of the lepanthiform-sheathed section, the sheaths of the long, slender secondary stems are unusual in that they are destitute of hairs or verrucae. The few-flowered raceme is shorter than the leaf, the lateral sepals are semiconnate, and the petals are acute. The lip is similar to that of *P. dirhamphis* Luer of Ecuador.

***Pleurothallis dorotheae* Luer, sp. nov.**

Planta parva dense caespitosa, foliis ellipticis crassissimis breviter petiolatis caulibus secundariis gracilibus aequilongis, flore solitarii nonresupinato glabro albivirescenti sparsim punctulato breviter pedunculato, sepalo impari synsepaloque concavis suborbicularibus, petalis purpureis ellipticis carinatis, labello orbiculato repando apiculato basi bi-auriculato.

Plant small, epiphytic, densely caespitose; roots fasciculate, flexuous. Secondary stems slender, suberect, unifoliolate, 1.5-3 cm long, with 1-2 basal sheaths. Leaf erect to suberect, thickly coriaceous, elliptical, marginate, 18-24 mm long including a 2-3 mm long petiole, 9-12 mm wide, the obtuse apex tridenticulate, the base obtusely cuneate into the short petiole. Inflorescence a solitary, non-resupinate flower produced in succession from a 4 mm long spathe at the base of the leaf; peduncle ca. 1 mm long; floral bract 3 mm long; pedicel 4 mm long; ovary 2.5-3 mm long; sepals glabrous, translucent light green with a few purple specks; middle sepal suborbicular to broadly ovate, obtuse, 4 mm long, 4 mm wide, 3-veined; lateral sepals connate into a concave, orbicular to transversely ovate synsepal, the apex obtuse to rounded, 4 mm long, 5.5 mm wide spread out, 4-veined; petals purple, elliptical-oblong, obtuse, 3 mm long, 1 mm wide, carinate dorsally; lip yellow, marked with purple, suborbicular to transversely ovate, 2.5 mm long, 3 mm wide, the rounded apex shortly apiculate, the margins minutely wavy, the disc with a large, depressed glenion flanked basally with obtuse calli, the base concave with a pair of obtuse auricles embracing the column; column yellow, stout, 1 mm long, 1 mm wide, the foot obsolescent.

ETYMOLOGY: Named in honor of Miss Dorothy Lankester of San Jose, Costa Rica, who cultivated this species in her garden.

TYPE: COSTA RICA: without locality, cultivated by Dorothy Lankester in San Jose, SEL greenhouse acc. no. 79-1613, flowered in cult. 28 Feb. 1980, *C. Luer 5204* (HOLOTYPE: SEL).

DISTRIBUTION: Costa Rica.

This attractive little species is characterized by a densely caespitose habit, thick, hard leaves, a little, pale green, non-resupinate, rounded flower with carinate petals and a rounded, apiculate lip with basal auricles.

***Pleurothallis epiglottis* Luer, sp. nov.**

Planta mediocris epiphytica caespitosa, foliis oblongis acuminatis caulibus secundariis gracilibus longioribus, floribus flavis solitariis successivis non-resupinatis e spatha parva basi folii, sepalo dorsali synsepaloque late o-

vato obtuso, petalis late ellipticis breviter acuminatis marginibus serrulatis, labello obtriangulari apice truncato apiculato lateribus obtusis erectis glenione erecto.

Plant medium in size, epiphytic, caespitose; roots numerous, fine, flexuous. Secondary stems slender, ascending to suberect, unifoliolate, 7-15 cm long, with a close, tubular sheath below the middle. Leaf erect, thinly coriaceous, oblong, 6-9.5 cm long, 1.6-2.6 cm wide, the apex acuminate, acute, tridenticulate, the base rounded, shallowly cordate, sessile. Inflorescence a succession of non-resupinate, solitary flowers borne from a 10-13 mm long reclining spathe at the base of the leaf; peduncles 3-5 mm long; floral bracts 4-5 mm long; pedicels 8-12 mm long; ovary 5 mm long; sepals glabrous, yellow, the middle sepal broadly ovate, obtuse, 6 mm long, 5 mm wide, 3-veined, the lateral sepals connate into a broadly ovate, obtuse lamina 6 mm long, 5.5 mm wide, 4-veined; petals yellow, elliptical, 4.5 mm long, 2.75 mm wide, 1-veined, the apex shortly acuminate, acute, the margins minutely serrate in the middle third; lip yellow, marked with purple, transversely obtriangular, 3 mm long, 4.5 mm wide spread out, the broadly truncate apex minutely apiculate, the sides rounded, erect, thickened toward the anterior margins, shallowly concave toward the posterior margins, the glenion erect, near the middle, the posterior surface flat and in apposition with the column-foot; column stout, 1.5 mm long, 2 mm wide, with a foot 1 mm long.

ETYMOLOGY. From the Latin *epiglottis*, "epiglottis," in allusion to the appearance of the erect glenion.

TYPE: *ECUADOR*: PICHINCHA: epiphytic in cloud forest above Mindo, alt. ca. 2000 m, 11 Nov. 1979, C. Luer, J. Luer & A. Hirtz 4739 (HOLOTYPE: SEL).

DISTRIBUTION: Western Ecuador.

This member of the cordate-leaved group is characterized by the small, yellow, non-resupinate flower that lies upon the oblong, acuminate leaf. The sepals and petals are broadly ovate, the petals shortly acuminate and serrulate. The lip is truncate with erect sides that flank an erect glenion reminiscent of an epiglottis standing guard over a trachea.

Pleurothallis heliconioides Luer & Vásquez, sp. nov.

Species *P. lanceanae* Lodd. cognata sed racemo longissimo flaccido disticho pendenti verticali et sepalis angustissimis rhachidi perpendicularibus.

Plant medium in size, epiphytic, caespitose, more or less pendent; roots slender, flexuous. Secondary stems unifoliolate, suberect, arching, to horizontal, stout, terete, lightly channeled near the apex, 6-13 cm long, enclosed near the base by 2-3 tubular sheaths. Leaf more or less horizontal, coriaceous, elliptical, 9-12 cm long, 2.5-3.5 cm wide, the subacute apex tridenticulate, the rounded base sessile. Inflorescence a lax, several-flowered, flaccid, distichous, pendent, vertical raceme, up to 23 cm long including the arching peduncle, from a spathe ca. 1.5 cm long at the base of the leaf; floral bract tubular, 5-6 mm long; pedicel 1.5 mm long; ovary green, minutely pubescent, 2 mm long; dorsal sepal yellow-orange, erect (horizontal in the natural position), narrowly linear, 31 mm long, 2 mm wide, 3-veined in purple near the base, shortly pubescent externally; lateral sepals yellow-orange, suffused with purple, connate into a narrowly ovate synsepal 27 mm long, 7 mm wide,

the acute apex minutely bifid, shortly pubescent externally, minutely verrucose internally; petals yellow, narrowly ovate, 7.5 mm long, 1.5 mm wide, 3-veined, the margins minutely serrate, the apex acuminate, acute; lip white, suffused with purple, oblong, thick, 4.25 mm long, 2 mm wide, the rounded apex minutely serrulate, the margins below the middle erect, rounded, serrulate, the disc sulcate centrally between thickened calli, the base hinged to the column-foot, minutely bi-auriculate; column yellow-white, semiterete with narrow wings, 3.5 mm long, the apex denticulate, the foot 2 mm long.

ETYMOLOGY: Named for the superficial similarity of the inflorescence to a heliconia (e.g. *Heliconia riopalenquensis* Dodson & Gentry).

TYPE: BOLIVIA: LA PAZ: Prov. of Sud Yungas, without locality, cultivated in Chulumani by Dino Menato, flowered in cult. 1 Feb. 1980, *C. Luer 5041* (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

Although the flowers of this species are basically very similar to those of *P. lanceana*, the habit of *P. heliconioides* is very distinct. The very long, flaccid raceme hangs straight down over the side of the leaf, the synsepals lie appressed to the rachis while the long, narrow, distichous, dorsal sepals stand out perpendicularly.

***Pleurothallis implexa* Luer, sp. nov.**

Planta epiphytica aerea longirepens implexa, caulibus secundariis gracilibus foliis anguste lineari-ellipticis apiculatis multibrevioribus, racemo laxo brevi paucifloro floribus successivis, sepalis libris carnosis anguste ovatis purpureo virescentibus, petalis parvis oblongis serrulatis acicularibus, labello oblongo obtuso ciliolato carinato.

Plant medium in size, epiphytic, repent, forming rhizomes up to 50 cm long in loose, entangled, pendent mats, the primary stems more or less aerial, 1-2 cm long between secondary stems, clothed by 2-3 brown, tubular sheaths, rooting at nodes. Secondary stems ascending, slender, unifoliate, 1.5-2 cm long, concealed by 1-2 tubular sheaths. Leaf erect to pendent in the natural position, coriaceous, linear-elliptical, 7-11.5 cm long, 0.7-1 cm wide, the obtuse apex ending in a short, pointed apiculum, gradually narrowed below to the slender base. Inflorescence a loose, successively 2- to 12-flowered raceme, 1.5-5.5 cm long including the slender peduncle, from a 2 mm spathe at the apex of the secondary stem; floral bract 2-2.5 mm long; pedicel 2 mm long; ovary 2 mm long; sepals fleshy, glabrous, greenish rose externally, purple within, the dorsal sepal narrowly ovate, acute, 10 mm long, 2 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals similar to the dorsal sepal, 10 mm long, 1.75 mm wide, nearly free, connate 0.5 mm to form a short mentum below the column-foot; petals translucent yellow-green with purple margins and apex, oblong, 3 mm long, 1 mm wide, the margins serrulate, the apex acuminate, acute; lip yellow with red margins and a red central stripe, oblong-obovate, 2.25 mm long, 1 mm wide, the apex obtuse, the margins ciliated, with a channeled callus down the center ending in a thick, bilamellate process at the base, the bi-auriculate base hinged to the column-foot; column yellow-white, semiterete, 2.5 mm long, the clinandrium denticulate, the foot short.

ETYMOLOGY: From the Latin *implexus*, "entangled, interlaced," referring to the loose, pendent, aerial mats formed by the creeping rhizomes.

TYPE: *ECUADOR*: CHIMBORAZO: epiphytic in scrubby trees east of Riobamba, alt. 3100 m, 14 Nov. 1979, C. Luer, J. Luer & A. Hirtz 4793 (HOLOTYPE: SEL).

DISTRIBUTION: Central Ecuador.

Although seemingly very different in habit, this unusual species is apparently allied to *P. barbulate* Lindl. *Pleurothallis implexa* may be recognized by the long, loose, creeping rhizomes; short secondary stems; long, narrow leaves; a short, successively-flowered raceme; free, narrow sepals; serrulate petals; and a ciliated lip.

Pleurothallis lappago Luer, sp. nov.

Planta mediocris breviter repens, caulibus secundariis crassis folio ovato carnosio brevioribus, racemo paucifloro folio brevioris, floribus successivis grandibus duris, sepalis virescentibus purpureo suffusis ovatis alte carinatis, petalis linearibus acuminatis, labello crasso unguiculato lamina ovata spiculata erosa bilamellata, ovario lappaceo.

Plant medium in size, epiphytic, shortly repent to caespitose, the rhizome stout; roots coarse, flexuous, occasionally branching. Secondary stems unifoliate, stout, 2-3.5 cm long, enclosed by 1-2 loose, tubular sheaths. Leaf erect, thickly coriaceous, smooth, broadly to narrowly ovate, 4-11 cm long, 2.5-3.5 cm wide, the subacute apex tridenticulate, apiculate, the sessile base cuneate to rounded. Inflorescence a short, successively few-flowered raceme up to 3.5 cm long, from a 1-1.5 cm long spathe at the base of the leaf; floral bract green, loose, oblique, acute, 5 mm long; pedicel rose, ca. 7 mm long; ovary 3 mm long, shortly spiculate, the capsule 15 mm long, densely spiculate along the ribs; sepals yellow-green, veined and suffused with red-purple, rigid, not widely spread, carinate, ovate, acute, connate 2-3 mm at the base, the dorsal sepal 19 mm long, 8.5 mm wide; the lateral sepals oblique, 22 mm long, 8.5 mm wide, petals translucent yellow, veined in red, linear-ovate, the apex acuminate, acute, 13 mm long, 2 mm wide; lip red-purple on dull white, fleshy, ovate with erose margins, 15 mm long, 5.5 mm wide, the apex acute, the base abruptly unguiculate, the concave claw 2 mm long and wide, biauriculate, the blade verrucose-spiculate, with a pair of tall, erose lamellae just above the middle; column greenish white, slender, clavate, 8 mm long, with a thick foot 4 mm long.

ETYMOLOGY: From the Latin *lappago*, "a bur-bearing plant" (*lappa*, "a bur"), referring to the appearance of the plant with fruit.

TYPE: *ECUADOR*: EL ORO: epiphytic in cloud forest near Zaruma, alt. 1100 m, 18 July 1979, C. H. Dodson et al. 8435 (HOLOTYPE: SEL), cultivated at SEL 79-1358, flowered in cult. 31 Mar. 1980, C. Luer illust. 5230.

DISTRIBUTION: Southeastern Ecuador.

This short-stemmed, thick-leaved species is related to *P. erinacea* Rchb. f. and its allies, but it is readily distinguished by the short, few-flowered inflorescence. The large, hard-textured flowers persist on bur-like ovaries. The petals are smooth at the base without an auricle.

***Pleurothallis miranda* Luer, sp. nov.**

Planta parva caespitosa, caulibus secundariis gracilibus vaginatis folio ovato petiolato longioribus, petiolo torsivo, spatha magna, flore successivo longipedunculo non-resupinato, synsepalo cucullato intus bilamellato, petalis profunde cucullatis, labello subquadrato sub columna acute deflexo.

Plant small, epiphytic, caespitose; roots fine, flexuous. Secondary stems slender, ascending, unifoliolate, 1-4.5 cm long, enclosed by a series of 3-4 loose, brown, compressed sheaths. Leaf suberect, coriaceous, ovate, petiolate, the blade 18-27 mm long, 11-15 mm wide, the apex acute, tridenticulate, the base rounded to cuneate into the twisted petiole 3-7 mm long. Inflorescence a fascicle of single, successive, long-pedunculate, non-resupinate flowers borne from an oblique spathe 8-13 mm long from the apex of the secondary stem; peduncles 12-24 mm long; floral bracts and pedicels each 3-4 mm long; ovary striped with green and purple, 2 mm long; sepals and petals translucent greenish white, veined and marked with purple; middle sepal ovate, subacute, 5.5 mm long, 4 mm wide; lateral sepals connate into a sub-orbicular lamina 4.75 mm long, 4.75 mm wide unspread, the rounded apex minutely bifid, deeply and conically concave in the center between a pair of short, erect lamellae; petals spatulate, 2.5 mm long, 2 mm wide, deeply concave-cucullate at the rounded apex, the base unguiculate; lip translucent yellow, suffused with brown, subquadrate, 1.4 mm long, 1.5 mm wide, sharply deflexed upon itself near the middle, with erect, acute, marginal folds to either side of the deflexion, the truncate apex broadly and roundly bilobed, minutely apiculate in the center; column white, suffused with brown at the apex, terete, 2 mm long, with an obsolescent foot.

ETYMOLOGY: From the Latin *mirandus*, "strange, causing wonder," alluding to the unusual characters of the species.

TYPE: *ECUADOR*. PICHINCHA: epiphytic in cloud forest along the river toward Nanegal, alt. ca. 2500 m, Oct. 1979, A. Hirtz and A. Andreae s.n., cultivated at SEL s.n., flowered in cult. 1 Jan. 1980, *C. Luer 4372* (HOLOTYPE: SEL).

DISTRIBUTION: Western Ecuador.

This unusual little species is noteworthy in the long, twisted petioles of the leaves subtended by a proportionately large, oblique spathe from which long-pedunculated flowers are borne. The flowers are non-resupinate and striped with purple; the deeply concave synsepal is bilamellate within; the apices of the petals are deeply cucullate; and the minute lip is sharply deflexed to lie along the under surface of the column.

***Pleurothallis parviflora* Luer, sp. nov.**

Species haec *P. antenniferae* Lindl. affinis sed habitu caespitoso, floribus multiminoribus et petalis membranosis differt.

Plant medium in size, epiphytic, caespitose; roots numerous, slender, fasciculate. Secondary stems slender, erect, unifoliolate, 12-20 cm long, with a close, tubular sheath below the middle and another 1-2 sheaths at the swollen base. Leaf erect, coriaceous, narrowly ovate, 6-10.5 cm long, 2-3 cm wide, the apex acuminate, acute, tridenticulate, the base cuneate to rounded,

sessile. Inflorescence racemose, 1-2 slender, erect, densely many-flowered racemes 10-16 cm long including the 3-4 cm long peduncle, from a spathe 15-22 mm long at the base of the leaf; floral bract 1.5-2 mm long; pedicel and ovary each 1.5 mm long; sepals and petals glabrous, translucent rose with rose veins; dorsal sepal oblong, 3 mm long, 1.75 mm wide, the apex abruptly acuminate, acute; lateral sepals connate into a deeply concave, ovate synsepal, 3 mm long, 2.25 mm wide unspread, the apex abruptly acuminate, minutely bifid; petals membranous, narrowly elliptical-obovate, acuminate, acute, 2.25 mm long, 0.3 mm wide; lip green, sagittate, 3-lobed, 1.3 mm long, 3.5 mm wide spread out, the obtuse anterior lobe ending in an acuminate, incurved apiculum, the obtuse lateral lobes erect, incurved, the base shortly reflexed and fixed to the base of the column; column stout, 1 mm long.

ETYMOLOGY: From the Latin *parviflorus*, "small-flowered," referring to the size of the flowers as compared to those of the closely allied *P. antennifera*.

TYPE: ECUADOR. NAPO: epiphytic in cloud forest below Papallacta alt. 2100 m, 29 Oct. 1979, C. Luer, J. Luer & A. Hirtz 4463 (HOLOTYPE: SEL).

DISTRIBUTION: Eastern Ecuador.

This small-flowered species is closely allied to *P. antennifera*, but may be distinguished from the latter by the caespitose habit and much smaller flowers with membranous petals.

Pleurothallis praecipua Luer, sp. nov.

Planta mediocris caespitosa, foliis parvis subconduplicatis anguste ovatis caulibus secundariis gracilibus ancipitiis multibrevioribus, flore solitario longipedunculato fasciculato, sepalo dorsali synsepaloque concavis anguste ovatis obtusis, petalis subfalcatis acutis incrassatis, labello praecipuo transverse obovato trilobato extus supra medium biapiculato, lobis lateralibus erectis late rotundatis falcatis abrupte acutis, lobo antico crasso rotundato apiculato foveato.

Plant medium in size, epiphytic, caespitose; roots numerous, fine, fasciculate. Secondary stems ascending to erect, slender, terete below, sharply but narrowly ancipitous above, unifoliate, 5-16 cm long, with a close, tubular sheath below the middle and another at the base. Leaf more or less recurving to spreading, conduplicate basally, coriaceous, narrowly ovate-elliptical, 3.5-5 cm long, 1.2-1.5 cm wide, the apex acuminate, acute, the obtusely cuneate base sessile, the sides decurrent on the secondary stem ca. 3 mm. Inflorescence a fascicle of solitary, successive, flowers borne from a narrow, 4-5 mm long spathe at the apex of the secondary stem a short distance above the base of the leaf; peduncle filiform, erect, 2-2.5 cm long; floral bract 5 mm long; pedicel 10-15 mm long; ovary 4 mm long; sepals and petals glabrous, lavender to white with purple dots; dorsal sepal concave, ovate, acuminate, narrowly obtuse, 10 mm long, 3.5 mm wide unspread; lateral sepals connate into an ovate, concave synsepal similar to the dorsal sepal, 10 mm long, 4 mm wide unspread; petals elliptical-subfalcate, 9 mm long, 1.9 mm wide, the apex acute, thickened externally, with microscopically serrate margins; lip white with a purple apex, transversely obovate,

3-lobed, 3.5 mm long, 4.5 mm wide spread out, the lateral lobes erect, broadly rounded, falcate, with an abruptly acute apex less than 1 mm from the sinus separating it from the anterior lobe, the anterior lobe thick, rounded, with a minutely serrated margin, shortly apiculate, with a nearby, wedge-shaped concavity on the disc, with a pair of pointed calli externally on either side above the middle, the broadly cuneate base transversely grooved, delicately hinged to the column-foot; column white, slender, arching, 4.5 mm long, with a short, rounded foot.

ETYMOLOGY: From the Latin *praecipuus*, "peculiar, extraordinary," referring to the unusual lip.

TYPE: ECUADOR: NAPO: epiphytic in cloud forest north of Baeza, alt. 1650 m, 10 Oct. 1979, C. Luer, J. Luer & A. Hirtz 4484 (HOLOTYPE: SEL).

DISTRIBUTION: Eastern Ecuador.

This species with laterally compressed stems is most remarkable in the peculiarities of the lip: a thick, rounded but flat, serrulate, apiculate middle lobe with a central pit is separated from the shortly acuminate apices of the large, dilated, lateral lobes by a narrow sinus. On the outer surface a short distance below these slits there is a pair of short, pointed calli.

Pleurothallis ramificans Luer, sp. nov.

Planta alta ramificans -caulibus secundariis proliferantibus, racemis paucis multifloris folio anguste elliptico longioribus, floribus illis *P. antenniferiae* Lindl. similibus sed lobis lateralibus labelli brevioribus angustioribusque.

Plant medium to large, epiphytic, scandent, branching, up to 1 m or more tall; secondary stems terete, proliferating, up to 30 cm long below, mostly 3-10 cm long above, with a bract below the middle and another at the base, unifoliate, rooting with superposed stem at the apex of an old stem. Leaf erect, coriaceous, narrowly elliptical, 5-10 cm long, 1-2.3 cm wide, the apex acute, tridenticulate, the base cuneate into the sessile base. Inflorescence racemose, 1-2 many-flowered, congested, erect, arching racemes 6-15 cm long from a 1-2.5 cm long spathe at the base of the leaf; floral bract 2.5 mm long; pedicel 3 mm long; ovary 2 mm long; flowers gaping, glabrous, light green, yellow or orange to purple, with or without reddish spots; dorsal sepal ovate, acuminate, acute, 6 mm long, 3 mm wide; lateral sepals connate into a concave, ovate, acuminate, acute synsepal 6 mm long, 4 mm wide unspread; petals narrowly linear, acute, thickened, 5.5 mm long, 0.75 mm wide; lip transversely ovate, 3-lobed, 1.5 mm long, 2 mm wide unspread, the middle lobe rounded, minutely serrulate, shortly apiculate, the lateral lobes ca. 1 mm long, above the base, oblong, subacute, incurved, the base acutely and broadly recurved, densely united to the base of the column; column stout, 1 mm long, the foot obsolescent.

ETYMOLOGY: From the Latin *ramificans*, "branching," referring to the habit of the species.

TYPE: ECUADOR: IMBABURA: epiphytic in cloud forest above Apuela, alt. 2500 m, 8 Feb. 1979, C. Luer, J. Luer, A. Hirtz & R. Escobar 3920 (HOLOTYPE: SEL).

ADDITIONAL MATERIAL EXAMINED: COLOMBIA: NARIÑO: epiphytic in cloud forest east of La Victoria, alt. 3000 m, 4 Nov. 1979, *C. Luer et al. 4649* (SEL); PUTUMAYO: between La Cocha and Sibundoy, alt. 2700 m, 29 July 1978, *C. Luer et al. 3079* (SEL), 3 Aug. 1978, *C. Luer et al. 3146* (SEL); ECUADOR: CARCHI: above Maldonado, alt. 2000 m, 21 Feb. 1978, *C. Luer, J. Luer & A. Hirtz 2683* (SEL); NAPO: north of Baeza, alt. 1500 m, 10 Aug. 1978, *C. Luer et al. 3222* (SEL); below Papallacta, alt. 2800 m, 28 Aug. 1978; *C. Luer et al. 3435* (SEL); above El Playon east of Juan Andrade, alt. 3200 m, 5 Nov. 1979, *C. Luer et al. 4774* (SEL); east of Salcedo, alt. 3100 m, 12 Nov. 1979, *C. Luer et al. 4774* (SEL); PICHINCHA: above San Jose de Minas, alt. 2500 m, 24 Aug. 1978, *C. Luer et al. 3335* (SEL).

DISTRIBUTION. Ecuador and southern Colombia.

Although the flowers of this species are similar to those of *P. antennifera*, the habit of *P. ramificans* immediately distinguishes it. Long, branching stems ascend in bushes and thickets to produce clusters of one-leaved stems above with their arching racemes. The flowers vary in color, but the shape of the lip is constant. The incurved, lateral lobes are shorter and narrower than those of *P. antennifera*.

Pleurothallis unduavica Luer & Vásquez, sp. nov.

Species haec *P. coripatae* Luer & Vásquez affinis sed floribus minoribus. sepalis pubescentibus, petalis erosis at labello quinquilamellato differt.

Plant small to medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems suberect, slender, terete, 2.5-4 cm long, unifoliate, mostly enclosed by 2 close, ribbed tubular sheaths. Leaf erect coriaceous, gray-green, smooth on both surfaces, elliptical, 4-6.5 cm long including an ill-defined petiole 0.5-1 cm long, 1.3-1.5 cm wide, the apex subacute, tridentulate, the base cuneate into the petiole. Inflorescence a suberect, distichous, densely flowered raceme to 14 cm long including the slender peduncle 4-5 cm long, from a 5-6 mm long spathe at the base of the leaf; floral bract thin, oblique, 1.5 mm long; pedicel 1-1.5 mm long; ovary 1 mm long; sepals free, translucent light green, glabrous externally, pubescent within, the laterals oblique, 6 mm long, 2 mm wide; petals translucent yellow, dotted with purple and with a purple midvein, obovate, 3 mm long, 1.5 mm wide, the apex rounded, minutely erose; lip yellow, marked with purple, oblong-pandurate, 3.5 mm long, 1.5 mm wide, the middle narrowed with recurved margins, the margins expanded below the middle, the apical half dilated, rounded, minutely verrucose, the disc with a pair of tall, smooth, marginal lamellae, a lower, longitudinal, midline carina, and to either side of the central carina a denticulate crest; column greenish white, dotted with red, slender, semi-terete, 1.8 mm long with a foot 1 mm long.

ETYMOLOGY: Named for Unduavi, a river and a town near the locality where this species was found.

TYPE: BOLIVIA: LA PAZ: Prov. of Sud Yungas, epiphytic in cloud forest, alt. 2450 m, below Unduavi, near Río Unduavi, 6 Feb. 1980, *C. Luer, J. Luer, R. Vásquez & M. Manon 5206* (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

This species is allied to *P. coripatae*, but it may be distinguished by the smaller flowers long-pubescent within, and erose petals. The pandurate lip has three lamellae similar to those of *P. coripatae*, but an additional pair of toothed crests exists between the lateral and medial lamellae.

***Pleurothallis urceolata* Luer, sp. nov.**

Planta grandis caespitosa, foliis ellipticis acutis caulibus secundariis et racemis paucis multifloris brevioribus, floribus flavis purpureo punctatis illis *P. antenniferae* Lindl. similibus sed majoribus, petalis non carnosus et lobo antico labelli urceolato cum marginibus involutis apiculum acutum formantibus differt.

Plant large, epiphytic to terrestrial, shortly repent to caespitose; roots coarse, flexuous. Secondary stems slender to stout, erect, unifoliate, 28-38 cm long, with a tubular sheath above the middle and 2 sheaths near the base. Leaf erect, coriaceous, elliptical, 11-17 cm long, 2.5-7 cm wide, the apex slightly acuminate, acute, tridenticulate, the base sessile, cuneate. Inflorescence racemose, 2-3 erect, flexible, arching, subdensely many-flowered racemes 15-25 cm long including the peduncle 6-7 cm long, from a spathe 1.5-2.5 cm long at the base of the leaf; floral bract 3-6 mm long; pedicel, 3-5 mm long; ovary 3 mm long; sepals and petals glabrous, yellow with purple dots; dorsal sepal ovate, acuminate, acute, 8 mm long, 4 mm wide; lateral sepals connate into an ovate, deeply concave, cymbiform synsepal, the apex acuminate, narrowly obtuse, 8 mm long, 5 mm wide unspread; petals narrowly linear-ovate, attenuate, acute, 8 mm long, 0.6 mm wide, more or less membranous, minimally thickened; lip green, 3-lobed, 1.5 mm long, 3 mm or more wide spread out, the lateral lobes antrorse, rounded, 1.5 mm long, 1 mm wide, the middle lobe transversely ovate, concave, with incurved margins forming an acute apiculum, the base deflexed, densely attached to the column-foot; column green, stout, 1.5 mm long, with an obsolescent foot.

ETYMOLOGY: From the Latin *urceolatus*, "pitcher-shaped," referring to the middle lobe of the lip.

TYPE: ECUADOR: NAPO: epiphytic in cloud forest north of Baeza, alt. ca. 1500 m, 10 Aug. 1978, C. Luer, J. Luer & A. Hirtz 3228 (HOLOTYPE: SEL).

ADDITIONAL MATERIAL EXAMINED: ECUADOR: CARCHI: terrestrial on the road cut southeast of Tulcan toward El Carmelo, alt. 3000 m, 23 Feb. 1978, C. Luer, J. Luer & A. Hirtz 2746 (SEL); NAPO: epiphytic in cloud forest near Papallacta, alt. 2850 m, 29 Oct. 1979, C. Luer, J. Luer & A. Hirtz 4435 (SEL); below Papallacta, alt. 2000 m, 29 Oct. 1979, C. Luer, J. Luer & A. Hirtz 4461 (SEL).

DISTRIBUTION: Eastern Ecuador.

This handsome species is closely related to *P. antennifera*, but *P. urceolata* may be distinguished by the caespitose habit, usually broader, acuminate leaves, racemes of larger, yellow flowers with red-purple spots, and a lip with the middle lobe concave with incurved margins forming a spout-like apex.

Pleurothallis vorator Luer & Vásquez, sp. nov.

Planta mediocris, folio ovato acuminato basi rotundato conduplicato caulibus secundariis argute ancipitiis brevioribus, floribus singularibus longipedunculatis, sepalis dorsali synsepaloque simili anguste ovato, petalis lineariovatis crassis attenuatis, labello suborbiculari lateribus unidentatis columna arcuata brevioribus.

Plant medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems monophyllous, erect, slender, terete below, sharply compressed above, 8-17 cm long, 4 mm deep above near the leaf, with a tubular sheath below the middle and another at the base; leaf erect to spreading, coriaceous, ovate, 5.5-8 cm long, 2.5-3.5 cm wide, the apex acuminate, acute, tridenticulate, the base rounded, conduplicate, sessile. Inflorescence a succession of solitary flowers borne in a fascicle from a 5-8 mm long spathe deep within the folded base of the leaf; peduncles erect, 10-12 mm long; floral bract 6-8 mm long; pedicel 12-14 mm long; ovary subverrucose, 4 mm long; sepals and petals yellow-orange, minutely flecked with red-purple; dorsal sepal narrowly ovate, concave, shortly subacute, 9 mm long, 3 mm wide; lateral sepals connate into a synsepal similar to the dorsal sepal, 8.5 mm long, 4 mm wide; petals linear-ovate, thick, 8 mm long, 1.3 mm wide, the apex yellow, terete, narrowly acute; lip dull yellow to brown, mottled with purple, suborbicular to subquadrate, shallowly concave, 2 mm long, 2 mm wide, with a pair of small, marginal, acute, retrorse teeth near the middle on either side, the truncate apex with a pair of low calli externally on either side, and a discrete but shallow concavity just inside the central margin, the base truncate with a pair of low, rounded calli; column ascending, arching, mottled with purple, 2.5 mm long, with a large deflexed anther and rostellum, and an obsolescent foot.

ETYMOLOGY: From the Latin *vorator*, "a devourer," in allusion to the appearance of the column poised over the lip, as the head of an animal continually about to eat from a dish.

TYPE: *BOLIVIA*: LA PAZ: Prov. of Nor Yungas, epiphytic in cloud forest along the road southwest of Coroico toward La Paz, alt. 2800 m, 4 Feb. 1980, cult. at SEL, 80-213, flowered in cult. 22 March 1980, *C. Luer, J. Luer, R. Vásquez & R. Lara 5223* (HOLOTYPE: SEL); without specific locality, cultivated by Dino Minato in Chulumani, flowered in cult. 1 Feb. 1980, *C. Luer et al. 5046* (SEL).

DISTRIBUTION: Bolivia.

This ancipitous-stemmed species is recognized by the single, speckled flowers with a shallowly concave, suborbicular lip, shortly toothed on both sides, held beneath a slightly longer, arching column with a seemingly oversized anther.

Porroglossum agile Luer, sp. nov.

Inter species generis *Porroglossi* Schltr. species haec habitu mediocri, pedunculo gracili glabro foliis anguste obovatis verrucosis longiore, sepalis glabris flavis abrupte anguste caudatis, petalis plusminusve oblongis apice dilatatis, lamina labelli cuneata agili callo basali pyramidalis pubescenti dignoscenda.

Plant medium-sized, epiphytic, caespitose; roots slender, flexuous. Secondary stems unifoliate, 5-10 mm long, enclosed by 1-2 white, tubular sheaths. Leaf erect, thickly coriaceous, verrucose, narrowly obovate, petiolate, 3.5-7 cm long including the 1.5-3.5 cm long petiole, 8-11 mm wide, the subacute apex tridenticulate, narrowly cuneate below into the petiole. Inflorescence a contracted, successively-flowered raceme borne by an erect, slender, glabrous peduncle 8-10 cm long, from a node low on the secondary stem; floral bract 5 mm long; pedicel 5 mm long; ovary minutely subverrucose, 4-6 mm long; sepals translucent light yellow with bright yellow veins, glabrous, 3-costate externally, the dorsal sepal obovate, 7 mm long, 5 mm wide, connate to the lateral sepals for 3.5 mm into a gaping cup, the obtuse to rounded apex abruptly contracted into a slender, reflexed tail 8 mm long, the lateral sepals ovate, oblique, 7 mm long, 7 mm wide at the very base, connate 2.5 mm to each other and to the column-foot to form a deep mentum, the acute apices contracted into slender, decurved tails ca. 6 mm long; petals translucent yellow with a brown midvein, oblong, 5 mm long, 1.5 mm wide, obscurely obtusely angled below the middle, narrowed to the slightly dilated, rounded apex; lip with a strap-like basal extension flexibly fitted around the free apex of the column-foot, the blade cuneate, 4.5 mm long, 4 mm wide, white with purple flecks and spicules above the middle, with an erect, transverse, more or less pyramidal, densely pubescent callus at the base, the truncate apex shortly apiculate with an adjacent midline concavity; column green, stout, semiterete, 2.5 mm long, the foot 4 mm long.

ETYMOLOGY: From the Latin *agilis*, "quick, nimble," referring to the rapid and repeated action of the lip.

TYPE: PERU: JUNIN: epiphytic near Chanchamayo, collected by J. Meza, cultivated by W. Königler in München, flowered in cult. 20 May 1980, C. Luer 5254 (HOLOTYPE: SEL).

DISTRIBUTION: Peru.

Superficially the flowers of this species appear similar to those of *P. muscosum* (Rchb. f.) Schltr., but *P. agile* may be readily distinguished by the glabrous peduncle. The densely pubescent, pyramidal callus at the base of the blade of the lip is similar to that of *P. meridionale* P. Ortiz.

In common with the other species of the genus, the lip of *P. agile* snaps up when stimulated, but within five minutes the lip has returned to the "down" position. This feat may be repeated consecutively at least four or five times before the returning mechanism begins to slow.

Porroglossum andreettae Luer, sp. nov.

Planta parva caespitosa, pedunculo gracili glabro erecto foliis anguste obovatis longiore, flore successivo, sepalis in caudas latas sensim contractis illis sepalorum lateralium declinatis, lateribus petalorum angulatis et lamina labelli grabra cuneata.

Plant small, epiphytic, caespitose, roots slender, flexuous. Secondary stems slender, blackish, unifoliate, ca. 1 cm long, with 1-2 close, tubular sheaths. Leaf erect to suberect, thickly coriaceous, minimally verrucose to nearly smooth, narrowly elliptical-obovate, 2.5-4 cm long including the 1-2 cm petiole, 6-8 mm wide, the apex subacute, tridenticulate, gradually nar-

rowed below into an indistinct petiole. Inflorescence a single flower produced successively from a few-flowered, congested raceme borne by an erect, smooth peduncle 4-6.5 cm long, with a close bract near the middle, from a node on the secondary stem; floral bracts imbricating, tubular, 5 mm long; pedicel 5 mm long; ovary dark olive green, subverrucose, 4 mm long; sepals yellow, veined and suffused with brown, microscopically pubescent within, the dorsal sepal obscurely obovate, connate to the lateral sepals for 3 mm into a gaping sepaline cup, the free portion triangular and reflexed into a thick smooth tail, the total length 10 mm, the width 4 mm, the lateral sepals more or less falcate, forming with the column-foot a deep mentum, the apices contracted into tails similar to that of the dorsal sepal, the total length 10 mm, 5 mm wide at the widest; petals translucent yellow with a brown midvein, oblong, 4.5 mm long, 2 mm wide, the apex rounded with a subacute angle near the middle of both margins; lip glabrous, yellow with a few purple flecks near the base, the blade obovate-obtriangular, 4.5 mm long, 2.5 mm wide, the truncate apex with a shallowly concave apical lobule, the basal extension folded with tension around the apex of the column-foot, column yellow, 2 mm long, with a foot 5 mm long.

ETYMOLOGY: Named in honor of Padre Angel Andreetta of Cuenca, Ecuador, who discovered this species.

TYPE: *ECUADOR*: ZAMORA -CHINCHIPE: epiphytic in cloud forest along Rio Calagras, alt. 1500 m, Oct. 1977, A. Andreetta, L. Carollo & M. Portilla 1714, cultivated by Padre Andreetta in Cuenca, flowered in cult. 8 Nov. 1979, *C. Luer 4695* (HOLOTYPE: SEL).

DISTRIBUTION: Southern Ecuador.

This little species may be recognized by the short, broad tails of the sepals, about as long as the blades themselves. The tails of the lateral sepals curve outward and downward. The blade of the lip is glabrous.

Porroglossum aureum Luer, sp. nov.

Species haec *P. sergioi* P. Ortiz affinis sed floribus aureis minoribus et lamina labelli angustiore glabraque differt.

Plant medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems unifoliate, 5-10 mm long, enclosed by 2 close, tubular sheaths. Leaf suberect, coriaceous, subverrucose, narrowly obovate, long-petiolate, 5-6 cm long including the petiole, 9-10 mm wide, the apex subacute, tridenticulate, the base cuneate into the 2-4.5 cm long petiole. Inflorescence a congested raceme of single, successive, flowers borne at the summit of a slender, erect peduncle 12-13 cm long, with 2-3 widely separated, close bracts, from a node low on the secondary stem; floral bract 5 mm long; pedicel 6-8 mm long; ovary 3-4 mm long; sepals glabrous, bright yellow with darker yellow veins and tails, the dorsal sepal transversely obovate, the lateral margins rounded, 5 mm long, 6.25 mm wide, connate to the lateral sepals for 3 mm to form a sepaline cup, the apex shortly acuminate, acute, sharply reflexed into a tail ca. 2 mm long, the lateral sepals transversely ovate, oblique, 4 mm long, 7 mm wide, connate 3.5 mm to form an acute mentum below the column-foot, the acute apices contracted into thickened

tails 10 mm long; petals translucent yellow with a dark yellow midvein, oblong, 3.5 mm long, 1.5 mm wide, obtusely angled on either side, narrowed toward the rounded apex; lip glabrous, the blade cuneate, obovate, 5 mm long, 3.5 mm wide, the apex obtuse, shortly acuminate with a short, midline sulcus, broadly thickened toward the base, then deflexed into the strap-like unguiculate base angled about the free apex of the column-foot; column stout, semiterete, 1.5 mm long, the stigma with acute, lateral angles, the curved foot 5 mm long.

ETYMOLOGY: From the Latin *aureus*, "golden yellow," in reference to the color of the flowers.

TYPE: *ECUADOR*. CARCHI: epiphytic in cloud forest above Maldonado, alt. ca. 2500 m, July 1977, W. Teague s.n., cultivated in San Francisco, flowered in cult. 5 July 1980, *C. Luer 5298* (HOLOTYPE: SEL).

DISTRIBUTION. Northern Ecuador.

This showy, golden yellow-flowered species seems most closely allied to the white, yellow-tailed *P. sergioi* from Colombia. *Porroglossum aureum* is readily distinguished by the color and the narrower, glabrous lip.

Porroglossum lycinum Luer, sp. nov.

Planta parva caespitosa, foliis spatulatis subverrucosis reticulatis, pedunculo exserto, flore successivo flavo mento profundo, caudis antrorsis crassis brunneis, petalis supra basim angustatis leviter curvatis obtusis, lamina labelli cuneata supra medium ciliata spiculataque, infra medium glabra leviter incrassata.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems slender, unifoliate, 10-15 mm long, enclosed by 1-2 loose, white, tubular sheaths. Leaf erect, coriaceous, dark green, lightly verrucose on the dorsal surface, lightly reticulated, obovate, petiolate, 3-5.5 cm long including the 1-2.5 cm long petiole, 9-12 mm wide, the apex obtuse to rounded, tridenticulate, the base cuneate into the petiole. Inflorescence a succession of solitary flowers in a contracted raceme borne by an ascending to horizontal, slender, green, glabrous peduncle 8-10.5 cm long, from a node low on the secondary stem; floral bract 5 mm long; pedicel 6 mm long; ovary green, minimally subverrucose, 4 mm long; sepals yellow, suffused with brown in the thickened, narrowed, apical thirds and faded to yellowish white toward the base, tricostate externally, minutely dotted with purple and minutely red-spiculate within, the dorsal sepal subverrucose externally, especially along the midrib, narrowly ovate, concave below the middle, the apex narrowly obtuse, 15 mm long, 6 mm wide spread out, connate to the lateral sepals for 3 mm, the lateral sepals obliquely transversely multangular, connate 2.5 mm to each other and to the column-foot to form a deep mentum, the apices contracted into laterally and forwardly directed, thick, gradually narrowing tails, 15 mm long, 6 mm wide at the widest above the base; petals light amber with a brown midvein, obscurely ovate-multangular, 5 mm long, 1.5 mm wide at the base, then narrowed above obtuse marginal angles, slightly curved, the apex slightly dilated, obtuse; lip with a narrow strap-like claw flexibly bent about the free apex of the column-foot, the blade cuneate, 5

mm long, 3.5 mm wide, light green, dotted with purple on the slightly thickened, glabrous, basal portion, densely covered with short, purple spicules above, the ciliated, truncate apex shortly apiculate with an adjacent, midline concavity; column light green, stout, semiterete, 2 mm long, the foot 4 mm long.

ETYMOLOGY: From the Greek *lykinos* (λυκινος), "wolf-like," in allusion to the appearance of the flower.

TYPE: PERU: AMAZONAS: epiphytic in cloud forest between Pomacocha and Moyobamba, alt. 2100 m, Aug. 1979, W. Königler 29, cultivated in München, flowered in cult. 19 May 1980, *C. Luer 5251* (HOLOTYPE: SEL).

DISTRIBUTION: Northern Peru.

This fierce-looking little species may be recognized by the spatulate, lightly verrucose, reticulated leaves; an elongated, slender peduncle; and a proportionately large, yellow and brown flower with thick, forwardly directed, sepaline tails. The blade of the lip is minutely ciliate and spiculate toward the apex, but the slightly thickened base is glabrous.

Porroglossum procul Luer & Vásquez, sp. nov.

Planta parva caespitosa, pedunculo gracili glabro erecto foliis anguste obovatis verrucosis longiore, flore successivo, sepalis in caudas teretes abrupte contractis, illis sepalorum laterium ascendentibus, lateribus petalorum angulatis et lamina labelli minute velutina cuneata.

Plant small, epiphytic, caespitose, roots slender, flexuous. Secondary stems blackish, unifoliate, 5-10 mm long, enclosed by 1-2 close, tubular sheaths. Leaf erect to suberect, thickly coriaceous, minutely verrucose, elliptical to narrowly obovate, 20-35 mm long including the blackish petiole 7-16 mm long, 7-9 mm wide, the apex subacute, tridenticulate, gradually narrowed below into the petiole. Inflorescence a solitary flower borne successively in a congested raceme at the apex of a slender, erect peduncle 6.5-7.5 cm long, with a close bract near the middle and another below, from a node low on the secondary stem; floral bracts imbricating, tubular, 5 mm long; pedicel 6 mm long; ovary black, rugose-verrucose, 4 mm long; dorsal sepal translucent pale rose-brown, speckled with light purple, glandular-cellular within, obovate, 5 mm long, 3.25 mm wide, connate to the lateral sepals for 3 mm into a laterally compressed sepaline cup, the free portion triangular, the obtuse apex abruptly contracted into an erect, light tan, terete tail 6 mm long; lateral sepals translucent yellow-green with brown veins, oblique, transversely ovate, ca. 5 mm long, 7 mm wide at the widest, 3 mm wide (or long) from the column-foot to the anterior margin, connate 3 mm to form with the column-foot a deep mentum, the obtuse apices abruptly contracted into ascending, light tan, 7 mm long, terete tails; petals translucent pale yellow, more or less oblong, with a subacute angle near the middle of both margins, the apex slightly dilated, rounded; lip white, the blade cuneate, 4 mm long, 2 mm wide, the truncate apex with a shallowly concave apical lobule, cellular pubescent, with a smooth, pyramidal callus at the base, the linear, basal claw folded with tension around the apex of the column-foot; column greenish white, semiterete, 2 mm long, the foot 5 mm long.

ETYMOLOGY: From the Latin *procul*, "far," referring to the distant locality.

TYPE: *BOLIVIA*: LA PAZ: Prov. of Nor Yungas, epiphytic in cloud forest southeast of Coroico toward Coripata, alt. 2000 m, 3 Feb. 1980, C. Luer J. Luer, R. Vásquez & R. Lara 5071 (HOLOTYPE: SEL).

DISTRIBUTION: Bolivia.

Porroglossum procul, the first species of the genus to be reported from Bolivia, is presently the farthest south species known in the genus. It is closely allied to the Ecuadorian *P. andreettae* Luer, but may be distinguished by the lateral sepals that are abruptly contracted into ascending, terete tails.

Porroglossum schramii Luer, sp. nov.

Planta parva caespitosa, pedunculo gracili foliis obovatis verruculosis multilongiore, flore glabro albo roseoguttato, apicibus sepalorum sensim caudatis, caudis crassis, lamina labelli cuneata cum callo basali glabro erecto transversali.

Plant small, lithophytic to epiphytic, caespitose; roots slender, flexuous. Secondary stems blackish, unifoliate, ca. 1 cm long, enclosed by 2 close, tubular sheaths. Leaf erect, thickly coriaceous, verrucose, elliptical-obovate, petiolate, 2.5-5 cm long including the 0.8-2 cm long petiole, 0.8-1 cm wide, the obtuse to rounded apex tridenticulate, the base cuneate into the petiole. Inflorescence a succession of solitary flowers produced in a few-flowered, congested raceme borne by a suberect, slender peduncle 9-10 cm long, from a node low on the secondary stem; floral bract and pedicel each ca. 5 mm long; ovary subverrucose, 4 mm long; sepals glabrous, white with rose dots, the tails light dull-tan, the dorsal sepal ovate, the acute apex gradually contracted into a thick, erect tail 5-6 mm long, the total length of the dorsal sepal 13 mm, 4.5 mm wide, connate to the lateral sepals for 2 mm to form a gaping, sepaline cup, the lateral sepals ovate, oblique, connate 2 mm below the column-foot to form a deep mentum, the acute apices gradually contracted into thickened tails, the total length of the lateral sepal 15-16 mm 5.5 mm wide, petals white, obovate, 4 mm long, 1.5 mm wide, obtusely angled on both margins in the lower third, narrowed above the middle to a dilated rounded apex; lip with a narrow claw fitted around the free apex of the column-foot, the blade white, sparsely dotted with purple below the middle, cuneate-obovate, 4.5 mm long, 4.25 mm wide, cellular-pubescent along the apical margins, obtusely apiculate with a shallow sulcus extending onto the blade, with an erect, short, transverse, glabrous callus at the base above the deflexed claw; column semiterete, 1.5 mm long, the foot 3.5 mm long.

ETYMOLOGY: Named in honor of James Schram of Los Angeles, California, co-discoverer of this species.

TYPE: *ECUADOR*: ZAMORA-CHINCHIPE: lithophytic in cloud forest between Loja and Zamora, alt. 1600 m, Nov. 1978, W. Teague & J. Schram s.n., cultivated in San Francisco, flowered in cult. 14 March 1980, C. Luer 5218 (HOLOTYPE: SEL).

DISTRIBUTION: Southern Ecuador.

This little species may be identified by the white flowers dotted with

rose, sepals gradually narrowed into light brown tails, and a white, cuneate lip with an erect, glabrous callus at the base.

Porroglossum taylorianum Luer. sp. nov.

Inter species generis *Porroglossi* Schltr. statura mediocri, pedunculo glabro exserto, flore successivo dilute armeniaco, caudis sepalorum elongatis recurvatis et lamina labelli obovato obtuso microscopice pubescenti distinguitur.

Plant medium-sized for the genus, terrestrial to epiphytic, caespitose; roots slender, fasciculate. Secondary stems unifoliate, 1-1.5 cm long, enclosed by 1-2 loose, ribbed, tubular sheaths. Leaf erect, coriaceous, smooth, narrowly elliptical, petiolate, 4-5 cm long including the 2-3 cm long petiole, 7-9 mm wide, the apex acute, tridenticulate, cuneate below into the petiole. Inflorescence a succession of solitary flowers borne in a congested raceme at the apex of a slender, glabrous, erect peduncle up to 11 cm tall, with 3-4 close bracts, from a node low on the secondary stem; floral bract tubular, 5 mm long; pedicel 4 mm long; ovary purple, subverrucose, 4-5 mm long; sepals translucent pale orange with light red-brown veins, subverrucose externally especially along the veins, glabrous within; dorsal sepal suborbicular spread out, 5.5 mm long, 5.5 mm wide, connate to the lateral sepals for 2.5 mm to form a sepaline cup, the rounded apex abruptly contracted into a reflexed, yellowish tail ca. 7 mm long; lateral sepals obliquely transversely ovate, connate 3.5 mm below the column-foot, each 6 mm wide, with the apex gradually contracted into a laterally reflexed, terete tail, the entire length 16 mm; petals translucent yellow with an orange-brown midvein, more or less narrowly ovate-oblong, 4.75 mm long, 1 mm wide, with broad angles on either side, the apex obliquely rounded; lip white, marked with purple, especially near the cellular-pubescent apex, the blade obovate-cuneate, 5 mm long, 3.5 mm wide, the apex obtuse with a narrow depression centrally between callus-like thickenings of the disc, with a smooth, rounded, longitudinal callus ca. 1.5 mm tall toward the base, the slender claw acutely bent under tension around the apex of the column-foot; column rose, semi-terete, 2 mm long excluding the anther, the foot slender, 4.5 mm long.

ETYMOLOGY: Named in honor of Taylor (Mrs. Frank) Slaughter of Pheasant Hill Orchids, Pittsburgh, Pa., who cultivated this species and submitted it to the Orchid Identification Center of the Marie Selby Botanical Gardens.

TYPE: *ECUADOR*: NAPO: terrestrial on steep cliff, above Baeza, alt. ca. 2000 m, collected by Stan Samuel s.n. in 1978, cultivated by Taylor Slaughter in Pennsylvania, flowered in cult. 26 Feb. 1980, *C. Luer 5203* (HOLOTYPE: SEL).

DISTRIBUTION: Eastern Ecuador.

The flower of this species is most similar to that of *P. muscosum* (Rchb. f.) Schltr. and its allies, but *P. taylorianum* is easily distinguished by the glabrous peduncle. From those species with a glabrous peduncle, this species is distinguished by the long, slender, recurved tails of all three sepals, and the glabrous callus of the lip.

Porroglossum teaguei Luer, sp. nov.

Species haec *P. amethystino* (Rchb. f.) Schltr. affinis sed flore majore, ovario papilloso, cauda sepalii dorsalis multilongiore et callo labelli crassiore altioreque differt.

Plant medium in size, epiphytic to terrestrial, caespitose; roots slender, flexuous. Secondary stem slender, 1-1.5 cm long, enclosed by 2 close, tubular sheaths. Leaf suberect, coriaceous, verrucose, narrowly obovate, long-petiolate, 5-10 cm long including the slender, 2-4 cm long petiole, 10-13 mm wide, the subacute apex tridenticulate, the base gradually narrowed into the petiole. Inflorescence a succession of single flowers produced in a congested raceme at the apex of a slender, erect to suberect peduncle 13-20 cm long, with 2-3 widely spaced, close, tubular bracts, from a node low on the secondary stem; floral bract 5 mm long; pedicel 8-10 mm long; ovary markedly verrucose to papillose, 3-4 mm long; sepals glabrous, bright amethyst, the dorsal sepal broadly ovate, 6 mm long, 6 mm wide, connate to the lateral sepals for 3 mm to form a sepaline cup, the shortly acuminate apex conduplicate, reflexed, produced into a somewhat thickened tail 12 cm long, the lateral sepals transversely ovate, oblique, 6 mm long, 6.5 mm wide, connate 3 mm to form a short conical mentum below the column-foot, the acute apices narrowed into slender tails ca. 20 mm long; petals translucent rose with a purple midvein, narrowly ovate, 5 mm long, 1.5 mm wide, obtusely angled on both margins below the middle, narrowed above to the oblique, obtuse apex; lip marked with dark purple, the blade sagittate-anchoriform, 5 mm long, 4 mm wide, the obtuse apex shortly and bluntly apiculate with a short sulcus, minutely ciliate, narrowed below obtuse, lateral angles to the deflexed base, the base of the blade with a tall, thickened callus, the base of the lip narrow, unguiculate, angled with tension around the free apex of the column-foot; column stout, semiterete, 2 mm long, the curved foot 5 mm long.

ETYMOLOGY: Named in honor of Walter Teague of San Francisco, California, who discovered this species.

TYPE. ECUADOR: PICHINCHA: terrestrial on a road embankment near Mindo, alt. 2200 m, July 1975, W. Teague s.n., cultivated in San Francisco, flowered in cult. 5 June 1980, *C. Luer 5299* (HOLOTYPE: SEL).

DISTRIBUTION: Western Ecuador.

This showy species is obviously closely allied to *P. amethystinum* with which it is sympatric. The flowers are of the same bright amethyst color, but those of *P. teaguei* appear considerably larger. The ovary is papillose while that of *P. amethystinum* is lightly verrucose; the tail of the dorsal sepal is twice as long as the blade while that of *P. amethystinum* is shorter than the blade; and the callus of the lip of *P. teaguei* is tall and thick compared to the low, slender, essentially ecallose base of the blade of *P. amethystinum*.

Porroglossum uxorium Luer, sp. nov.

Planta pumila epiphytica, pedunculo filiformi suberecto vel horizonatli foliis ellipticis reticulatis brevipetiolatis longiore, flore carnosio successivo, sepalis hepaticis in cupulam connatis cum apicibus in caudas breves incrassa-

tis, lateribus petalorum angulatis et lamina labelli cuneata apiculata velutina basi callosa.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems slender, 8-11 mm long, unifoliate, mostly concealed by a loose, ribbed, tubular sheath. Leaf erect, coriaceous, subverrucose, green with a network of purplish veins, elliptical, shortly petiolate, 25-30 mm long including the 5-8 mm long petiole, 9-11 mm wide, the apex obtuse to rounded, tridenticulate, cuneate below into the petiole. Inflorescence a congested raceme of single, successive flowers borne at the apex of a filiform, suberect to more or less transverse, lightly scabrous peduncle 4-7 mm long, from a node low on the secondary stem; floral bract tubular, 5 mm long; pedicel 6 mm long; ovary dark green, subverrucose, 4 mm long; sepals fleshy, tan with purple flecks near the purple apices, the dorsal sepal ovate, 9 mm long, 5 mm wide, connate to the lateral sepals for 3 mm to form a wide sepaline cup, the triangular free portion contracted into a thick, rounded apex, the 3 veins prominent externally, the lateral sepals broadly ovate, oblique, 8 mm long, connate 3.5 mm into a synsepal 10 mm wide spread out, the apices contracted into thick, rounded tails 2 mm long, 1.25 mm wide; petals translucent yellow, marked with purple, more or less oblong, 4 mm long, 2 mm wide, each side with an angle in the basal third, the angle of the upper margin obtuse, the lower acute, the apex thickened, dilated subtruncate; lip with a linear, angled claw bent under tension about the free end of the column-foot, the blade purple, cuneate, 4 mm long, 3.25 mm wide, the truncate apex with a protruding, narrowly obtuse apiculum, with a central cleft extending onto the blade, the lateral angles obtuse, the base with a thick pyramidal callus; column greenish white, semiterete, 2 mm long, with a curved foot 4 mm long.

ETYMOLOGY: From the Latin *uxorium*, "of the wife," referring to Jane Luer who discovered this species.

TYPE: ECUADOR: MORANA-SANTIAGO: epiphytic in cloud forest above the dam site east of Paute, alt. 1700 m, 10 July 1977, C. Luer, J. Luer, G. Luer & A. Andreetta 1683 (HOLOTYPE: SEL).

DISTRIBUTION: Southeastern Ecuador.

This little species is most closely allied to *Porroglossum condylosepalum* Sweet, but *P. uxorium* may be distinguished by the smaller leaves with a prominent network of purple veins. The tails of the sepals are two millimeters long, and the callus of the base of the blade of the lip is pyramidal and entire.

Restrepia dodsonii Luer, sp. nov.

Species haec *R. serrilabiae* Schltr. similis sed synsepalo roseo purpureo guttulado, petalis cum macula pubescenti basali, lateribus ambabus petalorum ciliatis et apice labelli subacuto vel anguste rotundato differt.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems unifoliate, 1.5-5.5 cm long, concealed by a series of 4-6 compressed, oblique, imbricating, whitish, unspotted sheaths. Leaf erect, coriaceous, suffused with purple beneath, ovate, 2-3.8 cm long, 1-2.5 cm wide, the subacute apex tridenticulate, the base rounded, sessile. Inflorescence a fascicle of slender, single-flowered peduncles 2-4 cm long, appearing behind the leaf,

from a node high on the secondary stem; floral bract tubular, 4-5 mm long; pedicel 2.3 mm long; ovary 2-3 mm long; dorsal sepal narrowly ovate in the lower portion, translucent rosy white with 5 thin, red-purple veins, narrowly attenuate in the middle, the apex clavate-thickened, orange, 19-24 mm long, 2 mm wide near the base; lateral sepals rose, suffused and dotted in lines with purple, connate to the minutely bifid, subacute to obtuse apex into an elliptical synsepal, 17-23 mm long, 7-8 mm wide, microscopically pubescent within; petals narrowly ovate in the lower portion, translucent white with a central, elevated, thickened, minutely pubescent, dark purple spot, with 1-2 hair-like appendages on both margins, filiform above into a minimally thickened apex, 11-13 mm long, 0.75 mm wide; lip dull cream, dotted with purple, narrowly oblong-subpandurate, 6 mm long, 1 mm wide, the blade subacute to narrowly rounded at the apex, the surface spiculate and the margins irregularly fimbriate, the basal portion suborbicular, shallowly concave, with a pair of lateral, hair-like, antrorse processes from thin lamellae coursing downward onto the blade; column slender, curved, clavate, white, 3 mm long, with a pedestal-like base.

ETYMOLOGY: Named in honor of Dr. Calaway H. Dodson, director of the Marie Selby Botanical Gardens and author of the *Orchids of Western Ecuador*, who has been familiar with this species for many years.

TYPE: *ECUADOR*: PICHINCHA: epiphytic in citrus trees ca. 3 Km west of Tandapi, alt. 1500 m, 16 Aug. 1975, C. Luer & S. Wilhelm 538 (HOLOTYPE: SEL).

ADDITIONAL MATERIAL EXAMINED: *ECUADOR*: PICHINCHA: epiphytic in cloud forest ca. 10 Km east of Tandapi, alt. ca. 1700 m, 2 Feb. 1978, C. Luer, J. Luer & A. Hirtz 2445 (SEL); epiphytic 12 Km west of Tandapi, alt. 1200 m, SEL greenhouse acc. no. 44-75-1, flowered in cult. 24 Aug. 1979, C. H. Dodson 8641 (SEL).

DISTRIBUTION: Western Ecuador.

This little species is apparently restricted to one valley of the western slopes of Pichincha. It is similar to the Colombian *R. serrilabia*, but the former is easily recognized by the pink color of the synsepal with tiny purple dots. The synsepal of *R. serrilabia* is yellow with purple dots. In addition, a purple, pubescent spot is present at the base of each petal of *R. dodsonii*, and the apex of the lip is narrowly rounded instead of truncate-retuse.

Restrepia iris Luer, sp. nov.

Ab speciebus ceteris generis *Restrepiae* HBK planta parva, vaginis caulium secundariorum immaculatis, pedunculo foliis late ovatis obtusis subaequilongis, synsepalo elliptico flavescenti purpureo striato, petalis supra basim minutissime dentatis et labello oblongo integro comparative lato dignoscenda.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems unifoliate, 3-5 cm long, concealed by a series of 4-5 compressed oblique, imbricating, white, unspotted sheaths. Leaf erect, coriaceous, suffused with purple beneath, broadly ovate, 3.5-4.2 cm long, 2-2.6 cm wide, the obtuse apex tridenticulate, the base rounded, sessile. Inflorescence a fascicle of slender, single-flowered peduncles 3-3.5 cm long, appearing behind the leaf,

from a node high on the secondary stem; floral bract tubular, 4-5 mm long; pedicel 3-5 mm long; ovary 2-3 mm long; dorsal sepal narrowly ovate in the lower portion, translucent white with 5 purple veins, narrowly attenuate in the middle, the apex dull orange, clavate-thickened, 20 mm long, 2 mm wide near the base; lateral sepals connate into an elliptical synsepal with a minutely bifid, obtuse apex, 18 mm long, 9 mm wide, striped in red-purple along the veins, becoming dots toward the apex, the background color greenish white toward the apex, rosy yellow centrally and white basally; petals narrowly ovate in the lower portion, translucent white with a purple midvein, both margins orange, minutely and sparsely denticulate, filiform above into a dark purple, clavate-thickened apex, 12 mm long, 1 mm wide; lip oblong, very slightly narrowed centrally, 6 mm long, 2.5 mm wide, the basal portion green, shallowly concave, with delicate, lateral, setiform processes 1 mm long, the blade oblong, orange, speckled with brown, visibly entire and smooth (microscopically cellular-glandular), the apex truncate, slightly re-tuse; column green, curved, clavate, 3.5 mm long, with a pedestal-like base.

ETYMOLOGY: From the Latin *iris*, "a rainbow," in allusion to the multicolored flowers.

TYPE :ECUADOR: ZAMORA-CHINCHIPE: epiphytic in cloud forest between Loja and Zamora, alt. 2500 m, Nov. 1978, W. Teague s.n., cultivated by H. Ripley in San Francisco, Calif., flowered in cult. 20 Aug. 1979, *C. Luer 4102* (HOLOTYPE: SEL).

DISTRIBUTION: Southeastern Ecuador.

This little species with colorful flowers may be distinguished from others of the genus by unspotted sheaths (although this may not hold true), and an ovate leaf and peduncles about the same length. The flowers are best identified by the small lip which is rectangular and comparatively broad with visibly entire margins and a smooth surface.

Restrepia teaguei Luer, sp. nov.

Inter species generis *Restrepiae* HBK planta mediocris, vaginis caulium secundariorum maculatis, foliis late ovatis obtusis, pedunculo elongato, synsepalo fusiformi aurantiaco rubroque purpureo guttato et petalis supra basim ciliatis dignoscenda.

Plant medium in size, epiphytic, caespitose; roots slender, flexuous. Secondary stems unifoliate, 4-8 cm long, concealed by a series of 5-6 compressed, oblique, imbricating sheaths, white, heavily dotted with black, less on the upper sheaths. Leaf erect, coriaceous, suffused with purple beneath, broadly ovate, 4-5.5 cm long, 3-3.8 cm wide, the obtuse apex tridenticulate, the base rounded, sessile, Inflorescence a fascicle of slender, single-flowered peduncles 3.5-4.5 cm long, appearing behind the leaf, from a node high on the secondary stem; floral bract tubular, oblique, 5 mm long; pedicel 2 mm long; ovary 4 mm long; dorsal sepal narrowly ovate in the lower portion, translucent white with 5 thin, purple veins, narrowly attenuate in the middle, the apex clavate-thickened, orange dotted with purple, 24 mm long, 3 mm wide near the base; lateral sepals connate to the minutely bifid, acuminate, acute apex into an elliptical-fusiform synsepal, the base narrowed, 24 mm long, 9 mm wide, red in the basal and apical thirds, orange in the mid-

dle, diffusely dotted with purple; petals narrowly ovate in the lower portion, translucent white with a purple midvein, both margins yellow, irregularly ciliate, filiform above into a minimally thickened apex, 15 mm long, 1.5 mm wide; lip orange, dotted with red-brown, oblong-subpandurate, 7.5 mm long, 2.5 mm wide, the blade truncate to shallowly retuse at the apex, the surface minutely verrucose and margins minutely serrulate, the basal portion suborbicular, shallowly concave, with a pair of lateral, hair-like, antrorse processes; column curved, clavate, 4 mm long, with a pedestal-like base.

ETYMOLOGY: Named in honor of Walter Teague of San Francisco, California, who discovered this species.

TYPE: *ECUADOR*: ZAMORA-CHINCHIPE: epiphytic in cloud forest between Loja and Zamora, alt. 1600 m, July 1975, W. Teague s.n., cultivated by H. Ripley in San Francisco, Calif., flowered in cult. 20 Aug. 1979, *C. Luer 4101* (HOLOTYPE. SEL).

DISTRIBUTION. Southeastern Ecuador.

This pretty species may be recognized by the red and orange, fusiform synsepal dotted with purple. The petals are ciliated on both margins of the narrowly ovate basal portion. Although the lip is similar to that of most of the other species, it appears to be smooth, but examination under the microscope reveals it to be minutely verrucose.

Scaphosepalum hirtzii Luer, sp. nov.

Inter species generis *Scaphosepali* Pfitz. habitu mediocri, foliis tenuibus longipetiolatis, sepalis glabris in tubum cylindricum connatis, cauda sepalii inferioris tubulosa decurvata, pulvinis sepalorum lateralium grandibus planis semilunatis ab medio reflexis caudis gracilibus brevibus, petalis falcatis et labello ligulato arcuato bis cristato dignoscenda.

Plant medium-sized, epiphytic, caespitose; roots slender, flexuous. Secondary stem slender, unifoliate, 4-7.5 cm long, provided with 2-3 close, tubular sheaths. Leaf erect, thinly coriaceous, elliptical, long-petiolate, 18-27 cm long including the 6-10 cm long petiole, 2.7-4 cm wide, the apex acute, tridenticulate, the base cuneate into the narrow, conduplicate petiole. Inflorescence a single, non-resupinate flower produced successively in a many-flowered, congested, progressively lengthening raceme by a slender, smooth, suberect to horizontal or descending peduncle, from a node on the secondary stem; floral bracts tubular, 4-6 mm long; pedicels 6-12 mm long; ovary purple-brown, smooth with low ribs, 4 mm long; middle sepal light brown, oblong, concave, 3-carinate, 11 mm long including the tail, 3 mm wide, connate to the lateral sepals for 6 mm to form a broad, cylindrical tube, the sides of the free portion revolute into a decurved, tubular tail; lateral sepals yellow-brown, connate 6 mm into a bifid lamina 8 mm broad when spread, 6-carinate, the apical callosities pale yellow to pale red-orange to pale orange-brown, flat, semilunate, reflexed from the middle, 8-9 mm long, 5 mm wide, the acute apices contracted into filiform, green tails 3 mm long; petals translucent yellow, falcate, 4 mm long, 1.75 mm wide, 2-veined, the acute apex recurved, the lower margin dilated; lip yellow, oblong-ligulate slightly dilated near the middle, arcuate, 4 mm long, 1.5 mm wide, the anterior por-

tion rounded, serrulate, the base truncate, obscurely bilobed, the disc with a parallel pair of crests near the middle, column red-brown, semiterete, 4.5 mm long, broadly winged above the middle, with a thick foot 2 mm long.

ETYMOLOGY: Named in honor of the discoverer, Alexander C. Hirtz of Quito, Ecuador.

TYPE: *ECUADOR*: PICHINCHA: epiphytic in cloud forest above Mindo, alt. 2200 m, 11 Nov. 1979, C. Luer, J. Luer & A. Hirtz 4752 (HOLOTYPE: SEL).

DISTRIBUTION: Western Ecuador.

Vegetatively this species is similar to *Sc. swertiaefolium* (Rchb. f.) Rolfe, but the flower is unique. The inferior sepal is connate up to the base of the tail with the lateral sepals to form a cylindrical tube the opening of which is blocked by the broad, semilunar pads of the lateral sepals. The diverging surfaces create a flat, orbicular face of the flower with only a midline crack from which the decurved tail of the inferior sepal emerges.

KONANTZIA, A NEW GENUS IN THE ORCHIDACEAE
FROM WESTERN ECUADOR

Calaway H. Dodson* & Norris Williams**

A monotypic genus in the Oncidiinae is proposed for an unusual plant with vestigial apical leaves on the pseudobulbs, and minute flowers on elongate paniculate inflorescences.

Konantzia Dodson & N. Wms., gen. nov.

Planta epiphytica habitu *Erycinae echinatae* (HBK) Lindl. pseudobulbi ovati folio apicali vestigiali basi vaginis foliaceis curvumcincti. Folia crassa carnosaque. Inflorescentia lateralis elongata paniculata dense florifera. Flores minuti, labello ecalcarato. Columna elongata apoda sine alis. Pollinia 2, stipite ligulato.

ETYMOLOGY: Named in honor of Sr. Max Konantz of Guayaquil, Ecuador, who discovered the plant.

TYPE: *Dodson 6832* (SEL).

Konantzia minutiflora Dodson & N. Wms., sp. nov.

Planta mediocris epiphytica, pseudobulbis parvis leviter compressis, foliis duris, inflorescentis paniculata usque 45 cm longa multiflora, floribus minutis albis, labello purpureo punctate ecalcarato.

Epiphytic, roots fasciculate, stems creeping; pseudobulbs round to ovate, slightly flattened, to 3 cm x 2 cm, apical leaf aborted, surrounded at the base by several conduplicate, imbricating sheaths, the uppermost pair foliate, leaves narrowly elliptical, acute, thick and fleshy, hard, articulate with the sheath near the base, dark green above with red punctations dispersed over the surface. Inflorescence from the base of the pseudobulbs, elongate, erect, to 45 cm long, paniculate, with the secondary branches densely-flowered, basal nodes provided with several appressed, tubular sheaths to 1 cm long; floral bracts small, triangular, to 0.5 mm long. Flowers tiny, white with purple spots inside the lip, sepals and petals forming a tube around the column and lip; dorsal sepal broadly ovate, obtuse, fleshy, to 2 x 1 mm; lateral sepals connate for one-third of their length, erect, ovate, deeply saccate at the base, acuminate, the synsepalum to 2 x 1.5 mm; petals erect obliquely ovate, to 1.8 x 0.8 mm; lip without a spur, obovate-spatulate, with the basal margins swollen to form a pair of thick, fleshy longitudinal calli, enlarged toward the base, to 2 x 1 mm; column footless, relatively slender, free from the lip, wingless, slightly arcuate.

ETYMOLOGY: Named in reference to the tiny flowers.

TYPE: *ECUADOR*: CHIMBORAZO: Pallatanga road at Caluma, collected by Max Konantz, alt. 800 m, 2 Aug. 1977, *Dodson 6832* (SEL).

ADDITIONAL MATERIAL EXAMINED: *ECUADOR*: COTOPAXI: Near Macuchi, Quevedo-Latacunga, alt. 1600 m, 18 Apr. 1980, *Dodson & Morgan 9312* (SEL).

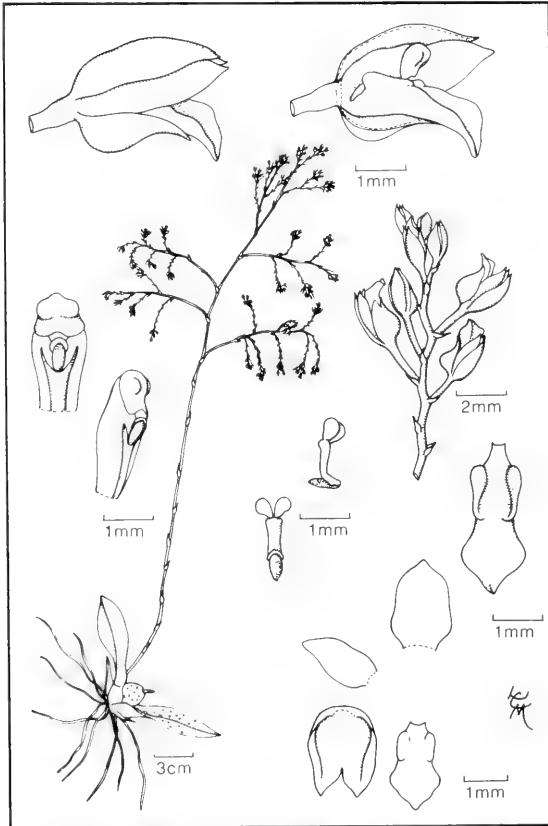
* The Marie Selby Botanical Gardens, 800 S. Palm Avenue, Sarasota, FL 33577

** Florida State University, 600 W. College Avenue, Tallahassee, FL 32306

DISTRIBUTION: Western Ecuador.

This species has also been collected at Eloy Alfaro in Manabí Province (R. Estrada, pers. comm.). The peculiar reduced apical leaves on the pseudobulb while the lateral leaves are well developed are found in the unrelated genus *Erycina*.

Konantzia differs from the related genera *Hybochilus* Schltr., *Leochilus* Knowles and Westc. and *Mesospinidium* Rehb. f. in the relatively slender column with wings or auricles, and from *Diadenium* Poepp. & Endl. and allied genera in the lack of a spur of foot on the lip. It differs from *Ionopsis* Kunth by the much smaller and acute lip with large basal calli.



KONANTZIA MINUTIFLORA Dodson & N. Wms.

EMBREEA – NEW GENUS IN THE ORCHIDACEAE

Calaway H. Dodson*

The 45 members of the genus *Stanhopea* Frost are remarkably homogeneous in the features of the plant with one exception: *S. rodigasiana* Claes ex Cogn. The species of *Stanhopea* have a single, petiolate, dark green leaf at the apex of a pyriform, dark green, pseudobulb, surrounded at the base by conduplicate chartaceous sheaths. The inflorescences are pendent from the base of the pseudobulb with two to fifteen, medium to large, fleshy flowers. *Stanhopea rodigasiana* has rectangular grey-green pseudobulbs, which are quadrate in cross section, grey-green leaves and elongate, single-flowered inflorescences. The flowers of *S. rodigasiana* differ from those of other species of *Stanhopea* in the dolabriform horns on each side of the mesochile, the posterior lobes of which are acute and the anterior lobes acuminate to aristate, and the bifid rostellum. The species of *Stanhopea* have falcate horns on the mesochile (or none) and an entire, spine-like rostellum.

I propose that the single species which is aberrant in the genus, with several significant discordant features, warrants recognition by placement in a separate genus.

Embreea Dodson, gen. nov.

Generis *Stanhopeae* Frost affine sed pseudobulbis subquadratis unifoliatis, foliis carnosis canovirescentibus, inflorescentia uniflora, cornibus mesochilii dolabriformibus, lobo antico acuminato lobo postico acuto et rostellum bifurcato differt.

ETYMOLOGY: Named in honor of Mr. Alvin Embree who has been very supportive of my studies of *Stanhopea*.

TYPE: *Claes s.n.* (BR).

This is a monotypic genus of northwestern Colombia and southeastern Ecuador.

Embreea rodigasiana (Claes ex Cogn.) Dodson, comb. nov.

Stanhopea rodigasiana Claes ex Cogn, Chronique Orchid enne 134. 1898.

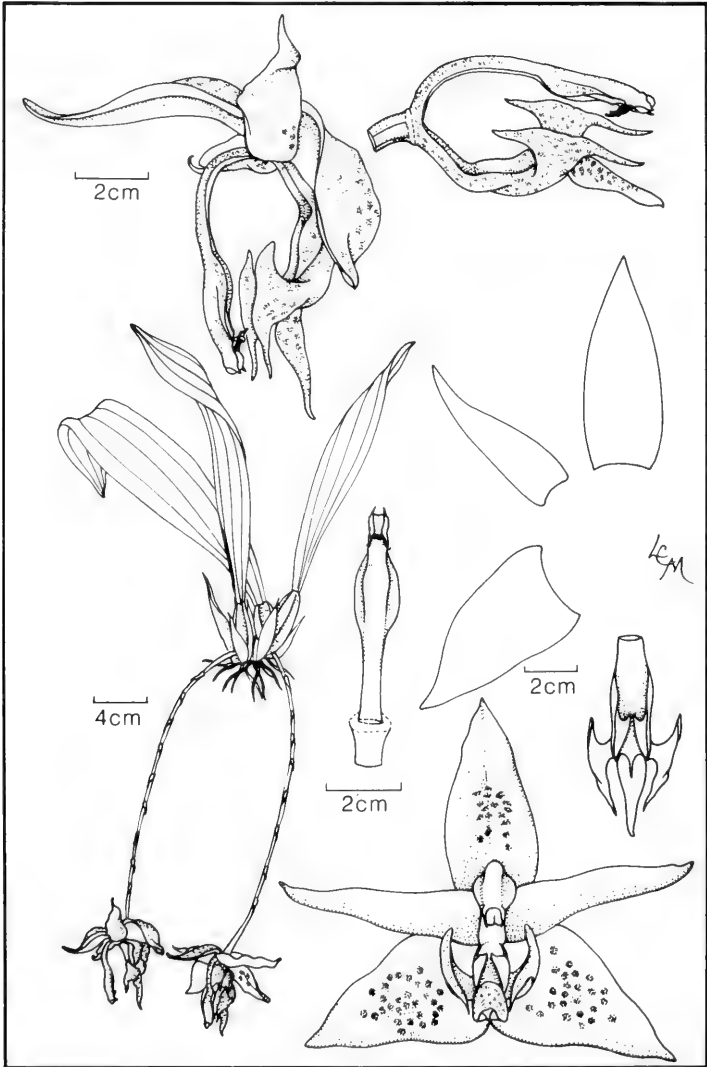
TYPE: COLOMBIA: ANTIOQUIA: *Claes s.n.* (HOLOTYPE: BR: ISOTYPE: K).

ADDITIONAL SPECIMENS SEEN: COLOMBIA: EL VALLE: La Elsa, km 65 old road Cali-Buenaventura, alt. 800 m, 22 June 1965, *Dodson & Hills 3141a* (SEL); ECUADOR: ZAMORA-CHINCHIPE: Region of Gualaquiza, *Embree s.n.* (SEL).

DISTRIBUTION: Western Colombia and southern Ecuador on both sides of the Andes.

This unusual species is usually considered to belong to the genus *Stanhopea*, but the plant is light green, the rostellum bifid and the horns of the lip hatchet-shaped. The species has been known only from the Choc o of western Colombia but has been recently collected on both sides of the Andes in southern Ecuador.

*The Marie Selby Botanical Gardens, 800 S. Palm Avenue, Sarasota, FL 33577



EMBREEA RODIGASIANA (Claes. ex Cogn.) Dodson

THREE NEW SPECIES OF MALVACEAE FROM MEXICO

Paul A. Fryxell

Research Geneticist, U.S. Department of Agriculture, Science and Education Administration, and Texas A&M University, College Station, TX 77843

Dendrosida parviflora Fryxell, sp. nov.

(Fig. 1)

Arbor usque ad 6 m alta, ramunculis viridibus atque cortice laevi; laminis foliorum ovatis concoloribus, glabris praeter caespitibus pilorum in axillis nervorum infra; pedicellis gracilibus, 1-4 cm longis, axillaribus; involucello nullo; calycibus 8-10 mm longis, 10-nervatis, extra glabris; petalis luteis, ca. 1.5 cm longis; fructibus glabris, in maturitate nigricantibus, 7 mm diametro, mericarpiis 7-8, omnis ~~l~~-seminali.

Tree to 6 m tall with smooth bark, the twigs green, appearing glabrate but minutely stellate-pubescent, the hairs less than 0.1 mm long. Leaf blades ovate to lanceolate, up to 17 cm long, 10 cm wide, usually smaller and 1.5-2.5 times as long as wide, basally more or less truncate (subcordate to subcuneate), palmately 5-7-nerved, crenate to subentire (the veins terminating at the margin in a glandular tooth), acute, membranous, green and concolorous, essentially glabrous except for dense tufts of white hairs (0.5- 1 mm long) in the axils of principal veins at base of blade beneath (fig. 1). Petioles 3-8.5 cm long 1/3-2/3 length of blade), with pubescence like that of stem. Stipules subulate, 3-4 mm long, caducous. Pedicels slender, usually solitary in the axils, more or less aggregated toward the branch tips, 1-4 cm long, articulated 4-6 mm below the flower. Involucel absent. Calyx 8-10 mm long, 5-lobed (ca. half-divided or more), 10-nerved (the 5 midribs becoming prominent ridges below), green and glabrous externally, minutely woolly and whitish internally, closely enclosing the fruit. Petals bright yellow throughout, ca. 1.5 cm long, ciliate on claw, otherwise glabrous. Staminal column 2 mm tall, glabrous, yellowish; filaments 1-1.5 mm long; anthers numerous, yellowish, 1 mm long; pollen orange-yellow, spherical, echinate. Styles glabrous, the stigmatic area truncate or subcapitate. Fruits essentially glabrous, green when immature becoming blackish at maturity, ca. 7 mm diameter, oblate or oblate-conic, 5-6 mm tall; mericarps 7-8, glabrous, the dorsal wall clearly defined and smooth having a characteristic "shoulder," dehiscent above this point, the lateral wall smooth except for a restricted zone of rugosity along basal-dorsal margin (fig. 1). Seed solitary, glabrous, ca. 3.5 mm long.

Type: MEXICO: Oaxaca: Mpio. San Juan Lachao. Carretera Puerto Escondido-Oaxaca, 1.5 km al N de La Asunción, 72 km al N de Puerto Escondido. Bosque de pino y encino. Suelo franco. Alt. 1260 m. Arbolito de 6 m de alto. Flores de color amarillo. Común en una cañada húmeda. 15 Nov 1979, Koch, Fryxell & Wendt 79549 (holotype: MEXU; isotypes: BM, CAS, CHAPA, CTES, ENCB, F, MO, NY, pf).

Dendrosida is a wholly Mexican genus of arborescent plants, known only from the states of Chiapas, Oaxaca, and Guerrero, of which D. parviflora is the fourth species to be described. The other three species are compared in a table (Phytologia 37: 290. 1977) that lists the principal distinguishing characters. The new species differs from these in its smaller flowers (as the specific epithet suggests), in its distinctive pubescence pattern, and in other characters. The characteristic mericarp morphology of the genus is illustrated for D. batesii Fryxell (Brittonia 23: 232. fig. 2. 1971) and for D. parviflora in the accompanying illustration (fig. 1).

Pavonia pulidoae Fryxell, sp. nov.

(Fig. 2)

Frutex 1.5 m altus, stellato-pubescent, trichomatibus statura variabilis; laminis foliorum ovatis plus minusve ~~dic~~coloribus, remote dentatis; pedicellis 1-2 cm longis, axillaribus; involucllo 8-9-partito, lobis involuclli lineari-lanceolatis, calycem excedentibus; calycibus anguste campanulatis, 10-12 mm longis; corollis tubularibus, 2-3 cm longis, salmonis; columna staminalis demum exsertis, filamentis 1 mm longis; stylis 10, pallidis, stigmatibus rubellis; fructibus oblongis, 8-9 mm diametro, pubescentibus, mericarpiis lignosis, 5, omnis 1-seminali.

Shrub to 1.5 m tall, the young stems densely pubescent, the hairs predominantly stellate, of variable size (0.2-1 mm long). Leaf blades ovate, truncate to cordate, remotely dentate or crenate to obscurely 3-lobed, rounded-acute, palmately 5-7-nerved, somewhat discolorous, 2-3 cm long, 1.2-2 cm wide, soft-pubescent above and beneath. Petioles 2-9 mm long, with pubescence like stem. Stipules subulate, 4-6 mm long, pubescent, caducous. Pedicels solitary in the upper axils, unjointed, ca. 1 cm long (in flower) to 2 cm long (in fruit), stellate-pubescent. Involucl 8-9-parted, the lobes linear-lanceolate (or weakly spatulate), 12-15 mm long (exceeding the calyx), 1-2 mm broad, more or less acute, pubescent. Calyx narrowly campanulate, sparsely and minutely pubescent, 10-12 mm long, 5-lobed, the lobes triangular, 3-4 mm long. Corolla 2-3 cm long, tubular (malvaviscoid), salmon-colored (drying reddish), externally covered with minute peg-like trichomes. Staminal column ultimately exserted by ca. 1 cm, glabrous, pallid, with 5 apical teeth; filaments short (1 mm); anthers and pollen yellowish. Styles 10, exceeding staminal column, pallid, with reddish capitate stigmas. Fruits enclosed by calyx, obovate, schizocarpic, ca. 8-9 mm diameter, minutely appressed-scabridulous, more or less 10-ribbed, apically acute; mericarps 5, 6-7 mm tall (fig. 2), relatively woody (carpel walls ca. 0.5 mm thick), 1-seeded. Seeds glabrous, reniform, 4-4.5 mm long.

Type: MEXICO: Edo. México: Mpio. Texcoco, Cerro Tetzcutzingo, 7 km al E de Texcoco. Cerro cubierto con bosque de encino, muy perturbado. Suelo franco. Alt. 2550 m. Arbusto de 1.5 m de alto. Tallos verticales; flor color mamey. Lado oeste del cerro. Escaso. 19 Junio 1979, Ma. Teresa Pulido S. 23 (holotype: CHAPA; isotype: pf).

The finding of this previously undescribed species of *Pavonia* in the well-botanized Valley of Mexico was indeed unexpected, and its discovery is a credit to the collector, Marfa Teresa Pulido, in whose honor the species is named. *Pavonia pulidoae* belongs to *Pavonia* sect. *Malache* (Vogel in Trew) DC., which now includes six Mexican species. The 25 species of *Pavonia* known from Mexico are the subject of a paper (in press with the Boletín de la Sociedad Botánica de México) that will provide a key to species and other information.

Sida wendtii Fryxell, sp. nov.

(Figs. 3, 4)

Herba perennes procumbens; laminis foliorum anguste ellipticis vel linearibus, integris acutisque vel ad apicem obscure tridentatis, supra glabris vel trichomatibus stellatis secus marginem (non costam); pedicellis 1-4 mm longis, axillaribus autem in fasciculis terminalibus ut videtur ob internodiis apicalibus perabbreviatis; calycibus 5-6 mm longis; petalis 16-23 mm longis, roseis basibus atrorubris; fructibus ca. 6 mm diametro, manifeste muricatis prominentiis omnis trichomate glochidiato ad apicem; mericarpiis 5-6.

Perennial herb with a woody taproot. Stems numerous, procumbent, branching, the internodes abruptly shortened at apices, up to 1 m long, seldom more than 1.5 mm diameter, with minute appressed stellate hairs, these becoming lost in age. Leaf blades elliptic, linear-lanceolate, or oblong, 4-10 times as long as broad, basally subcordate, entire and acute or obscurely tridentate at apex, up to 22 mm long, 2-4.5 mm broad (juvenile leaves shorter and broader with manifest apical dentations), the lower surface with appressed stellate hairs evenly distributed, the upper surface with similar hairs along the margin (but not along the midrib) or these lost, leaving the upper surface glabrous. Petioles 4-7 mm long, canaliculate, sparsely stellate-pubescent, more densely so distally near juncture with the blade. Stipules narrowly lanceolate to oblanceolate, sparsely hispid, subequal to petioles along stem to exceeding petioles (9-14 mm long) at apices of the branches, 0.4-0.9 mm wide. Pedicels 1-4 mm long, minutely stellate-pubescent, axillary but appearing at the branch tips where the internodes are so shortened that the flowers appear to be in a terminal fascicle. Involucrel absent, but the stipules at the branch tips may be mistaken for an involucrel because of crowding. Calyx 5-6 mm long, ca. 2/3-divided, minutely stellate-pubescent, the lobes prominently ciliate (the hairs 1-2 mm long), obscurely veined, the lobes greenish, the base yellowish. Petals 16-23 mm long, ca. 10 mm wide, asymmetrically obovate, rose-colored with a poorly defined dark red spot at base, gradually narrowed to a sparsely ciliate claw, otherwise glabrous. Staminal column 4.5 mm long, sparsely pubescent or glabrous at base, pallid; filaments 1.5-3 mm long; anthers ca. 30, orangeish; pollen of mixed coloration (orangeish and dark red), spherical. Styles 5-6, slender, pallid, glabrous, exceeding staminal column by 4-6 mm; stigmas capitate, reddish. Fruits ca. 6 mm diameter, oblate-conical, brownish, prominently muricate, each projection with glochidiate hair on apex; mericarps 5-6.

Type: MEXICO: Oaxaca: Mpio. Sto. Domingo Armenta, terracerfa a Santo Domingo, 1.5 km al S de la carretera a Pinotepa Nacional-Acapulco, 29 km al O. de Pinotepa Nacional. Zona de potreros y manchones de bosque. Suelo franco-arenoso. Alt. 20 m. Hierba perenne, tallos procumbentes. Raiz pivotante. Pétalos color rosa carne, con una mancha más oscura en la base. Sobre orillas del camino y en potreros. Común. 8 Nov 1979, Koch, Fryxell & Wendt 79424 (holotype: ENCB; isotypes: BM, BR, CAS, CHAPA, CTES, F, K, MARY, MEXU, MICH, MO, NA, NO, NY, TEX, WIS, XAL, pf).

This species is a member of Sida sect. Malachroideae G. Don, recently treated by Clement (Contr. Gray Herbarium 180: 16-30. 1957), but is distinct from other known species. Its flowers (fig. 3) are larger than any except the Paraguayan S. centuriata Clement, and its narrower, virtually entire leaves (fig. 4) are distinctive in form. It is a pleasure to name this species in honor of Tom Wendt, co-collector of the type material, whose alert eyes originally spotted this material, and whose willing hands helped press the numerous isotypes.

FIGURE LEGENDS

- Figure 1. Dendrosida parviflora. Top left, branch tip with two flower buds; top right, individual mericarp in oblique view; bottom, climax leaf showing (inset) pubescence at base of blade.
- Figure 2. Pavonia pulidoae. Top, open flower and leaf; bottom, individual mericarp (on left) and sectional view of mericarp showing position of seed (on right).
- Figure 3. Sida wendtii. Flower.
- Figure 4. Sida wendtii. Branch tip, showing crowding of leaves, stipules, and flowers; inset, range of variation in form of leaf apices.

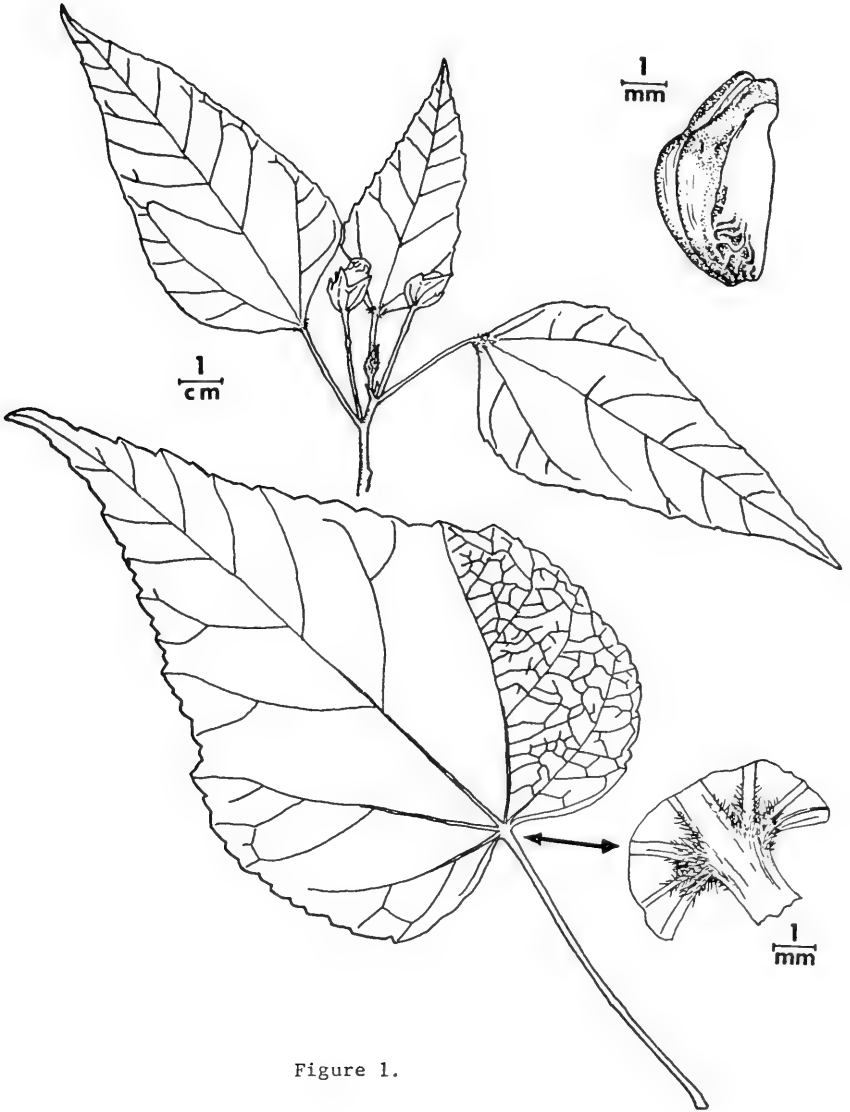


Figure 1.

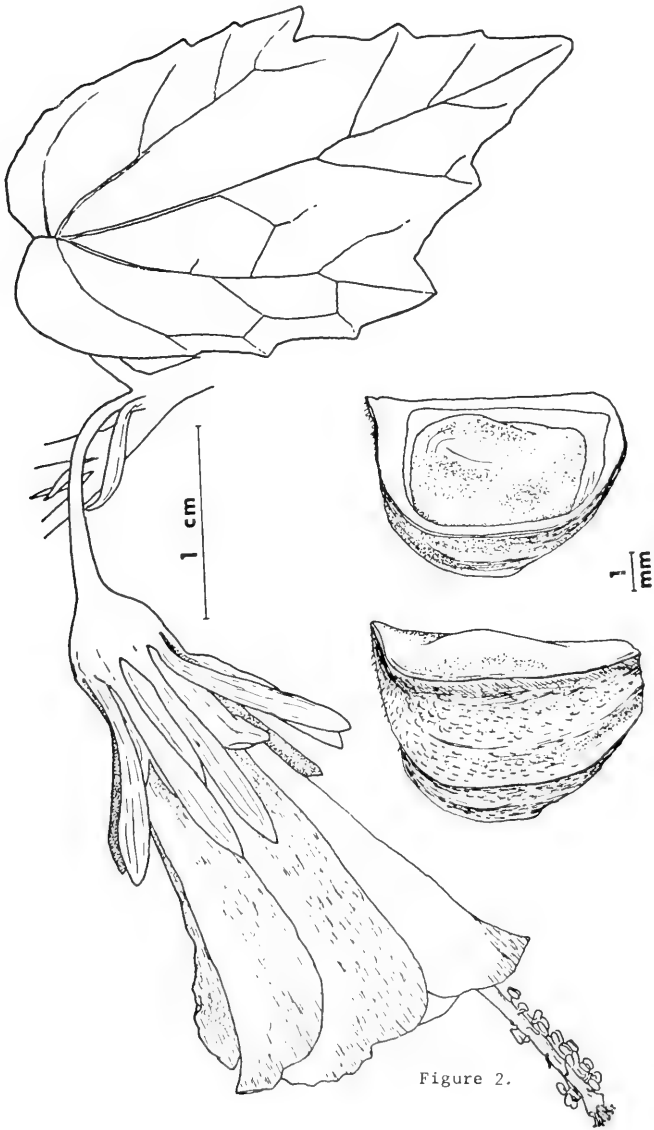


Figure 2.

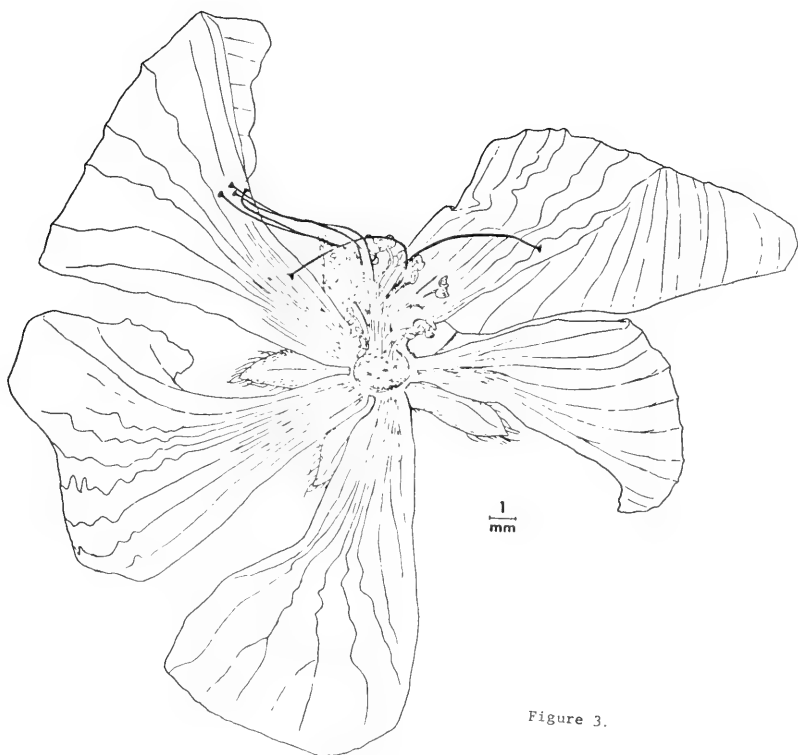


Figure 3.

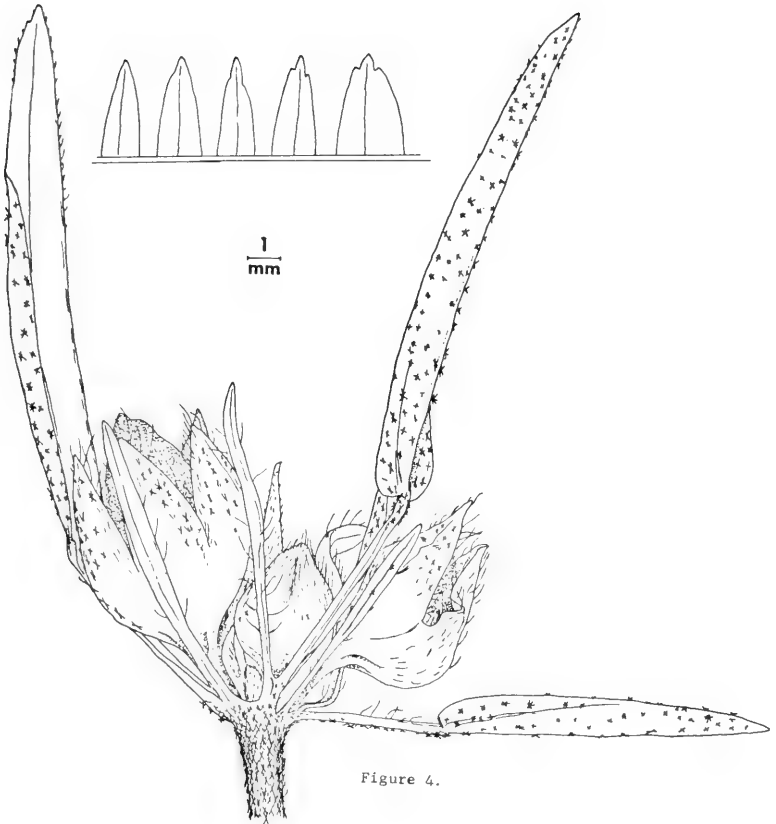


Figure 4.

NOTES ON THE GENUS *TSOONGIA*

Harold N. Moldenke

Unfortunately, time is no longer available for me to prepare the detailed monograph originally planned for this genus, but it has seemed worthwhile to place on record the bibliographic and other notes accumulated by my wife and myself over the past fifty years. This is the 56th genus so treated by me in the present series of papers in this and other journals. Herbarium acronyms used herein are the same as have been employed in all the previous papers in this series since 1930 and are fully explained in my "Fifth Summary" (1971), volume 2, pages 795 to 801, and in *PHYTOLOGIA MEMOIRS*, no. 2, now in press.

TSOONGIA Merr., Philip. Journ. Sci. 23: 264. 1923.

Synonymy: *Tsoangia* Merr. ex Mold., Résumé Suppl. 3: 35, in syn. 1962.

Bibliography: E. D. Merr., Philip. Journ. Sci. 23: 264. 1923; A. W. Hill, Ind. Kew. Suppl. 7: 246. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1076. 1932; P'ei, Sinensia 2: 68. 1932; Hu & Chun, Icon. Pl. Sin. 3: 50, pl. 150. 1933; Junell, Symb. Bot. Upsal. 1 (4): 96. 1934; Dop in Lecomte, Fl. Gén. Indo-chine 4: 785. 1935; Hu, Bull. Chinese Bot. Soc. 1 (2): 95. 1935; Mold., Suppl. List Inv. Names 7. 1941; H. N. & A. L. Mold., Pl. Life 2: 32 & 53. 1941; Mold., Alph. List Inv. Names 44. 1942; Mold., Known Geog. Distrib. Verbenac., ed. 1, 57, 58, 100, & 101. 1942; Mold., Alph. List Inv. Names Suppl. 1: 2. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 132, 135, 137, & 197. 1949; J. C. Willis, Dict. Flow. Pl., ed. 6, 750. 1951; Pételot, Pl. Med. Cambod. Laos Viet. 2 [Archiv. Recherch. Agron. Past. Viet. 18]: 245 (1953) and 4: 57 & 168. 1954; Angely, Cat. Estat. Gen. Bot. Fan. 17: 6. 1956; Mold., Résumé 171, 174, 177, 355, & 470. 1959; Runner, Rep. Groff. Coll. 362. 1961; Hartl, Beitr. Biol. Pfl. 37: 297. 1962; Mold., Résumé Suppl. 3: 35. 1962; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 218. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 1155. 1966; Mold., Résumé Suppl. 15: 11 (1967) and 16: 11. 1968; Rouleau, Guide Ind. Kew. 194 & 353. 1970; Mold., Fifth Summ. 1: 290, 292, & 303 (1971) and 2: 645, 758, & 911. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 1185. 1973; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 41, 47, & 51. 1978.

Erect shrubs or small trees, somewhat pubescent; leaves decussate-opposite, simple, long-petiolate, the blades marginally entire; inflorescence axillary, cymose, loosely few-flowered, shorter than the subtending petiole; flowers small, hypogynous, zygomorphic; calyx small, campanulate, 2-lobed; corolla yellow, gamopetalous, the tube cylindrical, elongate, apically somewhat amplicate, the limb rather spreading, subequally 4- or 5-lobed, the lobes broadly ovate, much broader than the tube, the throat not bearded; stamens 4, epipetalous, subdidynamous, attached to the

central portion of the corolla-tube, subexserted; style single, elongate; stigma punctiform; ovary superior, 2-locular. the cells 2-ovulate.

Type species: *Tsoongia axillariflora* Merr.

A monotypic genus (as far as now known), according to Merrill most closely allied to *Premna* L. and somewhat intermediate between that genus and *Vitex* Tourn., although distinctly closer to the former. It differs notable from *Vitex* in its subequally 4- or 5-lobed corollas which are not bilabiate and the simple leaves and from *Premna* in its slender, elongated corolla-tubes, its strictly axillary inflorescences, its glabrous corolla-throat, and its entire punctiform stigma. In *Premna* the corolla-tubes are short and broad, while the inflorescences are (except in a single species) strictly terminal, the single exception being the anomalous *P. cauliflora* Stapf. In the present genus the corolla-throat is not bearded, the tube being glabrous within except for a few hairs below the insertion of the filaments.

Junell (1934) asserts that "Die Plazenten verwachsen schon oberhalb der Samenanlagen. Es kommen keine Ausbauchungen von der Fruchtknotenwand vor. Die Samenanlagen sind in ihren chalazalen Teil an die Plazenten befestigt. Die Höhlen der beide Karpellen werden, wie bei dieser Subtribus gewöhnlich, durch eine unvollständige, von den verwachsensten Fruchtblattrandern gebildete Scheidewand getrennt." He bases these observations on *McClure* 9692 in the British Museum herbarium.

Angely (1956) erroneously ascribes two species to this genus.

TSOONGIA AXILLARIFLORA Merr., Philip. Journ. Sci. 23: 264. 1923.

Synonymy: *Tsoongia axilliflora* Merr. ex Mold., Suppl. List Inv. Names 7, in syn. 1941. *Tsoongia axillarifolia* Merr. ex Mold., Alph. List Inv. Names Suppl. 1: 2, in syn. 1947. *Tsoangia axillari-flora* Merr. ex Mold., Résumé Suppl. 3: 35, in syn. 1962. *Tsoongia trifoliata* Pételot, in herb.

Bibliography: see bibliography of the genus as a whole.

Illustrations: Hu & Chun, Icon. Pl. Sin. 3: pl. 150. 1933.

An erect shrub or small tree, 3--8 m. tall; branches terete, purplish, glabrous; branchlets ferruginous-pubescent; petioles 2--3 cm. long, pubescent; leaf-blades membranous, oblong-ovate to elliptic-ovate, 6--10 cm. long, 3--5 cm. wide, apically acuminate, marginally entire, basally rounded to subacute, olivaceous or dark-olivaceous and shiny above, glabrous or pubescent on the midrib, paler and subbrunneous (in drying) beneath, obscurely punctulate, more or less pubescent on the midrib and secondaries; secondary 6 or 7 per side, slender, conspicuous beneath, curvate, anastomosing; cymes short-pedunculate, 1--2 cm. long, few-flowered; bracts linear, scarcely 1 mm. long; calyx subcampanulate, 2.5--3 cm. long, 2-lipped, one lip ovate, about 1 mm. long and 1.5 mm. wide, apically rounded, marginally entire, the other lip 2-dentate, the teeth ovate, apically acute; corolla-tube 9 mm. long, externally granulose-glandular, subequally 4- or 5-lobed, the lobes ovate, 2 mm. long, apically rounded; filaments glabrous, slightly exserted; anthers 1 mm. long; fruit drupaceous, globose, black, 2 mm. in di-

ameter, glabrous.

This species, the type species of the genus is based on *McClure 3143* [Herb. Canton Chr. Coll. 9692] from forested ravines at Yik Tsok Mau, Hainan island, China, collected on May 18, 1922, originally deposited in the herbarium of the Philippine Bureau of Science in Manila, now doubtless destroyed. The genus is dedicated to Professor Ts'oong (Chung) Kwan Kwong of Peking University. Merrill (1923) cites also *Ts'oong 1908* from Kwantung.

Pételot (1953) asserts that the species is "Endémique au Nord-Vietnam et au Centre-Vietnam ainsi qu'à Haïnan" and that a leaf and bark decoction of this plant is used medicinally to treat itching, mange, and scab. The vernacular name for the plant in Indochina is "tho".

Recent collectors describe the species as a slender branched shrub, 2.7--5 m. tall, a tree, 2--8 m. tall, or even as "scandent on trees" [*Liang 62622*], the trunk 30--90 cm. in diameter at breast height, the bark gray, the branches gray-green, the leaves thin-papery, dark-green and shiny above, lighter-green beneath, the fruit obovate, green or light-green to yellow-green when immature, lustrous purple or purplish-green to greenish-brown, or even reddish-black, when mature. They have found it growing on mountainsides, in forested ravines, and in the dense shade of mixed woods, at 1000 m. altitude, flowering in July, and in fruit in July, August, and October.

The corollas are said to have been "greenish" on *Ching 8264* and "yellow" on *Liang 62622* & *62725*, *McClure 3143*, and *Tsang & Fung 581*.

Citations: CHINA: Kwangsi: *R. C. Ching 8264* (N). CHINESE COASTAL ISLANDS: Hainan: *Chun & Tso 44022* (B, N, W--1669552); *How 72362* (Bi); *Liang 62622* (N), *62725* (N, S, W--1670909), *63184* (N); *F. A. McClure 3143* [Herb. Canton Chr. Coll. 9692] (Bi--isotype, Ca--325750--isotype, Ca--366331--isotype, Gg--127988--isotype, N--photo of type, Ph--type, Z--photo of type); *Tsang & Fung 581* (B, N, W--1659944); *C. Wang 35721* (N). VIETNAM: Annam: *Poilane 11219* (W--2496744). Tonkin: *Pételot 5687* (W--1717084). MOUNTED ILLUSTRATIONS: Hu, *Icon. Pl. Sin.* 3: pl. 150. 1933 (N, Z).

NOTES ON THE GENUS *MONOCHILUS*

Harold N. Moldenke

Herewith are presented notes, chiefly bibliographic, assembled on this genus by my wife and myself over the past fifty years. This is the 55th genus on which our notes have been published to date. Time for a detailed monograph, as originally planned, is now, unfortunately, no longer available. Full explanation of the herbarium acronyms herein employed -- the same as used by me in

all of the large series of papers published in this journal -- will be found in my "Fifth Summary" (1971), volume 2, pages 795 to 801.

MONOCHILUS Fisch. & Mey., Ind. Sem. Hort. Petrop. 1: 34. 1835; Linnaea 10: Litt.-Ber. 97. 1836 [not *Monochilus* Wall., 1840, nor "Wall. ex Lindl.", 1966].

Synonymy: *Monochilus* Fisch. ex Spach, Hist. Nat. Vég. 9: 227. 1840. *Monachilus* Mukherjee & Chanda, Trans. Bos. Res. Inst. 41: 45. 1978.

Bibliography: Fisch. & Mey., Ind. Sem. Hort. Petrop. 1: 34. 1835; Fisch. & Mey., Linnaea 10: Litt.-Ber. 97. 1836; Fisch. & Mey., Ann. Sci. Nat. Paris, ser. 2, 5: 124. 1836; Reichenb., Handb. 190. 1837; Endl., Gen. Pl. 633 & 634. 1838; Sweet, Hort. Brit., ed. 3, 764. 1839; Meisn., Pl. Vasc. Gen. 2: [Comment.] 198, 199, & 290. 1840; Spach, Hist. Nat. Vég. Phan. 9: 227. 1840; Endl., Enchirid. Bot. 312. 1841; Reichenb., Nom. 108. 1841; D. Dietr., Syn. Pl. 3: 371 & 605. 1843; Walp., Repert. Bot. Syst. 4: 37. 1845; Lindl., Veg. Kingd. 664. 1847; Schau. in A. DC., Prodr. 11: 524 & 526--527. 1847; A. L. Juss. in Orbigny, Dict. Univ. Hist. Nat. 13: 184. 1849; Schau. in Mart., Fl. Bras. 9: 170--172 & 307, pl. 32, fig. 1. 1851; Schnitzl., Icon. Fam. Nat. Reg. Veg. 2: 137 Verbenac. [3]. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 301. 1858; Bocq., Adansonia, ser. 1, 2: 87. 1862; Pfeiffer, Nom. Bot. 2 (1): 132 & 345 (1874) and 2 (2): 1570. 1874; Benth. in Benth. & Hook., Gen. Pl. 2 (2): 1132, 1134, & 1147. 1876; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 258. 1894; Briq. in Engl. & Prantl., Nat. Pflanzenfam., ed. 1, 4 (3a): 156 & 157. fig. 60 C & D (1895) and ed. 1, 4 (3a): 382. 1897; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 431. 1904; M. Kunz, Anatom. Untersuch. Verb. 56 & 57. 1911; Nienburg, Justs Bot. Jahresber. 39 (2): 1051. 1916; J. C. Willis, Dict. Flow. Pl., ed. 5, 430. 1925; A. W. Hill, Ind. Kew. Suppl. 8: 154. 1933; Junell, Symb. Bot. Upsal. 1 (4): 43 & 108, pl. 7, fig. 1. 1934; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 38 & 96. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 258. 1946; H. N. & A. L. Mold., Pl. Life 2: 22--24 & 31. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 81, 162, & 191. 1949; Metcalfe & Chalk, Anat. Dicot. 2: 1031, 1032, & 1040. 1950; J. C. Willis, Dict. Flow. Pl., ed. 6, 430. 1951; Stellfeld, Trib. Farmac. 19 (10): 171. 1951; Angely Cat. Estat. Gen. Bot. Fan. 17: 5. 1956; Angely, Fl. Paran. 7: 4. 1957; Mold., Résumé 94, 220, 320, & 463. 1959; Angely, Liv. Gen. Bot. Bras. 35 & 49. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 258. 1960; Runner, Rep. Groff Coll. 362. 1961; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 431. 1963; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 187. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 737. 1966; J. Hutchins., Evol. Phyl. Flow. Pl. Dicot. 473. 1969; Angely, Fl. Anal. Fitogeogr. S. Paulo, ed. 1, 4: xiii & 826. 1971; Mold., Fifth Summ. 1: 157 & 366 (1971) and 2: 572, 755, & 895. 1971; Mukhopadhyay, Pollen Morph. Verb. [thesis]. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 756. 1973; Napp-Zinn, Anat. Blatt. A (1): 418.

1974; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 12 (2): 84. 1973; Troncoso, Darwiniana 18: 410. 1974; Mold., Phytologia 34: 275 & 507. 1976; Rouleau, Guide Ind. Kew. 124 & 352. 1976; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 13: 154 & 328. 1976; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 41, 45, & 48. 1978.

Dwarf erect herbs, growing from a creeping rhizome, glabrous or slightly viscid-puberulent; leaves alternate or subopposite, simple, membranous, rather large, marginally repand-dentate, exstipulate; inflorescence an elongated, axillary or terminal, loose-flowered raceme, the flowers borne in the axils of very small bracts, hypogynous, solitary, short-pedicellate, sparse along the raceme rachis; bractlets minute, borne at the midpoint of the pedicels; calyx gamosepalous, campanulate or subcyathiform, membranous, not costate, subbilabiate-obloque, shortly 5-fid, the lobes somewhat unequal, 2 superior, 2 lateral, and 1 basal, all apically acute; corolla gamopetalous, whitish, zygomorphic, hypocrateriform, the tube cylindric, oblique and somewhat ampliate above, posteriorly divided, the limb very oblique, bilabiate, the anterior lip spreading and apically trifid, the posterior lip with 2 short lobes at the base; stamens 4, inserted at the middle of the corolla-tube, somewhat unequal, shorter than the corolla-lips; anthers oblong, unappendaged, cernuus, bilocular, basally sagittate, the thecae parallel, basifixed to the dorsal connective; style terminal, capillary, elongate, apically rather obtuse, equaling the stamens; stigma punctiform; ovary short, bilocular and each locule biovulate or else each locule 2-locellate by a false partition; ovules erect, attached laterally near the base; fruit subdrupaceous, subglobose, basally closely enclosed by the fruiting-calyx, composed of 4 (or by abortion less) cocci, the pericarp fleshy, rugose, the endocarp leathery; seeds erect; cotyledons 2, applicate, thick, oily; radicle short, thick

Type species: *Monochilus gloxinifolius* Fisch. & Mey.

Junell (1934) says: "Die beiden Gattungen *Monochilus* und *Amazonia* (*Taligalea*) fasst Briquet in einem Subtribus *Monochileae* zusammen, die nach *Privee* gestellt wird. Der Fruchtknotenbau bei den beiden Gattungen ergibt sich jedoch als einem Typus angehörig, der für *Verbenoideae* vollständig fremd ist. Wie sich aus Taf. VII, Fig. 1 und 2 ergibt, sind die Samenanlagen nicht an den Rändern der Fruchtblätter, sondern in den Innenseiten derselben in einem gewissen Abstand von den Rändern befestigt. Dieser neuer Plazentationstypus ist, wie wir weiter unten sehen werden, charakteristisch für die folgenden Tribus von *Verbenaceae* (*Chloanthoideae* und folgende Tribus). Die beiden Gattungen werden in der Tribus *Viticoideae* untergebracht.....Die Plazenten sind bis an die Fruchtwand gespalten (Taf. VII, Fig. 1). Mehrzellige Drüsen treten auf den Fruchtblatträndern und den Plazenten auf."

Schauer (1847) makes *Monochilus* the type genus of a Subtribe *Monachileae* [*sic*] whose characters, he says, are: "Racemi laxiflori. Calyx subbilabiatus. Corolla tubulosa, unilabiata. Ovarii loculi uniovulati." Bentham (1876) comments that "Genus

corollae forma insignis. Specimina primo intuito *Privam laevam* referunt, praeter corollas calyce brevi statim dignoscenda".

The *Monochilus* of Wallich, referred to in the synonymy (above), is a synonym of *Zeuxine* Lindl. in the *Orchidaceae*, whose known species are listed below.

It may be worth noting here that the Endlicher (1838) reference given in the bibliography above is usually cited as "1836-1856", but the page involved here was actually published in 1838. Similarly, the Schnitzlein (1856) reference is usually cited as "1843-1870", but the page here involved was issued in 1856. The Angely (1971) reference is often cited by the erroneous titlepage date of "1970". Endlicher's *Enchirid. Bot.* (1841) is erroneously cited by some writers as "1831".

The derivation of the generic name, *Monochilus*, is from the Greek, *μονος*, one, and *χελος*, lip.

A list of excluded species, being members of the homonymous genus of Wallich, is as follows:

- Monochilus affinis* Lindl., Gen. Sp. Orch. 487. 1840 -- in the *Orchidaceae*
- Monochilus affinis* Wight, Icon. pl. 1728. 1852 = *Zeuxine longilabris* (Lindl.) Benth., *Orchidaceae*
- Monochilus boryi* Reichenb. f., *Linnaea* 41: 60. 1877 -- in the *Orchidaceae*
- Monochilus clandestinus* Wight, Icon. pl. 1727. 1852 = *Cheirostylis flabellata* Wight, *Orchidaceae*
- Monochilus flavus* Wall. ex Lindl., Gen. Sp. Orch. 487. 1840 = *Zeuxine flava* (Wall.) Benth., *Orchidaceae*
- Monochilus galeatus* Lindl., Journ. Linn. Soc. Lond. Bot. 1: 187. 1857 = *Zeuxine goodyeroides* Lindl., *Orchidaceae*
- Monochilus goodyeroides* Lindl., Gen. Sp. Orch. 487. 1840 = *Zeuxine goodyeroides* (Lindl.) Lindl., *Orchidaceae*
- Monochilus gracilis* Lindl. ex Miq., Fl. Ind. Bat. 3: 723. 1859 = *Adenostylis gracilis* (Blume) Merr., *Orchidaceae*
- Monochilus gymnochiloides* Ridl., Journ. Linn. Soc. Lond. Bot. 21: 499. 1885 = *Cheirostylis gymnochiloides* Reichenb. f., *Orchidaceae*
- Monochilus lepidus* Reichenb. f., Otia Bot. Hamb. 2: 110. 1881 = *Cheirostylis lepida* (Reichenb. f.) Rolfe, *Orchidaceae*
- Monochilus longilabris* Lindl., Gen. Sp. Orch. 487. 1840 = *Zeuxine longilabris* (Lindl.) Trimen, *Orchidaceae*
- Monochilus nervosus* Wall. ex Lindl., Gen. Sp. Orch. 487. 1840 = *Zeuxine nervosa* (Wall.) Benth., *Orchidaceae*
- Monochilus parviflorus* Miq., Fl. Ind. Bat. 3: 724. 1859 -- in the *Orchidaceae*
- Monochilus plantagineus* Reichenb. f., Otia Bot. Hamb. 1: 52. 1878 -- in the *Orchidaceae*
- Monochilus regius* Lindl., Gen. Sp. Orch. 487. 1840 = *Zeuxine regia* (Lindl.) Trimen, *Orchidaceae*
- Monochilus stenophyllus* Reichenb. f., Otia Bot. Hamb. 1: 52. 1878 -- in the *Orchidaceae*
- Monochilus tetrapterus* Reichenb. f., Otia Bot. Hamb. 2: 110. 1881 -- in the *Orchidaceae*

Monochilus vieillardii Reichenb. f., *Linnaea* 41: 60. 1877 -- in the *Orchidaceae*

Monochilus zollingeri Reichenb. f., *Bonplandia* 5: 35. 1857 -- in the *Orchidaceae*

MONOCHILUS GLOXINIFOLIUS Fisch. & Mey., *Ind. Sem. Hort. Petrop.* 1: 34. 1835; *Linnaea* 10: Litt.-Ber. 97. 1836.

Synonymy: *Monochilus gloxiniaefolius* Fisch. & Mey. apud D. Dietr., *Syn. Pl.* 3: 605. 1843.

Bibliography: see bibliography of the genus as a whole.

Illustrations: Schau. in Mart., *Fl. Bras.* 9: pl. 32, fig. 1. 1851; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 157, fig. 60 C & D. 1895; Junell, *Symb. Bot. Upsal.* 1 (4): pl. 7, fig. 1. 1934.

A low herb, subviscid with depressed hairs throughout; rhizome creeping, fleshy; stems abbreviated, subviscid-pubescent, leafless below; leaves crowded at apex of the stems, alternate or subopposite; petioles elongate, densely soft-pubescent; leaf-blades membranous, oblong, apically acuminate, marginally repandentate, basally acuminate, flat, penninerved, green above, often purpurescent beneath, the venation softly and densely pubescent; racemes axillary or terminal, subviscid-pubescent throughout, suberect, pedunculate, loosely many-flowered, the flowers subtended by a single, linear, spreading bract; pedicels slightly shorter than the calyx, bibracteolate at or slightly above the middle with minute stipitate bractlets; calyx about 4 mm. long, the lobes ovate, spreading, apically acute, accrescent in fruit and then finally widely patelliform; corolla white, externally glandular-pubescent, the tube about 8 mm. long, the lobes about 6 mm. long, ovate, the lateral ones reflexed; fruit drupaceous, ovoid, blackish.

This species is based on *Riedel 1150* from "In sylvis primaevis provinciae Sebastianopolitanae prope Macahẽ", Rio de Janeiro, Brazil, deposited in the Leningrad herbarium, where it was examined by Schauer. Some recent collections sent to me from Rio de Janeiro by the late Dr. Pabst differ so markedly in the inflorescence characters that I cannot reconcile myself to the thought that they actually represent this species, or even anything in this family.

Kunz (1911) and Napp-Zinn (1974) report the presence in this plant of "derartige drüsenhaarhomologe Nektarien" and note that the "Grundtypus insofern die Epithelschicht schlüsselförmig entwickelt."

Junell (1934) reports the species cultivated as well as native in Brazil.

Citations: BRAZIL: Rio de Janeiro: *Riedel 1150* (Mu--isotype). CULTIVATED: Belgium: *M. Martens s.n.* [h. b. lov.] (Br, N--photo, Z--photo). MOUNTED ILLUSTRATIONS: Schau. in Mart., *Fl. Bras.* 9: pl. 32, fig. 1. 1851 (N, Z).

ADDITIONAL NOTES ON THE GENUS *COELOCARPUM*. I

Harold N. Moldenke

COELOCARPUM Balf. f.

Additional & emended bibliography: J. C. Willis, *Dict. Flow. Pl.*, ed. 5, 154. 1925; Metcalfe & Chalk, *Anat. Dicot.* 2: 1032 & 1040. 1950; J. C. Willis, *Dict. Flow. Pl.*, ed. 6, 154. 1951; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 41 & 47. 1978; Mold., *Phytologia* 45: 40--47 & 505. 1980.

COELOCARPUM AFRICANUM Mold.

Additional bibliography: Cuf., *Bull. Jard. Bot. Brux.* 32 Suppl.: 795. 1962; Mold., *Phytologia* 45: 43 & 44. 1980.

Cufodontis (1962) says "Cum locum publicationis non inspexerim, nescio quod speciminum pro holotypo lectum est. Generis haec prima species in Af[rica] detecta." However, it is plainly stated in the original description of this species that the type is *Bally 11144*, deposited in the Kew herbarium. Cufodontis cites *Bally 11144* & *11236*, *Glover & Gilliland 742*, and *Peck Y.119* as "syn-types", but this is clearly erroneous. He lists these collections as having been made in Ethiopia, but they are all really from what was formerly British Somaliland, now Somalia.

COELOCARPUM MADAGASCARIENSE S. Elliott

Additional bibliography: Mold., *Phytologia* 45: 44--46. 1980.
Additional citations: MADAGASCAR: *Decary 3981* (Go).

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ADDITIONAL NOTES ON THE GENUS *BURROUGHSSIA*. III

Harold N. Moldenke

BURROUGHSSIA Mold.

Additional & emended bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 30 & 52. 1948; Rouleau, *Guide Ind. Kew.* 31 & 352. 1970; Anon., *Roy. Bot. Gard. Kew Lib. Curr. Awaren.* 11: 21. 1978; Mold., *Phytologia* 40: 423 & 505. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 41, 47, 50, 52, & 57. 1978; Hocking, *Excerpt. Bot. A.* 33: 90. 1979; Rogerson & al., *Bull. Torrey Bot. Club* 106: 62. 1979; Mold., *Phytologia* 45: 40 & 504. 1980.

BURROUGHSSIA APPENDICULATA (Robinson & Greenm.) Mold.

Additional bibliography: Mold., *Phytologia* 40: 423. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 50. 1978; Hocking, *Excerpt Bot. A.* 33: 90. 1979.

The corollas are said to have been "whitish" on *Correll & Johnston 21557*.

Additional citations: MEXICO: Chihuahua: *Correll & Johnston 21557* (N).

BOOK REVIEWS

Alma L. Moldenke

"THE PROTEAS OF SOUTHERN AFRICA" by John P. Rourke. xx & 236 pp., illus w. 90 color plates, 82 species & 1 genus distribution maps, 7 b/w draw. & 37 photo. Purnell & Sons Ltd., P. O. Box 4501, Capetown, South Africa. 1980. R 27,00 or \$34.00 U.S. including postage. Oversize.

"Every species of the genus *Protea* currently known to occur in Southern Africa, south of the Limpopo (lat. 22° S) is described and illustrated here" in this "popular book" for "the naturalist or interested reader." The nomenclature is based on the author's soon-to-be-published modern taxonomic revision of the genus. Taxonomic botanists, systematists and other scientists who will use the projected technical publication will surely want to consult the beautiful, accurate color plates and historical introductory notes in this fine book. For each of the 82 species known from various parts of the "Cape" there are given scientific name, authority, synonyms, derivation, description, history of collection, distribution and habitat, cultivation notes and mention of any known natural hybrids. Three of these species are also sub-Saharan, as are 35 others. The quality and format of this publication, as well as the printing of the many excellent color plates, make this whole book a work of art available at a very reasonable price.

"NARCOTIC PLANTS OF THE OLD WORLD -- Used in Rituals and Everyday Life -- An Anthology of Texts from Ancient Times to the Present" selected, translated and edited by Hedwig Schlieffer, iii & 193 pp., 5 b/w fig. & 12 photo. Lubrecht & Cramer Publishers, Monticello, New York 12701. 1979. \$12.50 cloth-bound & \$7.95 paperbound.

As in Schlieffer's similarly organized "Sacred Narcotic Plants of the New World Indians" (from Hafner Press of Macmillan), this study is introduced by Harvard's ethnobotanist, Richard Evans Schultes, has its excerpts arranged by plant families such as agarics, apocynads, cannabs, papavers, solanads, and makes fascinating and scientifically valuable reading about the effects of henbane, mandrake, nightshade, morphine, hemp, and many other substances.

"A GEOGRAPHICAL ATLAS OF WORLD WEEDS" by LeRoy Holm, Juan V. Panchó, James P. Herberger & Donald L. Plucknett, xlix & 394 pp. Wiley-Interscience of John Wiley & Sons, Inc., New York, N.Y. 10016. 1979. \$35.00

The authors have compiled this very useful and accessibly ar-

ranged information from their 15-year study recorded recently in "The World's Worst Weeds: Distribution and Biology" about almost 8,000 agricultural weeds ranked as Serious (only ca. 240 species), Principal, Common, X for unknown effect or Flora member without known weed-role in 124 countries worldwide. The introduction, repeated in the world's 10 most widely used languages, explains this ranking and country abbreviations used. "All weed scientists everywhere can use this geographical atlas of world weeds." It will be a boon to them to have access to it and consequently also to some of the world's hungry people.

"DRAFT INDEX OF AUTHOR ABBREVIATIONS COMPILED AT THE HERBARIUM -- ROYAL BOTANIC GARDENS, KEW" by R. D. Meikle et al., iii & 249 pp. Her Majesty's Stationery Office, London EX1P 1BN. 1980. £ 5.50 net paperbound.

This very useful, time-saving compilation is limited to collectors of flowering plants and authors of flowering plant taxa. It has been growing for half a century along with the "Index Kewensis" and can now be shared through this publication with botanical institutions and botanists the world over. Thank you!

"JEAN HENRI FABRE -- INSECTS" edited by David Black & illustrated by Stephen Lee, 108 pp., 5 sepia photos, 73 color & 77 sepia draw. & 1 map. Nature Classics of Charles Scribner's Sons, New York, N. Y. 10017. 1979. \$12.95.

This is a delightful little book for the naturalist-oriented 8- to 80-year-old or to one interested in the life and studies of the famous self-trained Fabre after reaching the age of 60 and settling with his studies, culminating in his 10 volumes of "Souvenirs Entomologiques", and his second family in an abandoned stone house in a harmas [glossary: Provençal word for a piece of stony waste ground once cultivated, or Fabre: "what I always wished for....an abandoned, barren, sun-scorched bit of land, favored by thistles and wasps and bees.....Into my Eden-cursed ground to others.....come the hunters of every kind of game, builders in clay, weavers, architects in pasteboard, carpenters and miners"]. Then follow easy and interest-holding translations of many of his observations on ants, cicadas, emperor moths, pine processionary caterpillars, crickets, locusts, beetles, praying mantids and bees. A *Philanthus* species has its specific name misspelled. The illustrations are attractive and profuse.

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NOTES ON TRADESCANTIA IV (COMMELINACEAE)

THE DISTINCTION BETWEEN T. virginiana AND T. hirsutiflora

D. T. MacRoberts
Louisiana State University in Shreveport

Abstract: The old question of the distinction between T. virginiana L. and T. hirsutiflora Bush is decided: Bush's taxon is a legitimate species, separated from T. virginiana primarily by the root structure. Previous descriptions of T. hirsutiflora are incorrect.

Whether T. hirsutiflora is a species distinct from T. virginiana is a question that was first raised by Bush (1904) himself: "Probably is the southern representative of T. virginiana." Anderson (1941) considered T. hirsutiflora to be ". . . so similar to T. virginiana that it might be considered a geographically localized variety of that species." Fernald (1944) expressed a similar opinion: ". . . may be only a southern representative of a variable species."

That the question remained unanswered for so long is at least partly due to the almost complete cessation of work on the genus after the publication of the monograph by Anderson and Woodson (1935) and partly because of the ambiguous descriptions and errors in that work. But, in addition, Small (1897, 1903, 1933) throughout his publications on the southeastern flora, ignored the species entirely. Radford, Ahles & Bell (1968) did not find the species in the Carolinas. Thus the two major texts on the southeastern flora fail to mention one of the most common species of the area. The result has been that three generations of southern botanists have been rather consistently identifying T. hirsutiflora as either T. virginiana or T. hirsuticaulis Small.

As I was preparing a study of the Louisiana Tradescantia it became necessary to either separate or combine these two species, both having been reported from the state. After examining all the specimens of the genus in the five major herbaria of the state and in our own collection, with examples of T. virginiana from Vanderbilt and Ohio State, it was clear that the southern specimens, i.e., those found south of the northern borders of Mississippi, Alabama and Georgia, presumably T. hirsutiflora, differed significantly from those found north of that line, presumably T. virginiana.

It was also evident that the descriptions of T. hirsutiflora in the Anderson & Woodson (1935) monograph and in the few manuals which included the species certainly did not fit the southern specimens which had been called by that name. In fact, there was

no southern species which they did fit. Was Bush's T. hirsutiflora simply another of the supposed Texas endemics and the widespread southern species another taxon entirely?

Anderson & Woodson's (1935) description of T. hirsutiflora and T. virginiana differ so little that it would be quite impossible to separate them except for one significant point: T. hirsutiflora is said to have ". . . eglandular or mixed glandular and eglandular pubescence" in the inflorescence while T. virginiana is always eglandular. The authors do not stress this difference but instead emphasize the "turgid" calyces of T. virginiana. The term "turgid" has no specific taxonomic meaning, to my knowledge, and must be taken in its usual sense of "swollen, bloated, or inflated from within." In this sense it will apply to many species of Tradescantia, certainly to T. hirsutiflora. The existence of glandular pubescence, however, is one of the most important diagnostics within the genus.

Anderson & Woodson (1935) included a photograph (Fig. 7 of Plate VI) of the calycine pubescence of T. hirsutiflora which certainly shows glandular trichomes. But it was totally unlike any specimen of T. hirsutiflora, collected from central Texas to Florida which I had examined. Not one, of over 300 specimens showed any glandular pubescence whatever.

Leaving this matter for later discussion, T. virginiana is described as usually glabrous, sometimes pubescent, between the lower sheaths and the inflorescence while T. hirsutiflora is usually pubescent in these areas, but sometimes glabrous. As a description of a statistical distribution, this is correct, but it provides no criterion for the identification of any individual specimen. Pubescence of the stems, leaves and bracts was recorded for each specimen in one of the categories: glabrous, ciliate, lightly pubescent, moderately pubescent and densely pubescent. These observations were converted into numerical values, ranging from zero for glabrous to four for densely pubescent and an "index" of pubescence was obtained by summing the three numerical values for the stems, leaves and bracts. The numbers themselves are simply names of categories and have no quantitative significance.

The normalized distribution of the pubescence index is given in Table 1. While the southern specimens are obviously more hirsute than those from northern states the overlap is so great that it tells nothing about an individual specimen.

The root size was tabulated for all specimens which had them, a gratifying number for recent collections, not for older. The roots of these two species are nearly uniform throughout their

length and can be classified even when only fragments are collected. Diameters, when measured, were taken at a point about 3 cm from the crown; most determinations were made from observations, the difference being readily apparent as is evident in Figure 1. The categories chosen; very large, large, medium, medium small, small and very small are, of course, in terms of *Tradescantia* roots. Thus "very large" represents those of *T. reverchonii* Bush which may be 1 cm in diameter, while "very small" corresponds to most of the *T. hirsutiflora* specimens with roots 1 mm or less in diameter.

The root-size distribution (Table 2) was very different from that of the pubescence index. There was a minimum of overlap. Moreover, the populations were geographically distinct. The small rooted plants were found up to about the northern boundaries of Alabama and Georgia; the large rooted ones north of that line. There were no intermediates, no zone of transition and no indication of clinal variation.

The descriptions in Anderson & Woodson (1935) do not fit the southern specimens:

T. virginiana: ". . . roots relatively slender, only slightly fleshy."

T. hirsutiflora: ". . . roots . . . relatively fleshy."

Thus the southern plants, heretofore thought to be *T. hirsutiflora*, are distinct from the northern *T. virginiana* by the root diagnostic but they are still not the species as described by Anderson & Woodson.

To resolve the matter I examined the types of *T. hirsutiflora* and *T. australis* Bush (considered to be synonymous by Anderson & Woodson) and the specimen used by these authors as an illustration of the calycine pubescence of *T. hirsutiflora*.

Bush's types (*T. hirsutiflora*, Reverchon 2480 (2 sheets), Van Zandt Co., Texas, April 10, 1901; *T. australis*, Reverchon 4052, Angelina Co., Texas, May 7, 1903; (MO!)) are typical of *T. hirsutiflora* throughout the south. They have many small roots and eglandular pubescence. The specimens exhibited two of the morphological patterns common to the species. Reverchon 4052 was slender, 2.5 dm tall, unbranched. Reverchon 2480 was pseudo-acaulescent, rather coarse, 1.2 dm tall, with strongly arcuate leaves which exceeded the inflorescence. Reverchon had identified 2480 as that catch-all for pseudo-acaulescent specimens: *T. brevicaulis* Raf. Bush's types were identical with the southern species known as *T. hirsutiflora* but they did not conform to the Anderson & Woodson (1935) description.

The plant photographed to illustrate *T. hirsutiflora* pubescence (Stevens 1381, LeFlore Co., Oklahoma, April 20, 1913 (MO!)) was a

puzzle. Why was it selected? The authors cite 23 other specimens from the normal range of T. hirsutiflora in their own herbarium (MO). Yet they present, as typical, a plant from the very boundary of the range as they understood it. Even so, the plant is totally unsuitable for the purpose since it consists only of the upper node and inflorescence and cannot be identified with any certainty as any particular species, certainly not as T. hirsutiflora.

The pubescence of this specimen appears to be eglandular but under high power, using transmitted light, some trichomes of the capitate type can be seen. Figure 1 of Plate VI in Anderson & Woodson (1935) is labeled T. bracteata and bears a strong resemblance to Stevens 1381. Comparison with other specimens of T. bracteata, using transmitted light and high powers confirms this resemblance and Stevens 1381 is probably that species. Anderson & Woodson confined T. bracteata to a range north of the Oklahoma-Kansas border but it is reported by Barkley (1977) from Sequoyah Co., Okla. and I have examined specimens from TAES and DUR from McCurtain Co., Okla.

I have collected specimens from central Texas which, based on the capitate trichomes and orange roots, would be classified as T. bracteata. In other respects they so closely resemble T. hirsutiflora that they have undoubtedly been identified as that species. Anderson (1941) observed that ". . . the extreme plants of type B [of T. bracteata] are morphologically very similar to Tradescantia hirsutiflora of the Gulf Coast, a species which is today completely unknown within the range of T. bracteata." Mohlenbrock (1970) in describing T. virginiana, said "This and the following species [T. bracteata] are very similar, differing mainly in the presence or absence of glandular hairs on the pedicels and sepals." While Mohlenbrock did not include T. hirsutiflora in the flora of Illinois, there is every possibility that it is to be found in the southernmost counties which are part of the Coastal Plain.

It may well be that T. virginiana, T. hirsutiflora and T. bracteata form a "virginiana" complex but until a satisfactory revision of the genus is made no conclusion is possible.

There may be still another reason for the confusion in the description of T. hirsutiflora. The trichomes of T. hirsutiflora are essentially identical to those of T. virginiana as illustrated by Fig. 5 of Plate VI in Anderson & Woodson (1935). They arise from a pustular base, are uniseriate, the cells separated by visible septa, and taper to a point. Not uncommonly cytoplasm will exude at the septa and accumulate in a ovoid drop surrounding the septum. If the hair is broken at a septum, as frequently happens, the drop and stump residue may appear to be a glandular trichome.

The various descriptions of *T. hirsutiflora* and *T. australis* by Bush (1904) are fairly accurate but do not mention the root structure. The description by Anderson & Woodson (1935) is misleading. A more accurate and complete description is:

Tradescantia hirsutiflora Bush, in Trans. Acad. Sci. St. Louis 14:181-193, 1904.

T. australis Bush, op. cit.

T. eglandulosa Bush, op. cit.

Type: Reverchon 2480 (2 sheets), Van Zandt Co., Texas, April 10 1901 (MO).

Plants highly variable in form, from .7 to 6.0 dm tall, slender to sturdy, frequently cespitose, sometimes acaulescent or nearly so, arising from a cluster of many small to very small (c. 1 mm) roots. Leaves firm, linear lanceolate, .6 to 2.0 cm broad, up to 30 cm long. Bracts much as leaves, but shorter. Sheaths long ciliate to densely pubescent, pubescence of stems, leaves and bracts highly variable, from glabrous to densely hirsute. Pedicels and sepals almost invariably pubescent, usually moderate to dense. Cymes umbellate, few to many flowered, the petals large, up to 3 cm long, quickly ephemeral, blue, rose or white. Pubescence eglandular throughout, the trichomes uniseriate, arising from a pustular base, tapered to an acute tip, the cells separated by visible septa. Chromosome number, $n = 6, 12$.

Waste land, roadsides, woods margins in various soils, sometimes in moderate shade but usually in full sun. Common and conspicuous throughout the southern United States from central Texas east to Florida, north at least to Tennessee and central Arkansas. Extremes of range unknown due to confusion with other species such as *T. virginiana* and *T. hirsuticaulis* in the east and *T. bracteata*, *T. tharpaii* Anderson & Woodson and *T. reverchonii* in the west.

T. hirsutiflora differs from *T. virginiana* in the small, numerous roots, generally heavier pubescence and geographical distribution. Since it has been established as a species for 75 years there appears to be no reason to change that status.

This work was made possible by the co-operation of the following herbaria whose assistance is most gratefully acknowledged:

Louisiana State University, Baton Rouge, Louisiana
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 University of Southwest Louisiana, Lafayette, Louisiana
 Vanderbilt University, Nashville, Tennessee.

References:

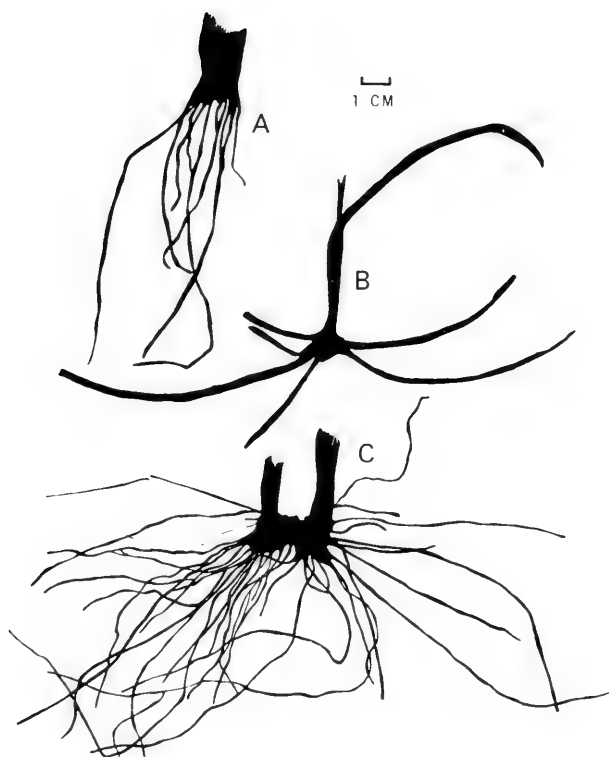
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Table 1: Distribution of pubescence index

Index	Southern specimens	Northern specimens
0	26	47
1	5	3
2	6	16
3	5	2
4	3	8
5	6	4
6	8	8
7	10	4
8	6	1
9	7	7
10	12	-
11	1	-
12	5	-

Table 2: Distribution of root size

Root size	Southern specimens	Northern specimens
Very large	-	-
Large	-	15
Moderately large	-	27
Medium	2	44
Moderately small	3	8
Small	31	6
Very small	64	-



Root structures. A, *T. hirsutiflora* (type).
B. *T. virginiana* (Ohio)
C. *T. hirsutiflora* (Louisiana)

NOTES ON TRADESCANTIA VI

OBSERVATIONS ON THE MECHANISM OF PIGMENT DEPOSITION

D. T. MacRoberts

Within a few hours of opening, the petals of Tradescantia L. (sensu strictu) become deliquescent, infolding on the similarly hydrolizing mass of stamens and filament hairs. The characterless globule produced cannot be reconstituted and, making a virtue of necessity, taxonomists have declared the flower to be of little diagnostic value.

Cytologists, on the other hand, cherish the large cellular stamen hairs (Kuster 1933). Unfortunately, though valuable for demonstration purposes, the self-sterility, poor germination and long generation have inhibited breeding experiments. However, use of Tradescantia as a monitor for radiation and chemical mutagenesis, indicated by color changes in the stamen hair cells (Grossman 1979) has led to increased interest in the genetics of flower color. Emmerling-Thompson and Nawrocky (1979) have studied the inheritance of flower color in hybrids between white flowered forms of the diploid species T. humilis Rose and T. subaspera Busy. They conclude that at least five independent loci govern flower color.

In addition to the loci which govern color there are other loci, more or less independent of the first, which determine the location of pigment deposition. White flowered Tradescantia (in the species found in the United States) are found in two forms: those in which all pigment is missing, the petals and stamen filaments and hairs being white; and those in which the petals are white but the stamen hairs and filaments retain their normal blue coloration. The first form we may term "albinistic"; the second "albiflora."

The photographs in Emmerling-Thompson and Nawrocky (1979) show clearly that their parent populations were albinistic in both species. Since they make no mention of any albiflora forms, the linkage between color and location was apparently unbroken in their specimens.

An interesting variation of this location linkage has turned up in the rather localized T. occidentalis (Britton) Smyth var. melanthera MacRoberts (1977). While the anther connectives of all other Tradescantia in the United States are either yellow like the anthers or only slightly darker, those of var. melanthera are a deep purplish brown. Recent collections of pink and white forms of this variety have shown that the dark anther connectives

result from deposition of the normal blue corolla pigment over the yellow of the connectives. The rose-pink forms had light brown anther connectives, noticeably darker than the anthers but much lighter than in the usual blue form, while the albinistic specimen had normal yellow connectives.

The depositional mechanism is apparently fairly easily transferred since specimens of T. hirsutiflora Bush growing among a population of var. melanthera had dark anther connectives but were otherwise normal specimens of that rather variable taxon.

T. occidentalis var. melanthera is the only variety of this widespread species which I have found in eastern Texas and western Louisiana. It forms extensive populations in a few areas unassociated with var. occidentalis which is common in central and western Texas. I have yet to find a mixed population.

Tradescantia has yet another disadvantage as a subject for inheritance studies: its species are not well delineated and their variation is poorly mapped. The existence of a variety with an easily detectable genetic difference may be of interest to anyone conducting breeding experiments or investigation susceptibility to radiation induced mutation.

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A NEW SPECIES OF *TILLANDSIA*
(SUBGENUS *ALLARDTIA*) FROM COLOMBIA

Harry E. Luther*

TILLANDSIA ABBREVIATA Luther, sp. nov.

T. reversae L. B. Smith affinis, laminis foliorum rotundatis apiculatis, scapis brevioribus et spicis stipitatis differt.

Plant stemless, flowering ca. 15 cm high; leaves few (ca. 10), 12 to 15 cm long; sheaths ample, obscurely brown-lepidote, dark purple above; blades ligulate, rounded and apiculate, flat, 25 mm wide, green with a thin red margin, glabrous above, very sparsely lepidote below; scape erect, very short, scarcely equalling the sheaths; scape bracts imbricate, ovate, acute; inflorescence digitate with 3 spikes; primary bracts very small, ovate, acute; spikes stipitate with 3 to 5 sterile bracts at the base, the fertile portion lanceolate, acute, strongly complanate, ca. 5 cm long, 15 to 18 mm wide, 8- to 10- flowered; floral bracts densely imbricate and concealing the rachis at anthesis, about equalling to slightly exceeding the sepals, elliptic, acute, the apex slightly incurved and sharply carinate, glabrous, rose red; sepals oblong, acute, 17 mm long, punctate-lepidote within, the posterior carinate and 2/3 connate; petals naked, ligulate, cucullate, 22 mm long, white at the apex and the base, pink just above the point of exertion from the sepals; stamens and pistil included.

TYPE: *Colombia:* Without specific locality. Flowered in cultivation by Franz-Georg Gruber (Gruber 39-22) of the nursery of Orchideas S.A., Fusagasuga, Colombia. Submitted by Dennis Cathcart, Bradenton, Florida. *H. E. Luther 333*, 15 July 1980, SEL herb. 034176. (Holotype: SEL).

Additional material examined: *Colombia:* Without specific locality. Flowered in cultivation by Franz-Georg Gruber (Gruber 39-22) of the nursery of Orchideas S.A., Fusagasuga, Colombia. Submitted by Jean Merkel, Boynton Beach, Florida. *H. E. Luther s.n.*, 18 Dec. 1979. SEL herb. 034177. (SEL).

This species is proposed with some hesitancy. *Tillandsia abbreviata* keys to *T. reversa* L. B. Smith in the latest treatment of the genus (Smith & Downs, 1977), but differs from this species by its much smaller habit, rounded and apiculate leaf blades, very short scape and distinctly stipitate branches. The dimensions and structure of the floral bracts and sepals are nearly identical to *T. reversa*, but due to the great dissimilarities in overall morphology, I consider *T. abbreviata* to be specifically distinct.

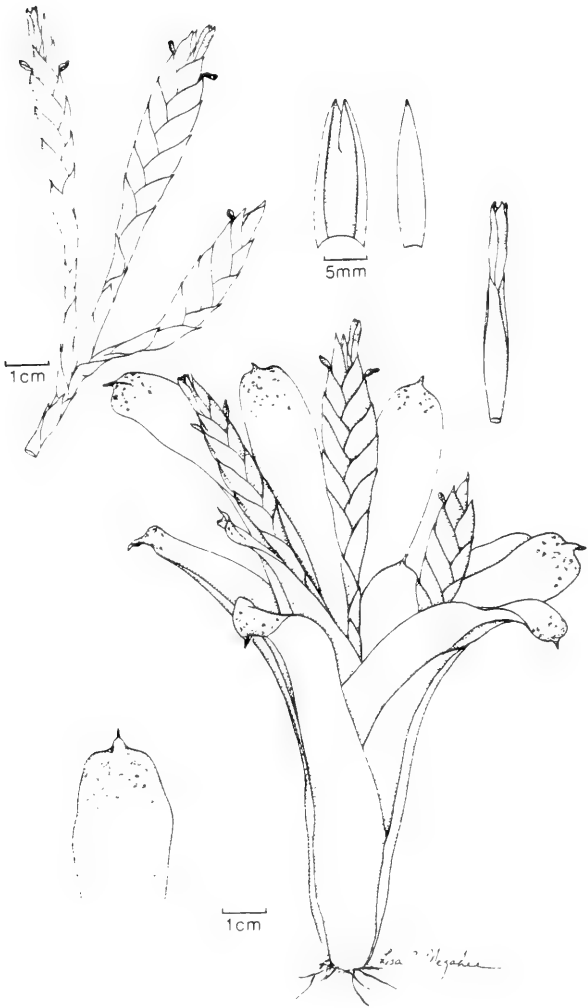
Acknowledgements

I thank Franz-Georg Gruber for bringing this interesting and ornamental species into cultivation, and Jean Merkel and Dennis Cathcart for obtaining it and bringing it to my attention. Special thanks is also given to the illustrator Lisa Megahee.

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*The Marie Selby Botanical Gardens, 800 S. Palm Avenue, Sarasota, FL 33577, U.S.A.



CHEMOSYSTEMATIC NOTES ON THE ASTERACEAE. III.

NATURAL SUBDIVISIONS OF THE VERNONIEAE.

H. Robinson¹, F. Bohlmann² and R. M. King¹

The Vernonieae, a mostly pantropical tribe of Asteraceae containing about 1500 species, is often treated as scarcely more than a series of minor elaborations of a large "core genus" *Vernonia*. Previous subdivisions at subtribal and generic levels have depended primarily on pappus form or on dispositions of heads in the inflorescence, characters that are convenient but not necessarily reliable at the level which they were used. Newer data on chromosome numbers (Jones, 1977) and chemistry (Harborne & Williams, 1977) have prompted some speculation, mostly regarding separate trends in American and Old World *Vernonia*. Pollen structure (Stix, 1960; Jones, 1979; Keeley & Jones, 1977, 1979; and Robinson, 1980a, 1980b) has been used primarily in correlation with species groups within genera. Thus, subtribal concepts in the Vernonieae have remained mostly artificial, and in recent treatments they have tended to be ignored (Jones, 1977). Collecting efforts by the third author of the present paper, and chemical analyses from the second author, have provided much new information for the tribe, and a better basis is sought here for the interpretation of this data. A partial synthesis of available chemical, cytological, and structural data leads to the following phyletic and taxonomic conclusions.

The present study is based on a more complete personal knowledge of the New World members of the tribe. A number of comparatively recent useful treatments also are available for the region, Jones (1973, 1976, 1979b), Jones and Faust (1978), Clonts and McDaniel (1978), and Nash (1976) for various areas of North America, Mexico, and Guatemala; Keeley (1978) for the West Indies; Aristeguieta (1964) for Venezuela; Cabrera and Vittet (1961), Robinson (1979a, 1979a, 1980a, 1980b, 1980c, 1980d), and Robinson and King (1979) for Brasil; and Cabrera (1944) for Argentina. Some useful recent works on African species have been consulted including Adams (1963) for tropical West Africa; Wild (1978a, 1978b) and Wild and Pope (1977a, 1977b, 1978a, 1978b) for south-central Africa; and Smith (1971) for the "Stengelioid species".

Some generalizations are possible regarding the pollen variations in the Vernonieae. There is a tendency for lophorate grains in the tribe, and even the less specialized grains, the

¹Department of Botany, Smithsonian Institution
Washington, D.C., 20560 USA

²Institute of Organic Chemistry, Technical University
D-1000 Berlin W. Germany

Lysimachium-type of Stix (1960) or Type A of Keeley and Jones (1979) have a somewhat uneven distribution of spines which suggests rudimentary lacunae. It is presumed here that some tendency toward lophorate grains is basic to the tribe. The simple *Lysimachium*-type pollen is undoubtedly ancestral in the tribe, as suggested by Keeley and Jones (1979), and it is found in most of the groups recognized here at the subtribal level. In both *Leptocarpum* and *Veronica* there are pollen grains with well-defined lophorate patterns, but in these the ridges are low as in the *Lysimachium*-type, and these seem to be derived directly from that type with no relationship to more specialized lophorate patterns in the tribe. More specialized forms of lophorate pollen occur in members of the subtribe Vernoniinae where they seem to be derived from the basic *Lysimachium*-type that is found in the more primitive members of that subtribe. The subtribes Elephantopodinae and Rolandrinae, which have exclusively specialized lophorate forms of pollen, are here considered derived from the subtribe Vernoniinae.

The Liabeseae are treated by some recent authors as a part of the Vernoniaceae (Turner & Powell, 1977; Jansen & Stuessy, 1980). The Liabeseae are related to the Vernoniaceae and such a placement is an improvement over the traditional placement in the Seneceioneae. However, the Liabeseae are a distinct group with many characters violating the limits of the Vernoniaceae including the basically opposite leaves, the often trinervate venation of the leaf blades, the presence of latex in some members of all three subtribes, the presence of heterogamous heads with rays, and the pollen that is never lophorate. The tribe has distinctions equivalent to those of other tribes related to the Vernoniaceae such as the Mutisieae and Cynareae. The chemistry of the Liabeseae is not definitive, showing mostly widely distributed compounds. Still, no complex germacranolides have been found such as are common in the Vernoniaceae.

The following subtribes are recognized in the Vernoniaceae.

PSEUDOSTIFFTIIINAE subtribus nov., H. Robinson, R.M. King, & F. Bohlmann

Plantae fruticosae vel subarborescentes; folia obovata apice truncata vel leniter retusa. Inflorescentiae thyrsoidae-paniculatae. Capitula uniflora; squamae involucri interiores facile deciduae; corollae subcarnosae 12-13 mm longae 5-lobatae in lobis erectae vel incurvatae; cellulae endotheciales anguste ellipticae in parietibus transversalibus angustis plerumque 1-2-nodatae; scapi stylorum superne et rami stylorum incrassati carnosii breviter scabri; setae pappi leniter inaequales non dimorphae. Grama pollinis non lophorate valde spinosa in diametro ca. 70 μ m.

Type genus: *Pseudostifftia* H. Robinson

The single genus and species is known only from the interior of Bahia, Brazil, an area of many notable endemics. The genus has been placed in the Vernoniaceae with reservations (Robinson,

1979b). The plant falls generally under the tribal description and does not fit within any other described tribe, but the thickened style with scabrid surfaces and the large non-lophorate pollen grains are unlike any other member of the *Vernonieae*. The elongate endothelial cells with few nodular thickenings are also unusual, but a similar form has been seen in the genus *Adenoon* Dalz. of the *Vernoniinae* from the region of India.

Chemical analysis of *Pseudostiffia* has indicated mostly polyacetylenes, triterpenoids, and no sesquiterpene lactones (Bohlmann, et al., #289). The isolated position of the genus is supported to the extent that there are no sesquiterpene lactones, but these are lacking in some other *Vernonieae* such as *Riptocarpia*.

Trichospirinae Lessing, *Linnaea* 6: 690. 1831.

Prostrate herbs with sessile leaves; leaves alternate on vegetative stems, subopposite on fertile stems. Heads axillary, with bracts which represent either compound heads or paleae; corollas ca. 2 mm long, deeply 4-lobed; thecae not caudate; style branches with slender smooth pointed hairs; achenes biconvex, biaristate, covered with papillae. Pollen grains sublophorate, strongly spinose (*Lychmophora*-type).

Type genus: *Trichospira* H.B.K.

The subtribe contains the single genus and species widely distributed in the American tropics at low elevations near coasts and rivers. The species, *T. verticillata* (L.) Blake, has been placed in the *Heliantheae-Coreopsidinae* in traditional treatments (Bentham & Hooker, 1873; Hoffmann, 1890-1894) because of the biconvex biaristate achenes, but it was returned to the *Vernonieae* by Robinson and Brettell (1973). The achenes remain totally unique within the tribe. The leaves of the fertile branches are often described as opposite, which would be unusual in the *Vernonieae*, but examination shows that they are slightly offset, alternate internodes being greatly abbreviated to give the appearance of leaf-pairs. The pollen is of the unspecialized type that seems primitive in the *Vernonieae* and the genus may represent an isolated divergent line in the tribe.

Cassini (1828) included *Trichospira* in the general group with *Rolanina* and *Spiranthes*, and there is some resemblance, especially in the reduced, often 4-lobed corollas, but other details, including achenes and pollen, are so different that close relationship seems unlikely.

The chemistry is not known, but should be of great interest as a test of the relationship.

Lychmophorinae Benth. & Hook., *Gen. Pl.* 2: 171. 1873. amend
H. Robinson, R.M. King & F. Bohlmann

Perennial herbs and shrubs or small candelabriform trees. Leaves large, or reduced and densely spirally inserted, often with lepidote or sublepidote pubescence. Inflorescence with

heads usually densely clustered or compound, sometimes clustered at end of long scape or forming secondary capitula. Heads usually with 1-5 flowers, rarely to 25 flowers; corolla regular, mostly 5-lobed; achenes sometimes dimorphic in pubescence and pappus (*Lychnophoropsis* and *Pithecoseris*); pappus usually with 2 distinct series, sometimes graduated or uniseriate, longer pappus elements setiform or strap-shaped. Pollen grains sublophorate or lophorate with low crests, strongly spinose (*Lychnophora* and *Chresta* types), mostly 30-40 μ m in diameter.

Type genus: *Lychnophora* Mart.

The subtribal name was superfluous at the time of description because of the inclusion of *Elephantopus* and *Rolandra*, type genera of previously named subtribes. The name Lychnophorinae becomes valid with the removal of the latter elements (Art. 63.3).

The subtribe is considered as including the following genera: *Albertinia* Spreng., *Chresta* Vell. ex DC., *Chromopappus* DC., *Eremanthus* Less., *Lychnophora* Mart., *Lychnophoropsis* Sch.Bip., *Piptolepis* Sch.Bip., *Pithecoseris* Mart. ex DC., *Proteopsis* Mart. & Zucc. ex DC., *Soaresia* Sch.Bip., nom. cons. (*Bipontia* Blake), and *Vanillosmopsis* Sch.Bip. The group is almost entirely restricted to Brasil. *Eremanthus jelskii* Hieron, and *Vanillosmopsis weberbaueri* Hieron., from Peru, do not seem to belong to those genera or to the subtribe.

The Lychnophorinae have traditionally been distinguished by having clustered heads with few flowers per head. The original concept has proven to include two separate lines of development, the Elephantopodinae and Rolandrinae having strongly lophorate pollen and, where known, a chemistry unlike that of the Lychnophorinae as delimited here. Also, the present concept includes some elements in *Piptolepis* and *Eremanthus* that have 12-25 flowers in the heads, and includes the genera *Albertinia* and *Vanillosmopsis* which were placed in a remote position near the beginning of the tribe by Bentham and Hooker (1873) and Hoffmann (1890-94) because of their uniseriate pappus. All members of the subtribe have pollen of the *Lychnophora*-type or of the immediately related *Chresta*-type (Robinson, 1980a). The lophorate condition of the *Chresta*-type is structurally related to the *Lychnophora*-type, and it has no evident relationship to the lophorate forms with high ridges seen in the Vernoniinae, Elephantopodinae, and Rolandrinae.

Recent chemical studies (Bohlmann, et al., #283, 287, 312, 314, 320; Vichnewski, et al., 1976) have shown that members of the Lychnophorinae as presently circumscribed tend to have furanone heliangolides such as goyazensolide, a type of germacranolide not seen in the Vernoniinae or Elephantopodinae. At the same time the Lychnophorinae seem to lack the various non-furanone germacranolides that are common in members of the Vernoniinae or the germacranolide dilactones that are known in the Elephantopodinae. Furanone heliangolides do occur elsewhere in the tribe in the genus *Centratherum* which may be related

to the Lychnophorinae, but which is strikingly different in structure and is placed here in a separate subtribe. The chemistry of *Chresta* shows relationships to that of the Vernoniinae, as both a glaucolide and a hirsutinolide are present.

In the present paper, *Piptolepis* is placed in the Lychnophorinae on the basis of the furanone heliangolides (Bohlmann, et al., #314) and general habit, even though the heads are not densely clustered and have up to 25 flowers per head. *Albertinia* is included on the basis of its evident relationship to *Vanillosmopsis* even though the chemical analysis thus far has found only acyclic squalene and some closely related cyclic triterpenoids. *Vanillosmopsis* previously has been shown to contain eremanthine identical to that in *Eremanthus* (Vichniewski & Gilbert, 1972; Harborne & Williams, 1977), and more recently a furanone heliangolide of the goyazensolide type has been reported (Bohlmann, et al., #314), also linking the genus to *Eremanthus* in the traditional Lychnophorinae.

CENTRATHERINAE subtribus nov., H. Robinson, R.M. King & F. Bohlmann

Plantae herbaceae annuae vel breviter perennes in specie unico fruticosae. Capitula terminalia subsolitaria vel diffuse disposita multiflora non paleacea; squamae involucri dimorphae exteriores foliosae interiores aristatae vel muticae persistentes; corollae 4-13 mm longae regulares 5-lobatae plus minusve longe stipitato-glanduliferae; cellulae endotheciales subquadratae, parietibus in lineis numerosis ornatis; pili stylorum pungentes; setae pappi facile deciduae vel nullae. Grana pollinis irregulariter leniter lophorata spinulosa in diametro ca. 40 μ m (*Centratherum*-type).

Type genus: *Centratherum* Cass.

The subtribe contains the genera *Centratherum* Cass. and *Oiospermum* Less. It is primarily Neotropical, and it contains some Old World elements, but some previously associated Old World elements are excluded. An Asiatic genus *Phyllocephalum* Blume has often been included in *Centratherum*, being re segregated only recently by Kirkman (1978, in herb.), but the latter differs by having a strongly lophorate form of pollen close to that called Type F by Keeley and Jones (1979). The latter authors cite the pollen type from Old World species of *Vernonia*, and the genus *Phyllocephalum* is regarded here as a member of the subtribe Vernoniinae.

The corollas of the Centratherinae show few to many long-stalked *Hieraceum*-type glands in all species examined. It is notable that such glands are absent in *Phyllocephalum*, further indicating that the latter is not closely related to *Centratherum*.

The *Centratherum*-type pollen is similar to that called the *Chresta*-type by Robinson (1980a), having a distinct lophorate pattern with low ridges. In the Centratherinae, the areoles of the pollen are more numerous and more irregular than in *Chresta*,

often being elongate rather than isodiametric. Both pollen types are closely related to the basic widely distributed *Lychnophora*-type, and are not close to the strongly lophorate pollen types of the Vernoniinae.

Centratherum has been shown to contain furanone heliangolides (Ohno, McCormick & Mabry, 1979; Bohlmann, et al., #289), suggesting relationship to the Lychnophorinae, but the multi-flowered rather solitary heads differ completely from members of that group. The new subtribe cannot be distinguished as easily from the large subtribe Vernoniinae on the basis of structure, but the latter group is more distinct chemically, lacking furanone heliangolides.

PIPTOCARPHINAE subtribus nov., H. Robinson, R.M. King & F. Bohlmann

Plantae fruticosae vel subarborescentes; caules et folia plerumque lepidota vel stellate pilosa. Lamina foliorum a petiolis valde demarcatae. Inflorescentiae pyramidaliter paniculatae vel axillares; squamae involucri interiores facile deciduae interdum in parte connatae; corollae regulares 5-lobatae; thecae antherarum interdum caudatae; pili stylorum breves apice rotundatae in parietibus saepe incrassatae rugulosae interdum septatae; pappus plerumque biseriatus exterior saepe distinctus brevibus interior capilliformis vel taeniatus. Grana pollinis sublophorata valde spinulosa in diametro ca. 40 μm (*Lychnophora*-type).

Type genus: *Piptocarpha* R.Br.

The subtribe is presently recognized as containing three genera, *Piptocarpha* R.Br., *Pollalesta* H.B.K., and *Critoniopsis* Sch.Bip. The genera are notable for their lepidote or stellate pubescence on the stems and leaves, but the most significant character of the group seems to be the short, blunt, often roughened hairs of the styles which can be seen even in the nearly glabrous-leaved *Piptocarpha luschnathii* Kraschen (= *P. stifftioides* H. Robinson, *Stifftia axillaris* Barroso & G. da Vinha). Septate hairs have been illustrated by Cabrera (1944) for *Piptocarpha sellowii* (Sch.Bip.) Blake, and also occur in such species as *Critoniopsis pyenantha* (Benth.) H. Robinson, *C. elbertiana* (Cuatr.) H. Robinson, and some other members of the genus, however, the character is absent in some other species of the subtribe, and it may occur rarely in other subtribes.

Some species of Piptocarphinae closely approach members of the Vernoniine genus *Eremosis* of Mexico and Central America in some characters, but actual relationship may not be close. The subtribe has the primitive *Lychnophora*-type pollen as do the similar members of the Vernoniinae, and they all have apparently evolved from nearer the basal stock of the tribe. The sterile tails on the anthers in *Piptocarpha* are a unique specialization, such tails not being found elsewhere in the tribe.

Chemical data on the subtribe is meager. Extracts of *Piptocarpha oblonga* (Gardn.) Baker include some triterpenes and

flavonoids (Bohlmann, et al., #289). None of the complex germanolides common in other subtribes have been observed.

Vernoniinae Lessing, Synopsis 146. 1832.

Annual or perennial herbs, shrubs, or small trees, few to many branched, glabrous to densely tomentose. Leaves alternate to rarely opposite. Inflorescence solitary, diffuse, cymose, corymbose or thyrsoïd-paniculate. Heads with 1-many flowers; involucre bracts multiseriate, inner and outer bracts similar or variously differentiated, bracts with or without appendages or apical aristae; receptacle usually without paleae (with paleae in *Bolanosa* A.Gray, *Lepidonia* Blake of Mexico and Guatemala, *Heterocomma* DC. and *Alcantara* Glaziou ex Barroso of Brasil, and *Dewildermania* O.Hoffm., *Gossweilera* S.M.Moore, and *Omphalopappus* O.Hoffm. of Africa); corollas usually purplish or whitish (yellowish in *Gongrothammus* Steetz; reddish in *Mattfeldanthus* H.Robins. & King), usually 5-lobed, usually regular (ligulate with 5 equal lobes in all except a few central flowers in *Stokesia* L'Hér., bilabiate with 2 longer exterior lobes in *Dipterocypsela* Blake, peripheral flowers with 4 shorter outer lobes in *Mattfeldanthus*); anthers calcarate, not tailed (slightly subcaudate in *Adenoon* Dalz.); endothelial cells mostly quadrate with irregular fine lines on inner surface; anther appendages with or without glands; style with sharp or sometimes a few rounded hairs abaxially, sometimes with glands; achenes prismatic or obcompressed, rarely winged (*Dipterocypsela*), rarely dimorphic (*Heterocypsela* H.Robins.); pappus usually double with short outer series and capillary inner series, sometimes with only capillary setae of various lengths, sometimes reduced to a corona or massive collar (*Struchium* R.Br.). Pollen grains sublophorate (*Lychnophora*-type) to strongly lophorate with various patterns of high crests, rarely with crests having exposed columellae (*Phyllocephalum*), with small to large spines, mostly 30-60 μ m in diameter.

Type genus: *Vernonia* Schreb., nom. cons.

The subtribe includes the vast majority of the genera and species of the tribe and ranges geographically throughout the Old World tropics and American tropics extending northward into eastern North America. The subtribe includes those elements of the tribe that share the commonest and most functional character-states and most of these have been placed in the genus *Vernonia* sensu lato. Such combinations of character-states probably approximate the ancestral condition in the tribe, but *Vernonia* sensu lato probably represents many parallelisms, and probably includes a mixture of both primitive and specialized forms. For this reason reference is given here to segregate genera of *Vernonia*, especially in the Old World where the species differ chemically and cytologically from the type *V. novaboracensis* (L.) Michx. of eastern North America.

The *Vernoniinae* have a complete range of variation in pollen form (Stix, 1960), including the *Lychnophora*-type or Type A

which seems to be primitive (Keeley & Jones, 1979), and various strongly lophorate types that seem to be derived. All variations seem to be potentially useful in taxonomy, but the various lophorate types differ from each other in less significant details in the patterns. In the latter case definite parallelisms and some cases of variations between species that must be rather closely related have been seen (Robinson, 1980b). The difference between the lophorate and the *Lychnophora*-type seems more basic, and examples of differences within closely related groups are less obvious. The "Lepidaploae scorpioideae" group of *Vernonia* in Baker (19873) contains many species under the part called "subscorpioideae" with various lophorate pollen types, and many under the part called "scorpioideae verae" with the *Lychnophora*-type, but more recent studies indicate these groups of species are not closely related (Robinson, 1980b). In Africa, typical members of *Baccharoides* Moench have lophorate pollen, but some species treated as a subgroup by Smith (1971) have *Lychnophora*-type pollen. In the latter case, differences in other characters make actual relationships between *Baccharoides* and its simulators uncertain.

Genera of the Vernoniinae in both Hemispheres with *Lychnophora*-type pollen such as typical *Vernonia* of eastern North America, the "scorpioideae verae" Baker of tropical America, *Eremosia* (DC.) Gleason and *Leiboldia* (Schlecht. ex Benth. & Hook.) Gleason of Mexico and Central America, the monotypic *Hololepis* DC., *Heterocoma* DC., and *Alcantara* Glaziou ex Barroso of Brasil, and *Gymnanthemum* Cass. and *Gongrothamnus* Steetz (*Grogonothamnus* of some authors) of Africa would seem to present more primitive pollen states for their areas, but the extent of independent origin of the lophorate forms in the two Hemispheres remains in question. The pollen of typical *Baccharoides* in Africa, seems identical with forms in *Stokesia* L'Hér. of the southeastern United States, and *Vernonia* subg. *Lepidaploa* Cass. (lectotype: *Vernonia albicaulis* Pers.), *Pacourina* Aubl., and *Struchium* P. Browne of tropical America, but the lophorate pollen in *Cyanthillium* Blume in eastern Asia and Malaysia seems different. The lophorate types "E" and "F" of Keeley and Jones (1979), in which the ridges of the reticulum have exposed columellae, are apparently restricted to the Old World.

In other respects the Vernoniinae of America and the Old World seem to represent distinct groups. The basic chromosome number of many Old World segregates of *Vernonia* seems to be $X=10$ while the American groups have mostly $X=17$ (Jones, 1977). Old World genera have a distinct sesquiterpene lactone chemistry: elemanolides have been reported from species of *Baccharoides* and *Cyanthillium* and vernolide type germacranolides have been reported in *Baccharoides*, *Gymnanthemum*, and *Cyanthillium* (Lleander-Chanco, Herrera & Balgos, 1976; Harborne & Williams, 1977). These forms do not occur in American Vernoniinae. The American genera tend to have various glaucolides or hirsutinolides

(Harborne & Williams, 1977; Bohlmann, et al., 1979, #296), which are present also, however, in some Old World species that have been placed in *Vernonia*, and in an African species of *Erlangea* (Bohlmann & Czerson, 1978). Old World Vernoniinae tend to be different in flavonoid chemistry also, having only flavone glycosides, while American taxa have either flavones, flavanols, or both.

Taxonomically useful chemical data on the subtribe Vernoniinae is available from many sources, and the general summary by Harborne and Williams (1977) can be consulted for some of the more significant correlations. Epoxy fatty acids are widely distributed in the tribe, but seem most abundant in *Stokesia* and species of *Baccharoides* of the Vernoniinae, both of which have been studied as possible commercial sources (Gunn & White, 1974; Smith, 1971). Harborne and Williams (1977) recognize the systematic limitations of the epoxy resins, however, since they are neither present in all Vernonieae nor are they restricted completely to the tribe. *Stokesia* also contains hirsutinolides similar to those in American species of *Vernonia*, indicating relationship to the latter.

Three African genera, *Erlangea* Sch.Bip., *Ethulia* L.f., and *Bothriocline* Oliv. ex Benth, & Hook. seem to be linked by the occurrence of distinctive 5-methylcoumarins (Rustaiyan, et al., 1980b). The first of these also contains highly oxygenated germacranolides similar in some ways to those in *Baccharoides*, *Cyanthillium*, and *Gymnanthemum* (Rustaiyan, et al., 1980a).

Other chemicals seem useful in taxonomy of the Vernoniinae at a more restricted level. Allenic germacranolides have been isolated from *Vernonia cotoneaster* Less and *V. lilacina* Mart., two distinct but related members of the subgenus *Lepidoploa* (Bohlmann, et al., #292, 296). Elaborated acyclic sesquiterpenes of a type not previously known in the tribe have been isolated from *V. polyanthes* Less. and *V. fagifolia* Gardn., two of the non-scorpioide members of the "scorpioideae verae" (Bohlmann, et al., #296).

Elephantopodinae Lessing, *Linnaea* 5: 135. 1830.

Perennial herbs from stolons or rootstocks. Inflorescence corymbose to spicate or glomerulate; heads usually clustered, or compound with clusters often subtended by 1-many foliaceous bracts; involucre of 4 pairs of bracts; flowers mostly 2-4; corollas 4-10 mm long, unequally 5-cleft. Pollen grains strongly lophorate, with high smooth crests.

Type genus: *Elephantopus* L.

The group has been recognized at the subtribal level by Cabrera (1944) and Cabrera and Vittet (1961) in include three genera, *Elephantopus*, having a pappus of 5 straight awns or setae, *Orthopappus* Gleason with numerous straight pappus setae, and *Pseudelephantopus* Rohr with distorted pappus setae. The group was distinguished by the zygomorphic corollas having the

inner cleft much deeper than the others. The group has since been treated for the North American, Central American, West Indian area with *Elephantopus* interpreted broadly to include the other two genera (Clonts & McDaniel, 1978).

The strongly lophorate pollen grains with high crests seem to relate this subtribe and the following Rolandrinae to the more advanced members of the Vernoniinae, and there is no reason to place them close to the Lychnophorinae with which they were placed in the traditional treatments of Bentham and Hooker (1873) and Hoffmann (1890-94).

Elephantopus has been chemically analysed and seems to have a tendency for sesquiterpene dilactones, a tendency not seen elsewhere in the tribe (Harborne & Williams, 1977). The group has no indication of the furanone heliangolides which seem characteristic of most Lychnophorinae, further emphasizing the lack of relationship between the two groups.

Rolandrinae Lessing, *Linnaea* 6: 105. 1831.

Perennial herbs and shrubs. Heads in axillary or pedunculate clusters or glomerules, each head with 1 flower; involucre bracts 2-6, with apical spur or arista; corollas ca. 2 mm long, regular, with 4-5 lobes, lobes with sclerified tips externally; pappus of short squamellae. Pollen grains strongly lophorate, with high crests bearing small spinules.

Type genus: *Rolandra* Rottb.

The subtribe contains the genera *Rolandra* and *Spiracantha* H.B.K. of Central America and northern South America. The subtribe shares clustered heads and strongly lophorate pollen with the Elephantopodinae with which it is placed in the traditional systems of Bentham and Hooker (1873) and Hoffmann (1890-94), and it probably shares an origin with that group from advanced members of the subtribe Vernoniinae. The technical difference from the Elephantopodinae is the actinomorphic corolla, but the two genera of the Rolandrinae also have single flowers in the head and corollas of reduced size with sclerified lobe-tips. Further examination of these and other genera may show that a broader subtribal concept is preferable.

Chemistry of the Rolandrinae is not yet known.

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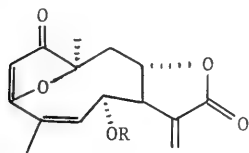
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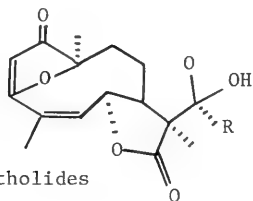
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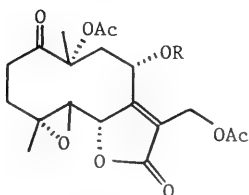
Sesquiterpene lactones



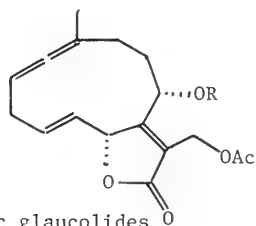
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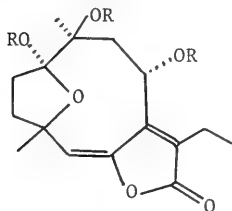
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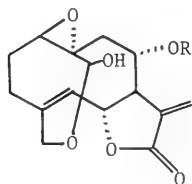
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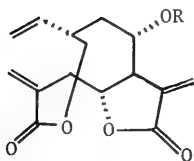
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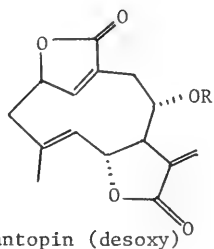
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vernolides

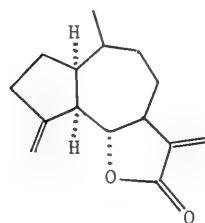


vernolepin type



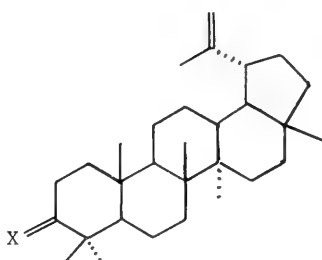
elephantopin (desoxy)

Sesquiterpene lactone

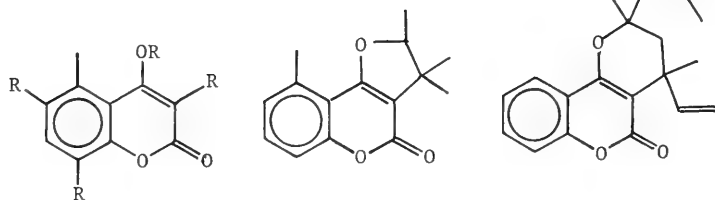


guaianolides

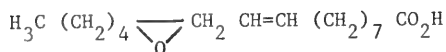
Triterpene



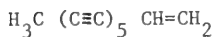
Coumarins



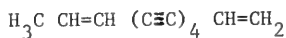
Epoxy fatty acid



Polyacetylenes



pentaynene



trideca-1,11-diene-3,5,7,9-tetrayne

Main chemical constituents of the tribe Vernonieae - II

RE-ESTABLISHMENT OF THE GENUS *CRITONIOPSIS*

(VERNONIEAE: ASTERACEAE).

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

Critoniopsis was originally described by Schultz-Bipontinus (1863) as a distinct genus of the Vernoniaeae, but has been treated in all subsequent literature as a section of *Vernonia* Schreb. The generic name was in reference to the heads which resemble those of the Eupatorian genus *Critonia* P. Browne in their imbricate involucre with deciduous inner bracts. The genus was based on *C. lindenii* Sch.-Bip. of Colombia, and the sectional name has been applied mostly to species of the northern Andes, but a few species have also been included from as far away as south-central Brasil. The most important summary of the group is by Cuatrecasas (1956).

The present need to restore the generic status of *Critoniopsis* derives from the fact that the genus is more closely related to the genera *Piptocarpha* R.Br. and *Pollalesta* H.B.K. than it is to *Vernonia*. The vegetative aspects of the related genera are often similar, and some confusion has resulted. One species described in section *Critoniopsis* as *Vernonia cuatrecasasiana* Aristeg. has tails on the anthers and has been transferred to *Piptocarpha* by Badillo (1974). A second species, *V. peruviana* Cuatr., has long tails on the anthers of the type specimen, and it probably belongs to *Piptocarpha* also. A microscopic feature noted for *Piptocarpha* by Cabrera (1944) is blunt and often septate hairs on the style, a type of hair that is comparatively rare in the tribe. Examination shows that *Pollalesta* and *Critoniopsis* have such blunt hairs, and that pointed hairs are nearly or completely lacking. The pollen of the three genera is the same, the common *Lychnophora*-type. All three genera have rather smooth coriaceous involucre with deciduous inner bracts. The achenes are mostly hairless, or sometimes sparsely pilose in *Pollalesta*, the thick hairs described in *Critoniopsis pendula* proving to be glands that appear more prominent because of the immaturity of the achenes. The outer achenes are often curved and slightly obcompressed. The surface of the achenes is usually a dull tan color, and the sides are smooth to shallowly fluted. On the basis of the shared characters, the three genera have been placed together in a subtribe *Piptocarphinae* by Robinson, Bohlmann and King (1980).

In recognizing *Critoniopsis*, some other Andean species have been seen having few to many blunt hairs on the styles. Blunt hairs generally seem more common toward the base of the branches and on the upper shaft, and some may even occur in typical *Ver-*

nonia. The Andean species usually have numerous blunt hairs and usually are shrubs and small trees, indicating closer relationship to *Critoniopsis*. Four species, *V. crassilanata* Cuatr., *V. neogleasoniana* Cuatr., *V. sparrei* H. Robins., and *V. trichotoma* Gleason, all of Ecuador, seem to form a natural group of their own with opposite leaves, more persistent spreading involucrel bracts, achenes often with hairs, style hairs without septations, and corollas with the basal tube cylindrical ending abruptly at the bases of the deeply cut lobes. Another species with a similar corolla form is *V. flexipappa* Gleason (= *V. giannasi* Stutts) of southern Ecuador, but it has alternate leaves with closely crenulate margins, and slender single-flowered heads with deciduous inner bracts. *Vanillosmopsis weberbaueri* Hieron. is similar to *Critoniopsis* in corolla and achene form, but the anthers have rather distinct tails. Two final excluded species are the more flexuous or subsacandent *V. angustiniana* Cuatr. and *V. aristeguietae* Cuatr. of Colombia and Venezuela which have more persistent inner involucrel bracts and pubescent achenes.

Most of the species of *Critoniopsis* can be distinguished by using the key by Cuatrecasas (1956). Two species were not included in the key. *Critoniopsis pendula* was described by Cuatrecasas in the same paper, but was not included in the section, perhaps because of its dense tomentum. The new species, *C. cuatrecasasi* can be distinguished by the heads with 9-11 flowers and the papyraceous leaves with non-bullate upper surfaces.

Critoniopsis Sch. Bip., Jahresber. Pollichia 20-21: 430. 1863.

Vernonia sect. *Critoniopsis* (Sch. Bip.) Baker in Martius, Fl. Bras. 6 (2): 19. 1873.

Shrubs and small trees; stems and leaves often with scales or stellate hairs, rarely densely tomentose or sparsely pubescent; leaves alternate (rarely opposite in *C. pichinchensis*), petioles distinct; laminae mostly elliptical, entire or with some serrulations in distal half. Inflorescence terminal, thyrsoid to corymbose paniculate, with cymose to subcymose branches. Heads discrete, sometimes clustered, 1-11-flowered (-16 in *C. pallida*); involucrel bracts rather coriaceous, smooth, strongly subimbricate to imbricate, appressed, inner bracts easily deciduous; corolla with distinct funnelliform throat; anther thecae without long tails; anther appendage without glands; style base with slightly broadened sclerified ring; hairs of upper style beginning slightly below base of branches, mostly blunt, sometimes septate. Achenes prismatic to slightly obcompressed, smooth to shallowly fluted, glabrous or with glandular dots, never with setae; carpodium somewhat turbinate; pappus often with outer series weak or undifferentiated, never squamiform. Pollen of *Lychnophora*-type.

Type species: *Critoniopsis lindonii* Sch. Bip.

The following 26 species are included in the genus at this time.

CRITONIOPSIS BITRIFLORA (Cuatr.) H. Robinson, comb. nov., *Vernonia bitriflora* Cuatr., Bot. Jahrb. 77: 64. 1956.

CRITONIOPSIS BOGOTANA (Cuatr.) H. Robinson, comb. nov., *Vernonia bogotana* Cuatr., Bot. Jahrb. 77: 65. 1956.

CRITONIOPSIS BRACHYSTEPHANA (Cuatr.) H. Robinson, comb. nov., *Vernonia brachystephana* Cuatr., Bot. Jahrb. 77: 66. 1956.

CRITONIOPSIS CUATRECASASII H. Robinson, sp. nov.

Plantae arborescentes 6-8 m altae mediocriter ramosae in caulibus et superficiis inferioribus foliorum dense canescentiter vel cinerascentiter lepidotae. Folia alterna, petiolis 5-25 mm longis; laminae papyraceae rigidae ellipticae vel leviter obovatae plerumque 7-13 cm longae et 2.5-5.0 cm latae base cuneatae saepe subtiliter inaequales margine plerumque integrae distaliter interdum subserrulatae apice breviter acutae vel minute apiculatae supra glabrae nitidae vel in nervis primariis persistentiter leniter lepidotae minute reticulate prominulae subtus lepidotae in nervis majoribus aliquantum evanescentiter lepidotae, nervis secundariis utrinque ca. 6-10 a ca. 45° divaricatis leniter arcuatis. Inflorescentiae thyrsoido-paniculatae terminales et in axillaribus foliorum superiorum in ramis dense corymbosae vel cymosae pauce minute anguste bracteiferae. Capitula 8-9 mm alta et ca. 5 mm lata in pedicellis 0-1 mm longis; squamae involucri 30-35 valde subimbricatae 1-6 mm longae et ad 1.5 mm latae interiores facile deciduae basilares canescentiter lepidotae aliter subglabrae et in partibus purpurascens apice anguste rotundatae subscariosae margine pauce fimbriatae. Flores ca. 9-11 in capitulo; corollae lavandulae ca. 7 mm longae extus sparse glandulo-punctatae in apicibus loborum densiores, tubis ca. 3 mm longis anguste infundibularibus, faucibus ca. 1.5 mm longis infundibularibus base non demarcatis, lobis ca. 2.5 mm longis et 0.6 mm latis; thecae antherarum ca. 2 mm longae base vix appendiculatae; appendices antherarum ca. 0.6 mm longae et 0.2 mm latae glabrae; pili stylorum in parietibus incrassati rugulosi raro septati. Achaenia ca. 2.8 mm longa glandulo-punctata; setae pappi majores 35-40 ca. 4.5 mm longae apice leniter incrassatae, exteriores ca. 0.5-1.0 mm longae filiformes. Grana pollinis in diametro ca. 40 μ m.

TYPE: COLOMBIA: Boyaca: La Uvita, subiendo por la carretera de Chita, 2900 m alt. Arbol 6-8 m. Hoja papirácea, rígida, verde amarillenta brillante haz, verdoso cenicienta muy clara envés. Filarias purpuráceas hacia el extremo. Corollas lilas, claras. "blanquizco". 16 Sept. 1969. *J. Cuatrecasas & L. Rodríguez 27811* (Holotype, US). PARATYPE: COLOMBIA: Boyaca: La Uvita, subiendo por la carretera de Chita, 2900 m alt. Arbolito 6 m.

Hoja flexible, verde amarillento medio, brillante haz ceniciento envés. Involucro verdoso apagado con puntas parduscas. 16 Sept. 1969. *J. Cuatrecasas & L. Rodríguez 27808* (US).

The paratype seems to have more narrowly elliptical leaves and narrower more pubescent outer involucral bracts than the holotype.

CRITONIOPSIS ELBERTIANA (Cuatr.) H. Robinson, comb. nov., *Vernonia elbertiana* Cuatr., Bot. Jahrb. 77: 68. 1956.

CRITONIOPSIS FLORIBUNDA (H.B.K.) H. Robinson, comb. nov., *Vernonia floribunda* H.B.K., Nov. Gen. et Sp., ed folio 4: 30. 1818.

CRITONIOPSIS FRANCISCANA (Cuatr.) H. Robinson, comb. nov., *Vernonia franciscana* Cuatr., Bot. Jahrb. 77: 69. 1956.

CRITONIOPSIS GLANDULATA (Cuatr.) H. Robinson, comb. nov., *Vernonia glandulata* Cuatr., Bot. Jahrb. 77: 69. 1956.

CRITONIOPSIS HUAIRACAJANA (Hieron.) H. Robinson, comb. nov., *Vernonia huairacajana* Hieron., Bot. Jahrb. 19: 43. 1894.

CRITONIOPSIS HUILENSIS (Cuatr.) H. Robinson, comb. nov., *Vernonia huilensis* Cuatr., Bot. Jahrb. 77: 71. 1956.

CRITONIOPSIS JELSKII (Hieron.) H. Robinson, comb. nov., *Vernonia jelskii* Hieron., Bot. Jahrb. 36: 459. 1905.

CRITONIOPSIS KILLIPII (Cuatr.) H. Robinson, comb. nov., *Vernonia killipii* Cuatr., Bot. Jahrb. 77: 71. 1956.

Critoniopsis lindenii Sch. Bip., Jahresber. Pollichia 20-21: 431. 1863.

CRITONIOPSIS MUCIDA (Cuatr.) H. Robinson, comb. nov., *Vernonia mucida* Cuatr., Bot. Jahrb. 77: 72. 1956.

CRITONIOPSIS OCCIDENTALIS (Cuatr.) H. Robinson, comb. nov., *Vernonia occidentalis* Cuatr., Bot. Jahrb. 77: 73. 1956.

CRITONIOPSIS PALLIDA (Cuatr.) H. Robinson, comb. nov., *Vernonia pallida* Cuatr., Bot. Jahrb. 77: 74. 1956.

CRITONIOPSIS PENDULA (Cuatr.) H. Robinson, comb. nov., *Vernonia pendula* Cuatr., Bot. Jahrb. 77: 57. 1956.

CRITONIOPSIS PICHINCHENSIS (Cuatr.) H. Robinson, comb. nov., *Vernonia pichinchensis* Cuatr., Bot. Jahrb. 77: 76. 1956.

CRITONIOPSIS POPAYANENSIS (Cuatr.) H. Robinson, comb. nov.,

Vernonia popayanensis Cuatr., Bot. Jahrb. 77: 77. 1956.

CRITONIOPSIS PYCNANTHA (Benth.) H. Robinson, comb. nov., *Vernonia pycnantha* Benth., Pl. Hartw. 134. 1844.

CRITONIOPSIS SEVILLANA (Cuatr.) H. Robinson, comb. nov., *Vernonia seviliana* Cuatr., Bot. Jahrb. 77: 78. 1956.

CRITONIOPSIS SUAVEOLENS (H.B.K.) H. Robinson, comb. nov., *Vernonia suaveolens* H.B.K., Nov. Gen. et Sp. ed folio 4: 30. 1818.

CRITONIOPSIS TUNGURAHUAE (Benoist) H. Robinson, comb. nov., *Vernonia tungurahuae* Benoist, Bull. Soc. Bot. Fr. 83: 804. 1936.

CRITONIOPSIS UNGUICULATA (Cuatr.) H. Robinson, comb. nov., *Vernonia unguiculata* Cuatr., Bot. Jahrb. 77: 80. 1956.

CRITONIOPSIS UNIFLOSCULOSA (Cuatr.) H. Robinson, comb. nov., *Vernonia uniflosculosa* Cuatr., Bot. Jahrb. 77: 81. 1956.

CRITONIOPSIS URSICOLA (Cuatr.) H. Robinson, comb. nov., *Vernonia ursicola* Cuatr., Bot. Jahrb. 77: 82. 1956.

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ARNOGLOSSUM RENIFORME (Hook.) H. Robinson, comb. nov., *Senecio atriplicifolius* var. *reniformis* Hook., Fl. Bor. Amer. 1: 332. 1833. *Cacalia reniformis* Muhl. ex Willd., Sp. Pl. 3 (3): 1735. 1804, not *Cacalia reniformis* Lam., Fl. Fr. 2: 75. 1778. *Mesadenia reniformis* (Hook.) Raf., New Fl. 4: 79. 1838. The need for the new combination has been called to my attention by Steve Smith working on the revised edition of the National List of Scientific Plant Names. The name replaces *A. muhlenbergii*.



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Critoniopsis cuatrecasatii H. Robinson, Holotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

NEW SPECIES OF VERNONIEAE (ASTERACEAE). VII.

CENTRATHERUM CARDENASII FROM BOLIVIA

Harold Robinson
Department of Botany
Smithsonian Institution, Washington, D.C., 20560.

Material of the genus *Centratherum* borrowed from the U.S. National Herbarium a number of years ago for a study of the genus, included a specimen from Bolivia collected in 1966 by the late Dr. H. M. Cardenas. The specimen had achenes that obviously never had any pappus, and the specimen was returned with indication that it was not a *Centratherum*. The close resemblance to species of that genus seemed to indicate close relationship, however. In view of the limited generic possibilities in this group of the Vernonieae, a study has been undertaken with the following results.

The Cardenas specimen has all the characteristics of the *Centratherinae*, including the outer series of foliaceous involucre bracts, the long-stipitate glands on the corollas, and the *Centratherum*-type pollen, a pollen with low crests as in the *Lychnophora*-type, but with spines arranged in a definite network enclosing numerous irregular areolae (Robinson, Bohlmann & King, 1980). The two known genera of the subtribe are *Centratherum* Cass. with a short readily deciduous pappus, and *Oiospermum* Less. with no pappus. The former is widely distributed in South America and occurs elsewhere, while the latter is restricted to eastern Brasil. The lack of pappus might suggest that the Bolivian specimen is a second species of *Oiospermum*, but the appearance of the specimen would dictate otherwise. Rigorous application of the traditional generic character seems unwise in view of the frequency with which the pappus is lost in various groups of Asteraceae.

The achenes of *Oiospermum* are notable for the fine indument of small distorted twin-hairs. The achenes of *Centratherum* are glabrous except for scattered glandular punctations, a condition also seen in the Cardenas specimen. The inner involucre of *Oiospermum* consists of glabrous bracts all being uniform in structure and differing only in size. In *Centratherum* the inner bracts are variously pubescent, and form a graduated series in which the apices of the innermost bear broad scarious margins, a situation also seen in the Cardenas specimen. The examples seen of *Oiospermum* show a style with the pubescent part of the upper shaft very short. In *Centratherum* and in the Cardenas specimen the pubescent part of the style shaft as half as long to nearly as long as the style branches. On the basis of the comparison, I would maintain the genus *Oiospermum* as distinct from *Centra-*

therum, but I consider the epappose Cardenas specimen as a member of the latter genus.

Within *Centratherum* the Cardenas specimen is distinct by the lack of pappus. Also, the leaves are densely covered with a pubescence of T-shaped hairs that nearly hides the glandular punctations, and the petioles and the bases of the outer involucral bracts are usually rather broad or winged, neither character being evident in other species of the genus. The Cardenas specimen is recognized here as a new species which is named for the collector.

CENTRATHERUM CARDENASII sp. nov., H. Robinson

Plantae herbaceae subperennes vel perennes? 30-40 cm altae paucè ramosae. Caules teretes dense canescentiter pilosulus vel subtomentosi, pilis plerumque sub-T-formibus vel T-formibus irregulariter distortis, internodis ca. 1.3-1.5 cm longis. Folia alterna, petiolis 5-8 mm longis vix vel distincte anguste alatis; laminae ellipticae vel obovatae plerumque 2-3 cm longae et 1.0-1.5 cm latae base acuminatae indistincte demarcatae margine serratae apice obtusae supra et subtus glandulo-punctatae et dense pilosulae, pilis T-formibus distincte stipitis, nervis secundariis utrinque ca. 5-6 ca. 45° divaricatis. Capitula subscaposa in internodis ultimis ca. 6 cm longis terminalia solitaria ca. 14 mm alta et lata; squamae involucri exteriores ca. 10 foliiformes 5-20 mm longae et 5-9 mm latae ovatae vel obovatae base late insertae margine integrae vel subserrulatae dense glandulo-punctatae et pilosulae; squamae interiores ca. 30 ca. 2-3-seriatae ovatae vel lanceolatae 3-7 mm longae et ca. 2.5 mm latae extus in partibus subherbaceis dense puberulae exteriores breviter acutae interiores in appendicis apicalibus late scariosis margine serrulatis purpureae. Flores ca. 50 in capitulo; corollae purpurascens aliquantum firmas ca. 12 mm longae, tubis cylindræis ca. 7 mm longis glandulis longi-stipitatis dense obsitis et paucè glandulo-punctatis, faucibus anguste infundibularibus ca. 2.5 mm longis glandulo-punctatis et paucè vel non stipitato-glanduliferis, lobis linearibus ca. 3 mm longis et 0.4 mm latis extus glandulo-punctatis et sparse stipitato-glanduliferis; filamenta antherarum in partibus superioribus ca. 0.35 mm longis, cellulis in parietibus valde annulate ornatis; thecae antherarum ca. 1.5 mm longae; appendices antherarum oblongo-ovatae breviter acutae ca. 0.5 mm longae et 0.18 mm latae; basi stylorum non noduliferi; scapi stylorum in partibus hispidulis superioribus ca. 0.7 mm longi, rami stylorum ca. 1.4 mm longi. Achaenia 2.2-2.8 mm longa subteretes ca. 10-costata sparse glandulo-punctata non pilifera; pappus nullus. Grana pollinis in diametro ca. 40 µm.

TYPE: BOLIVIA: Santa Cruz: San Miserato-Chiquitos, 900 m, en pendiente de gramíneas. Herb 30-40 cm, flowers purpuras. V-66. *M. Cardenas 6253* (Holotype, US).



BOLIVIA

Centratherum cardenasii H. Robinson, Holotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXCII.

VALIDATION OF SUBTRIBES.

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

In the survey of the Eupatorieae by Robinson and King (1977), nineteen generic groups were recognized that were more or less equivalent to subtribes. Of these, four had subtribal names available from older literature, Adenostemmatinae B.L. Robinson, Eupatoriinae Lessing, Alomiinae Lessing and Ageratinae Lessing. An additional name, Piqueriinae Benth. & Hook., was available which is considered a synonym of Ageratinae as presently delimited. Two additional subtribal names have been published by the present authors in more recent papers, Oxylobinae K. & R. (1978a) and Disynaphiinae K. & R. (1978b). The forthcoming review of the Eupatorieae will recognize twelve additional subtribes for which formal names are needed. The names and descriptions are as follows.

GYPTIDINAE subtribus nov., R. M. King & H. Robinson

Folia opposita vel spiraliter inserta. Capitula multiflora; squamae involucri plerumque subaequales persistentes; receptacula saepe conica epaleacea vel raro paleacea; corollae in lobis plerumque papillosae; filamenta superne in parietibus cellularum valde annulate ornata; basi stylorum plerumque glabri et non noduliferi interdum pilosi aut noduliferi. Achaenia plerumque 5-costata; carpodia variabilia; pappus plerumque capillaceus, setis plerumque elongatis scabris vel interdum plumosis, cellulis apicalibus interdum inflatis apice rotundatis. $x = 10$.

Type genus: *Gyptis* (Cass.) Cass.

TRICHOCORONINAE subtribus nov., R. M. King & H. Robinson

Plantae aquaticae vel subaquaticae. Folia opposita sessilia interdum verticillata. Capitula multiflora; squamae involucri subaequales persistentes; receptacula leniter convexa epaleacea; corollae in lobis papillosae; filamenta superne in parietibus cellularum non vel pauca ornata; basi stylorum glabri non noduliferi. Achaenia 5-costata; carpodia distincta superne saepe valde demarcata; pappus brevis vel nullus. $x = 15, 30$.

Type genus: *Trichocoronis* A. Gray

AYAPANINAE subtribus nov., R. M. King & H. Robinson

Folia opposita plerumque sessilia vel breviter petiolata. Capitula multiflora; squamae involucri plerumque subimbricatae

et valde inaequales persistentes; receptacula leniter convex raro columnaria non paleacea vel raro paleacea; corollae in lobis utrinque laeves raro papillosae; filamenta superne in parietibus cellularum valde annulate ornata; basi stylorum noduliferi glabri vel hirsuti; appendices stylorum interdum tenuiores et longe papillosae aliter leniter mamillosae vel breviter papillosae. Achaenia 5-costata; carpodia distincta valde demarcata saepe distorta interdum in cellulis basilaribus inflata; pappus plerumque setiformis scaber raro brevis vel nullus. $x = 10$.

Type genus: *Ayapana* Spach

LIATRINAE subtribus nov., R. M. King & H. Robinson

Folia basilaria rosulata. Inflorescentiae late corymbiformes vel pseudospicatae. Capitula 4-80-flora; squamae involucri subimbricatae et valde inaequales persistentes; receptacula leniter convex non vel raro paleacea; corollae in lobis plerumque elongatae intus papillosae; cellulae in partibus superioribus filamentorum plerumque quadratae in parietibus irregulariter ornatae; basi stylorum glabri non noduliferi; appendices stylorum filiformes dense papillosae. Achaenia plerumque 10-costata, pilis saepe valde bifurcatis vel uniseriatis; pappus plerumque setiformis, setis scabris vel plumosis. $x = 10$.

Type genus: *Liatris* J. Gaertner ex Schreb.

FLEISCHMANNIINAE subtribus nov., R. M. King & H. Robinson

Plantae herbaceae annuae vel perennes. Folia opposita vel raro alterna. Capitula (10)-20-50-flora; squamae involucri plerumque subimbricatae et inaequales raro subaequales persistentes; receptacula plana vel minute conica glabra epaleacea; corollae in tubis breves, nervis inferne latioribus, lobis late triangularibus, cellulis in partibus superioribus prorulosis; filamenta in partibus superioribus angusta, cellulis elongatis indistinctis in parietibus valde dense annulate ornatis; basi stylorum glabri non noduliferi, scapi stylorum raro piliferi et glanduliferi; rami stylorum filiformes dense papilloso. Achaenia 5-costata raro teretia; carpodia distincta superne valde demarcata, parietibus cellularum incrassatis; pappus capillaceus, setis scabris plerumque numerosis raro 5 aut 10. $x = 4, 10$.

Type genus: *Fleischmannia* Sch.-Bip.

CRITONIINAE subtribus nov., R. M. King & H. Robinson

Folia plerumque opposita. Capitula 1-300-flora; squamae involucri plerumque subimbricatae vel imbricatae interiores plerumque facile deciduae exteriores persistentes; receptacula plana vel leniter convexa raro conica epaleacea vel raro paleacea; corollae intus interdum pilosae in lobis utrinque laeves; filamenta superne non per-elongata in parietibus cellularum leniter vel non ornatis; basi stylorum glabri non vel raro noduliferi; rami stylorum saepe spathulati vel apice breviter clavellati plerumque leniter vel non papilloso. Achaenia 5-costata;

carpopodia distincta vel indistincta superne plerumque indistincte demarcata; pappus plerumque capillaceus scaber raro squamiformis vel nullus, apicibus non rotundatis. $x = 10$.

Type genus: *Critonia* P. Browne

PRAXELINAE subtribus nov., R. M. King & H. Robinson

Folia plerumque opposita. Capitula plerumque 5-80-flora; squamae involucri imbricatae interdum subimbricatae omnino facile deciduae; receptacula leniter convex vel alte conica epaleacea vel raro paleacea; corollae in lobis intus plerumque valde papillosae; filamenta superne in parietibus cellularum valde irregulariter ornatis; basi stylorum glabri non vel raro noduliferi; rami stylorum filiformes dense papilloosi. Achaenia 2-5-costata; carpodia plerumque breviter cylindracea, cellulis scleroideis saepe bistratosi; pappus plerumque setiformis et scaber plerumque elongatis, cellulis apicalibus acutis. $x = 10$.

Type genus: *Praxelis* Cass.

HEBECLINIINAE subtribus nov., R. M. King & H. Robinson

Folia opposita vel alterna plerumque longe petiolata. Capitula 4-150-flora; squamae involucri subimbricatae interiores facile deciduae exteriores persistentes; receptacula leniter convexa epaleacea saepe hirsuta; corollae intus interdum pilosae in lobis utrinque laeves; filamenta in partibus superioribus prelongata, cellulis numerosis plerumque subquadratis in parietibus non ornatis; basi stylorum glabri non noduliferi; rami stylorum filiformes vel perangustati leniter mamilloosi vel breviter papillosae raro apice minute clavellati. Achaenia 5-costata; carpodia superne indistincte demarcata; pappus setiformis raro nullus saepe facile deciduus, cellulis apicalibus acutis. $x = 10, 16$.

Type genus: *Hebeclinium* DC.

NEOMIRANDEINAE subtribus nov., R. M. King & H. Robinson

Plantae saepe epiphyticae aliter humicola. Folia opposita plerumque distincte petiolata. Capitula 2-28-flora; squamae involucri valde subimbricatae vel imbricatae interiores facile deciduae exteriores persistentes; receptacula plana vel leniter convexa epaleacea interdum pilosa; corollae intus interdum pilosae in lobis utrinque laeves, cellulis lobarum plerumque latis et in parietibus rectis; filamenta in partibus superioribus prelongata, cellulis numerosis plerumque subquadratis in parietibus non ornatis; basi stylorum glabri noduliferi vel non noduliferi; rami stylorum filiformes sublaeves non clavellati. Achaenia 5-costata; carpodia breviter superne leniter demarcata; pappus setiformis, setis scabris, cellulis apicalibus acutis. $x = 17$, ca. 20-25.

Type genus: *Neomirandea* R. M. King & H. Robinson

MIKANIINAE subtribus nov., R. M. King & H. Robinson

Plantae plerumque scandentes vel interdum erectae. Folia opposita vel verticillata. Inflorescentiae in ramis racemosae vel subcymosae vel corymbosae vel thyrsoido-paniculatae. Capitula 4-flora; squamae involucri 4 subaequales persistentes; receptacula plana epaleacea; corollae in lobis plerumque laeves, cellulis loborum interiores plerumque laxae quadratis marginalibus interdum longe piliformis; filamenta in partibus superioribus incrassata, cellulis numerosis subquadratis in parietibus non ornatis; thecae antherarum plerumque a corollis distincte exsertae; basi stylosum incrassati non noduliferi plerumque glabri interdum papilloso; rami stylosum filiformes non clavellati vix vel valde papilloso. Achaenia 4-10-costata; carpodia superne non valde demarcata; pappus capillaceus, setis scabris, cellulis apicalibus obtusis vel acutis. $x = 16-20$?

Type genus: *Mikania* Willd.

HOFMEISTERIINAE subtribus nov., R. M. King & H. Robinson

Plantae herbaceae perennes vel suffruticosae. Folia alterna saepe sub inflorescentiis valde congesta saepe dissecta. Inflorescentiae longe scaposae unicapitatae. Capitula multiflora; squamae involucri dense subimbricatae multiseriatae inaequales plerumque persistentes interiores deciduae apice anguste acutae; receptacula leniter convexa epaleacea; corollae angustae glabrae in lobis intus laeves; filamenta superne in parietibus cellularum plerumque elongatarum non ornatis; basi stylosum glabri vix vel non noduliferi; rami stylosum filiformis superne leniter latiores vix mammosi vel leniter papilloso. Achaenia 5-costata; carpodia breviter obturaculiformia superne abrupte demarcata, cellulis quadratis multiseriatis; pappus variabilis, setis 3-15 interdum squamellis interspersis. Grana pollinis perminute spiculifera. $x = 18-19$.

Type genus: *Hofmeisteria* Walp.

OAXACANIINAE subtribus nov., R. M. King & H. Robinson

Plantae fruticosae. Folia alterna mediocriter dissecta. Inflorescentiae diffusae in capitulis solitariis mediocriter pedunculatis dispositae. Capitula multiflora; squamae involucri subimbricatae multiseriatae inaequales interiores facile deciduae exteriores persistentes; receptacula leniter convexa distincte paleacea, paleis cum floris facile deciduis; corollae angustae in lobis utrinque laeves vel intus papillosoe; filamenta in partibus superioribus angusta, cellulis subquadratis numerosis in parietibus non ornatis; basi stylosum glabri noduliferi; rami stylosum distaliter vix vel valde clavellati. Achaenia 2, 5-costata; carpodia breviter obturaculiformia, cellulis subquadratis multiseriatis; pappus vestigialiter setiformis vel squamellaeformis interdum setis unicis longis. $x = 18$.

Type genus: *Oaxacania* B. L. Robins. & Greenm.

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OXALIDACEAE EXTRA-SUDAMERICANAE III*

Subgenus MONOXALIS (Small) Lourt. stat. nov.

Por Alicia Lourteig* *

Abstract. Oxalis Subgenus Monoxalis (Small) Lourt. stat. nov. n.c. is established; the two species belonging to it are studied and the key is given. Some remarks on the morphological significance of the simple and phyllodic leaves of the genus Oxalis are contributed by Michel GUEDES.

Las hojas del género Oxalis presentan variaciones que, en relación con caracteres de otros órganos corresponden a grupos taxonómicos infra-genéricos. Las hojas pueden ser uni- a plurifolioladas. El caso más simple es el de las hojas unifolioladas; existen en especies austro-americanas y sudafricanas. En Sudamérica un grupo muy característico que vive en las regiones selváticas del E de Brasil presenta hojas unifolioladas con pecíolos alados; otro grupo que vive en el "cerrado" también posee hojas unifolioladas pero puede presentar al mismo tiempo hojas bi- y trifolioladas, es un caso de reducción foliolar.

Dos especies poseen pecíolos filodiales conservando raramente los folíolos, que son muy pequeños, en exsiccata. La colaboración de mi colega Michel Guédès precisa esas diferencias anatómicamente.

Taxonómicamente este estudio trata de dos especies unifolioladas de la región seca limítrofe de los Estados Unidos y México sobre el mar Caribe.

Asa GRAY publicó Oxalis dichondraefolia en 1852. Small dividiendo el género Oxalis en varios otros creó Monoxalis para esa especie en 1903; Rose describió otra, Monoxalis robusta, en 1907.

Las estípulas, en general poco consideradas en los estudios genéricos, son de particular interés y ofrecen variaciones en los diferentes grupos o secciones como lo mostraré en próximas publicaciones. Los estigmas, aunque en estas dos especies son de forma muy particular, son en las otras especies de origen ventral, aunque sean "terminales" o se presenten fuertemente curvados hacia el exterior sobre el dorso del estilo, lo mismo que éstos.

En el caso de Monoxalis los estilos son un ensanchamiento del estilo generalmente agudo, la estructura floral y del fruto es la misma de todas las especies del género.

Estas consideraciones, dentro del cuadro general de mi reorganización sistemática del género, me llevan a dar a Monoxalis el rango de subgénero.

*I. Phytologia 1975; II. Phytologia 1979.

**Muséum National d'Histoire Naturelle, Paris.

Subgenus MONOXALIS (Small) Lourt. stat. nov.

Small, Fl. S.E. US. 665. 1903; N. Am. Fl. 25(1): 45. 1907 (Genus).
Knuth, Bot. Jahrb. 50, Suppl. 219.1914; Pflanzenreich 103. 1930 (Sectio)

Subarbustos, a veces reducidos, base leñosa. Hojas unifolioladas. Estípulas subuladas a setiformes. Folíolos enteros. Cimas 1-2-floras. Estigmas lingüiformes, elípticos. Cápsulas oblongas. Semillas con estrías transversales, interrumpidas, profundas y superficie rugosa.

Tipo. Oxalis dichondraefolia A. Gray (= Monoxalis dichondraefolia (Gray) Small).

Clave de las especies

A. Sépalos exteriores deltoideo-cordados. Folíolos oblongo-truncados o cóncavos mucronados. Estípulas h. 1 cm

1. O. dichondraefolia

B. Sépalos exteriores ovado-enangostados. Folíolos oblongos u obovados, obtusos, mucronados. Estípulas h. 3 cm

2. O. robusta

1. O. dichondraefolia Gray *

Fig. 1 A

Gray, Pl. Wright. 1: 72. 1852. Knuth, l.c. 103.1930.

O. villosa G. Don, Gen. Syst. 1: 762. 1831. Exell, J. Bot. 63: 175. 1925. Non villosa Marsh. Bieb. 1803 nec Progel 1877, Baker 1883.

Acetosella dichondraefolia (Gray) Kuntze, Rev. 1: 92. 1891.

Monoxalis dichondraefolia (Gray) Small, l.c. 666.1903; l.c. 45. 1907.

Tipo. Estados Unidos, From Texas to New Mexico, El Paso, leg. Wright 74 X 1849 GH. Isótipos BM, FI, G, K, NY, P, US.

Subarbusto hasta 20 cm de alto. Raíz leñosa, profunda (h. más de 12 cm). Pubescencia blanquecina, fina subtomentosa mezclada con pelos largos en todas sus partes. Tallos leñosos en la base (h. 1 cm diám.) ramificado desde la base, ramas prostradas o procumbentes (h. 45 cm de largo). Follaje denso. Internodios casi nulos h. 35 mm. Estípulas subuladas a setiformes, erguidas, pilosas, nervio central prominente (3 - 10 mm). Pecíolos ascendentes mayores o menores que las láminas. Láminas oblongas o suborbiculares o subcuadrangulares (5 - 37 x 4 - 32 mm) borde violáceo finamente ciliado, ápice cóncavo a retuso con apículo (± 1 mm), pubescencia más densa en el envés, nervaduras secundarias 2 pares basales y 2 \pm paralelos; base truncada a cordada. Cimas 1-floras menores o apenas mayores que el follaje. Pedúnculos ascendentes (h. 6,5 cm), bractéolas subuladas o setiformes, agudas (h. 10 mm) cerca de las flores. Pedicelos (h. 5 mm) pubescencia densa ascendente.

Sépalos agudos, tomentosos, ciliados, los exteriores deltoideo-

h = hasta

* El epíteto recuerda la forma de las hojas semejantes a las de Dichondra (Convolvulácea).

cordados o hastiformes (6 - 12 mm, base h. 7 mm), agudos, tomentosos, ciliados; los interiores lineares a elípticos, enangostados, agudos (6 x 1-2 mm). Pétalos amarillo intenso, anchamente obovado-espátulados, $1\frac{1}{2}$ - $2\frac{1}{2}$ veces el largo del cáliz, pubescencia cortísima en la fauce y exteriormente esparcida, más larga en los bordes, a veces inconspicua. Estambres rojizos, filiformes, base ensanchada, casi glabros, los largos ca. 5,5 mm, los cortos h. 4 mm, soldados h. $1/5$. Pistilos (macro-meso- y de igual largo que los estambres largos) h. 6 mm; estilos gruesos, densamente pilosos; estigmas elípticos, subagudos, pelos finísimos y pocas papilas en el borde interior; ovario oblongo, densamente piloso, pelos ascendentes, carpelos 3-4-seminados.

Cápsulas oblongas (7,5 - 10 mm) obtusas, densamente pilosas, pelos finos, cortísimos, hirsutos y largos ascendentes, cáliz poco menor que ella, estilos h. 2 mm, carpelos interiormente densísimamente pilosos, 3-4-seminados. Semillas elipsoideo-apiculadas, ocráceo-blanquecinas con \pm 7 hendiduras irregulares, transversales, interrumpidas, superficie \pm lobulada.

Distribución geográfica. Región limítrofe de México y el SW de los Estados Unidos.

Material estudiado. ESTADOS UNIDOS. Texas. From W Texas to New Mexico, El Paso, leg. Wright 74 V - X 1849 BM, FI, G, GH, K, NY, P, US. Val Verde Co. E of Laughlin A.F.B. E of Del Río, leg. D.S. and H.B. Correll 24730 11 X 1961 GH. Val Verde Co., leg. V.L. Cory 858 17 IV 1929 GH. Bracket, leg. Canby 50 21 III 1900 GH, US. Kinney Co., N of Bracketville, leg. Higgins 5592 2 VI 1972 NY. Uvalde Co., leg. Reverchon 22 I 1885 GH. Along stream at Blewett, leg. D.S. Correll & I.M. Johnston 18173 18 VII 1957 GH, NA. Sabinal, leg. Palmer 10091, 10104 7 VI 1916 S, US. Ib., leg. ipse 11049 5 X 1916 S, US. Near Uvalde, leg. ipse 33664 30 IV 1928 NY. Frío Co., 6 mil. SW of Dilby, leg. Tharp 24 VI 1941 GH. Prope Río Frío, leg. Berlandier 2016 = 606 GH. Prope Río Frío inter Laredo et Bejar, leg. Berlandier 1440 II 1828 FI, GH. Del Río, leg. Jones 26301 20 IV 1930 BM, US. Ib., 950 ft., leg. Fisher 32246 19 VII 1932 US. Sandy banks of Frío, leg. Reverchon 1502 VI 1885 F, GH, NA. Jim Wells Co. Alice, shaded banks, leg. Palmer 11258 13 III 1917 BM, GH, NY, US. Webb Co. Ab. 9 mil. N of Laredo, leg. Tharp & York 52-77 5 I 1949 MEXU, PENN. N of Laredo, leg. K.M. & M.C. Wiegand 1274 15 III 1935 GH. Nueces Co. S Texas, along Nueces Bay 20 ft., leg. Heller 1442 12 III 1884 F, G, GH, K, LE, NY, US. Guadalupe, 105 mil. SW of San Antonio, leg. Palmer 138 IX 1879 G, GH, K, NA, NY, P, US. 18 mil. SE of San Antonio, leg. M. Clare 23 V 1932. Brooks Co. 2 mil. Falfurrias, leg. Hamby 1650 5 IV 1941 NA. Starr Co. Sullivan City, leg. C. Lundell & A. Lundell 9896 2 IV 1941 US. Clower Río Grande valley, leg. Clover 662 14 III 1933 NY. Hidalgo Co. W Sullivan City, leg. Johnston 3778 30 III 1959 NY. La Joya, leg. Clover 1326 25 VI 1933 NY. Cameron Co. Bronxville, leg. Tharp 1862 14-15 III 1923 US. Ib., leg. Hanson 426 7 V 1919 NY, US. Ib., leg. Lewton 159 12 IV 1905 NA, US. Ib., Resaca de la Palma, leg. Runyon 581 24 X 1923 US. NW of Bronxville, leg. C.L. & A. A. Lundell 10690 12 III 1924 NY, US. San Diego, leg. Croft 86 1884-1888 NY, US. Ib., leg. ipse 5064 1885 F, NY. Santa Marfa, leg. Nealley 154 1889

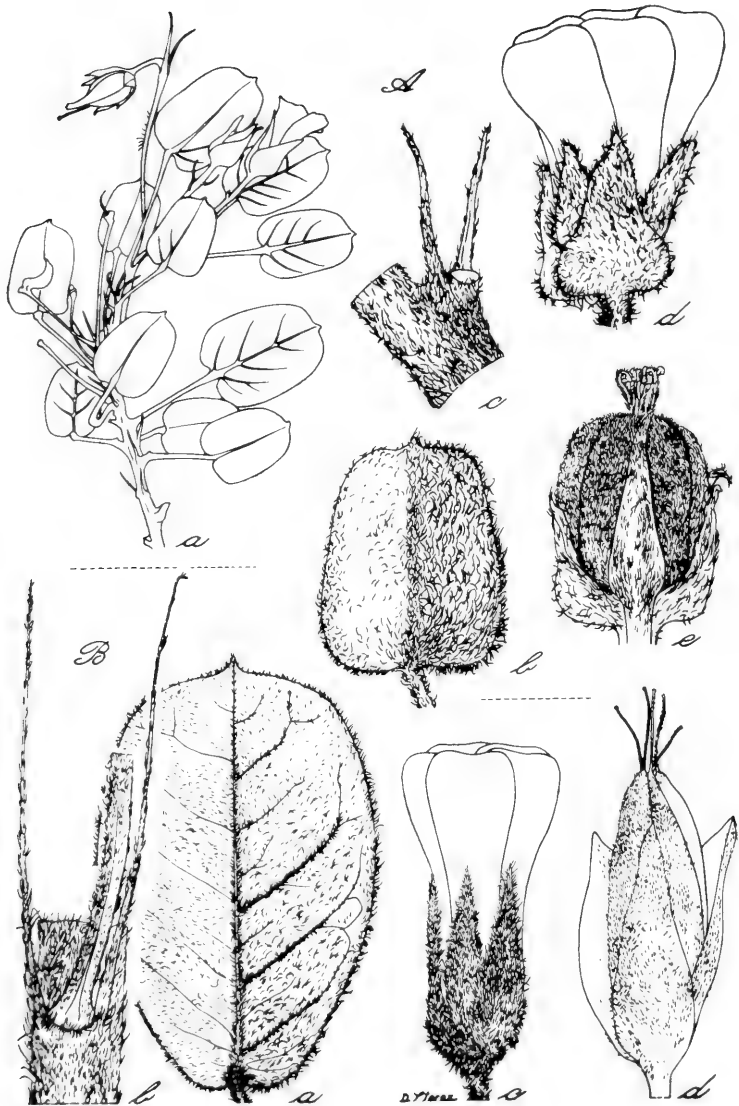


Fig. 1. A. *Q. dichondraefolia*: a, rama $\times 1$; b, hoja $\times 2$; c, estípulas $\times 6$; d, flor $\times 4$; e, fruto $\times 4$. a-c Parry 128; d Palmer 138; e Wright 906. B. *Q. robusta*: a, hojas $\times 2$; b, estípulas $\times 6$; c, flor $\times 3$; d, fruto $\times 4$ a-c Purpus 5762; d Ventura 2736. Storez del.

US. Ib., leg. ipse 68 F. El Jardín, along Resaca de Rancho Viejo, leg. Small and Wherry 11876 14 IV 1925 NY. Realitos, leg. White house 782 16 III 1934 NY. W of Langtry, leg. Small & Wherry 12028 22 IV 1925 NY. Boundary U.S. & Mexico, leg. Mearns 1220 3 XII 1892 US. Boundary of Mexico, Valley of the Río Grande, bel. Doñana, leg. Bigelow, Parry et al. 128 K, NY, US. Eagle Pass, leg. Harvard IV 1883 US. Ib., leg. Clark 4092 3 VIII 1931 G. Riverside, Eagle Pass, leg. Schott 20 II 1852 F. Green Island, leg. Tharp 1128 23-29 VI 1922 NY, US. Vic. of Devils River, leg. Rose & Fitch 17959 16 X 1913 US Hidalgo Co., Lomita Alta, Mission, leg. Cameron 13 VI 1937 F. Lower Río Grande, Bronxville, leg. Runyon 2507 9 IV 1941 F. Starr Co., N of Río Grande City, leg. Clover 1357 XII 1933 NY. Clay dune (Loma Alta) E of Bronxville, leg. Small & Wherry 11848 14 IV 1925 NY. Río Bravo del Norte, leg. Schott III 1852 NY. Texas, leg. Townsend 21 F. Texas, leg. Wright 906 1851 G, GH, K, L, US. Ib., leg. ipse 37 1849 K.

MEXICO. Nueva España, leg. Sessé, Mocifio, Castell y Maldonado 1002 1787 -1795-1804 Tipo 0. villosa G. Don BM. Isótipo F.S.l., leg. Gregg 192 1848-49 GH. Coahuila. Río Grande Valley near Díaz, 700 ft., leg. Pringle 9025 21 IV 1900 F, GH, LY, MEXU. US. W. Muzquiz, Santa Ana, leg. Marsh 553 16 VII 1926 F, GH, MEXU. Monclova, leg. ipse 1673 5 V 1939 F, GH. Allende, 55 Km SW of Eagle, leg. ipse 1789 10 V 1939 F, GH. Nuevo León. 12 mil. N of Sabinas Hidalgo, leg. Heard & Barkley 14538 A 26 III 1944 F, GH, WIS. Near Monterrey, leg. Pringle 2513 17 VII 1889 BM, F, K, M, S. Monterrey, leg. Edwards and Eaton NY. 17 mil. E of Monterrey, leg. Barkley et al. 7160 1 VII 1947 MEXU. Monterrey, leg. Dodge 48 III 1891 US. Ib., leg. Orcutt 1125 1924 US. Ib., 500-700 m, leg. Rutten et R. Pikelhaaring 624 12 V 1921 U. Tamaulipas. 4 mil. S of Jaumave, leg. Stanford, Lauber, Taylor 2284 5 VII 1949 GH, NY. Chamal, Hacienda, leg. Wootton 25 VI 1949 US. Río Soto de la Marina, leg. Kay & Higgins 156 8 VI 1951 WIS. Nuevo Laredo, leg. Webster, et al. 11177 6 VI 1962 MEXU, S. Jaumave, hill near San Vicente, leg. Rozynski 460 VII 1932 F. SW of González, leg. Ripley and Barneby 13548 27 X 1964 NY. Victoria ad Río Blanco, leg. Karwinski 1119 1842 LE. San Luis de Potosí. Minas de San Rafael, Agua del Medio, leg. Purpus 5228 VII 1911 BM, F, GH, US. Mun. Villa Hidalgo, 3 Km SW San Lorenzo, 1450 m, leg. Rzedowski 11462 27 VIII 1959 ENCB. Mun. de Guadalcázar, ca. de El Huizache, 1350 m, leg. ipse 8280 26 X 1956 ENCB, MEXU.

Oxalis robusta (Rose) Knuth *

Fig. 1 B

Knuth, Notizbl. Berlin 7: 297. 1919; Pflanzenreich 103-104. 1930.

Monoxalis robusta Rose in Small, N. Am. Fl. 25 (1): 45. 1907.

Tipo. México, Veracruz, Zacuapán, Barranca de Santa María, leg. Purpus 2289 XI 1906 NY. Isótipos F, US, GH.

Pubescencia blanca, fina, ondulada, subtomentosa con pelos largos, finos, mezclados. Tallo subleñoso erguido o procumbente (h. 30 cm) densamente foliado. Follaje densísimo hacia el ápice. Internodios casi nulos hacia el ápice. Estípulas subuladas a setiformes, pilosas (10 - 30 mm)

* El epíteto alude al porte de la planta

Pecíolos menores que las láminas (h. 50 mm), igual pubescencia que el tallo más densa. Las inserciones de las estípulas caídas se esclerifican. Lámina oblonga a obovado-oblonga (32 - 80 x 20- 50 mm), obtusa, acumen triangular (0,5 - 1 mm) pubescencia corta, en ambas faces, 5-6 pares de nervaduras secundarias paralelas ascendentes; base cordada. Cimas menores que el follaje, 1-2-floras. Pedúnculos rígidos, pubescencia igual a la de los tallos más densa. Brácteas setiformes (h. 10 mm) pilosas, bractéolas más pequeñas.

Sépalos densamente pubescentes, agudos, acuminados con papilas en el interior hacia ápice, los exteriores ovado-anagostados (6 x 3 mm en la base), los interiores sublineares (6 x 2 mm). Pétalos amarillos dos veces el largo del cáliz. raro pelos en los bordes. Estambres glabros, filamentos filiformes, apenas soldados en la base, los largos ± 9 mm, los cortos ± 1 mm. Pistilos ± de igual largo que los estambres largos, ± 9 mm, androginóforo rojizo, glandular, ovario ovoideo, piloso; estilos libres, filiformes, rojizos, pelos blancos ascendentes; estigmas laminiformes, rojizos, bordes papilosos.

Cápsula oblonga, subaguda finamente, densamente tomentosa, cáliz h. 3/4 de su altura, estilos ± 2 mm; carpelos interiormente densamente adpreso-pilosos, 3-4-seminados. Semillas pardas, ovoideas, agudas (2,1 - 2,2 mm), estrías cortas, angostas, profundas, subhorizontales, zonas altas con tubérculos ordenados verticalmente.

Distribución geográfica. Endémica de Veracruz (México).

Material estudiado. MEXICO. Veracruz. Plan del Rfo. E Zapata, 210 m, leg. Hernández y Dorantes 1830 14 I 1973 F. Mun. Dos Ríos, Cerro Gordo, leg. Dorantes 364 8 X 1971 ENCB, GH, F, MEXU. Mun. E. Zapata, near Plan del Rfo, leg. Gilly et al. 61 13 II 1943 NY. Puente Nacional Vera Cruz, sandy localities near, leg. Purpus 14207 IX 1902 A, F, Zacuapán and vic., Barranca de Santa María, leg. Purpus 2289 XI 1906 F, GH, NY, US. Zacuapán, Ternerera, leg. ipse 5762 II 1912 G, P. Rancho Los Conejos, rocky localities leg. Purpus 15323 1923 F. Mun. Dos Ríos, Plan del Rfo, leg. Ventura 2736 23 VI 1971 TEX. Rinconada, 250 m, leg. ipse 10761 7 I 1975 CHAPA, ENCB, MEXU. Rfo Plan, 39 Km, S of Jalapa, ca. 2500 ft., leg. Long & Burch 3207 25 III 1970 A. Mun. del Puente Nacional, Rfo Escondido, 150 m, leg. Ventura 14407 9 VIII 1979 ENCB. Plan del Rfo, leg. ipse 7180 17 X 1972 ENCB. Ib., 270 m, leg. ipse 3736 23 VI 1971 ENCB. Palo Gacho, 300 m, leg. ipse 2909 28 XI 1970. ENCB. Leg. Pavón FI. Ex herb. Sessé, Mociño, etc. 1009 1787-1795-1804 F, G.

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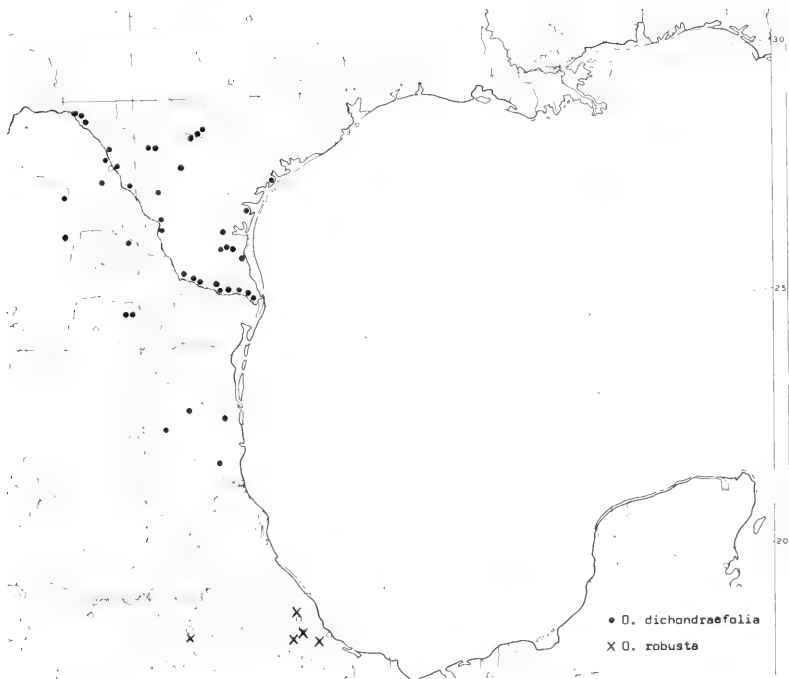


Fig. 2. Distribución geográfica de Oxalis Subgénero Monoxalis.

Remarques sur la signification morphologique des
feuilles simples et phyllodiques d'Oxalis.⁽¹⁾

Les feuilles des Oxalis Sect. Monoxalis possèdent un pétiole terminé par une foliole unique; elles sont unifoliolées. Celle d'O. robusta (Rose) Knuth examinée à ce point de vue montre bien dans sa folio-

(1) Par Michel Guédès, Maître-Assistant au Muséum National d'Histoire Naturelle, Paris.

le unique une nervation comparable à celle d'une foliole ordinaire d'Oxalis avec une seule nervure principale médiane (fig. 4 a). La foliole unique correspond à la foliole terminale de la feuille composée des autres espèces.

Il doit en être de même pour un groupe d'espèces des forêts de l'E du Brésil: les ailes du pétiole d'Oxalis mandioccana Mart. et Zucc. ex Zucc. sont bifaciales, sont de simples portions de limbe formées par les marges pétiolaires.

Les Oxalis monophylla L. et O. Dregei Sonder, d'Afrique du Sud, possèdent sans doute aussi des feuilles unifoliolées.

Dans certaines espèces d'un groupe du "Cerrado" de l'E du Brésil, à feuilles unifoliolées, parfois quelques feuilles sont bi- ou trifoliolées

Dans la section Phyllodoxys, les feuilles sont phyllodiques, leur lame principale correspondant au pétiole. O. fruticosa Raddi et O. leptopodes G. Don ont été examinées.

Au sommet de leur pétiole phyllodique, l'insertion des trois folioles se fait séparément chez O. leptopodes (fig. 3 A) tandis que les folioles sont digitées chez O. fruticosa (fig. 3 B).

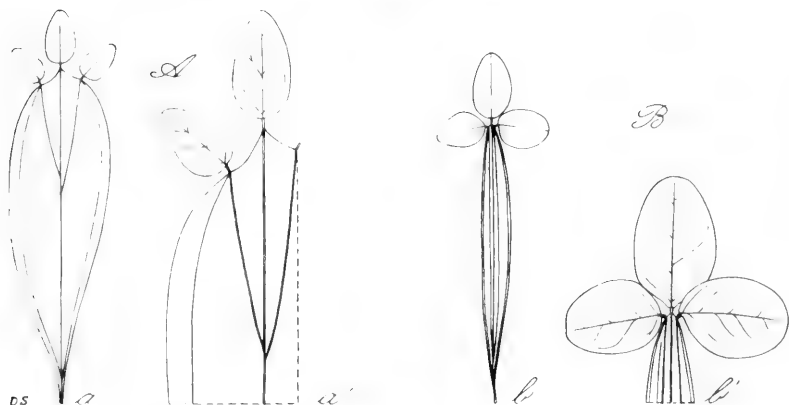


Fig. 3. A. Oxalis leptopodes: a, feuille $\times \frac{1}{2}$; a', détail de la même $\times 1,5$; B. Oxalis fruticosa: b, feuille $\times \frac{1}{2}$; b', détail de la même $\times 1,5$. Storez del.

Le pétiole de O. leptopodes trop mince et fragile, n'a pu être étudié en coupe à partir du matériel d'herbier. Celui de O. fruticosa est probablement subunifacial. Contrairement à ce qu'indique Metcalfe (Ann. Bot. 47, 355-359), les faisceaux qu'il présente ventralement ne sont pas seulement faits de fibres, mais sont des faisceaux de structure normale,

dont le bois est dirigé vers l'intérieur⁽¹⁾. Cette inversion s'explique si le pétiole est une lame dont les régions latérales sont replyées ventralement (= involutées) et congénitalement unies à la partie principale de la lame (schéma en coupe fig. 4 f, face morphologiquement dorsale en trait fort, lignes d'union congénitale en traités). Il n'y a pas de faisceau inversé au niveau du médian, ce qui semble indiquer que les zones latérales replyées n'atteignent pas la ligne médio-ventrale, de part et d'autre de laquelle la face morphologiquement ventrale demeure apparente. Dans le schéma 4 b, vu ventralement, on a représenté en hachures la face morphologiquement dorsale: elle occupe la plus grande partie de la face topographiquement ventrale du pétiole, mais respecte la zone médio-ventrale.

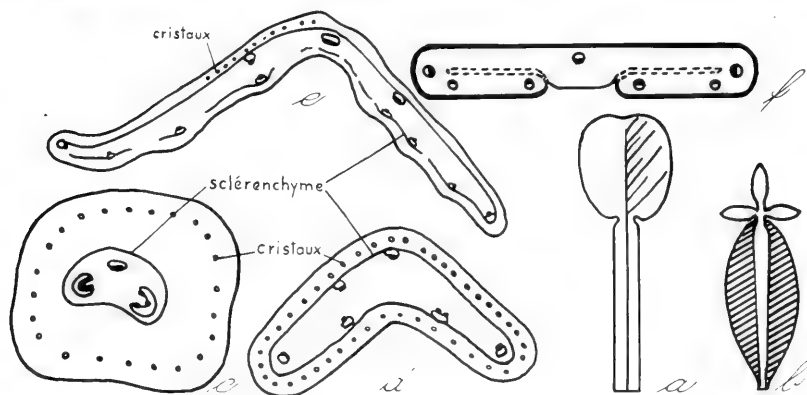


Fig. 4. Schéma d'une feuille d'*Oxalis robusta*; b, schéma d'une feuille d'*Oxalis fruticosa*; c, d, e, coupes transversales du pétiole de la même; f, schéma de la structure du même. Guédès del.

Trois coupes transversales du pétiole sont représentées en fig. 4 c, d, e de bas en haut, c, près de l'insertion, d, e dans le tiers inférieur du pétiole. Les faisceaux latéraux ont en c une orientation perpendiculaire au médian, sont repliés en croissant et tendent à émettre des rameaux ventraux et dorsaux. La ramification s'est faite et les rameaux se sont eux-même divisés en 2-3, pour aboutir à la structure schématisée en fig. 4 f. Les faisceaux de la portion aplatie du pétiole ont généralement leur liber adjacent à un sclérenchyme, d'une ou deux couches de cellules, qui est discontinu ventralement dans la partie large (fig. 4 e). A l'extérieur de celui-ci se trouve une couche plus ou moins régulière de cellules à cristaux, dont une partie seulement est représentée en fig. 4 e.

(1) Au moins chez Belem e Pinheiro 2390, étudié à ce sujet.

NOTES ON THE GENUS *TEIJSMANNIODENDRON*

Harold N. Moldenke

In view of the recent (1951) revision of the genus, the detailed monograph which I had planned to publish would be presumptuous and is also now impractical because of lack of time. It would seem, however, that the bibliographic and other notes assembled by my wife and myself over the past 51 years ought to be placed on record. This is the 57th genus so treated by me in the extensive series of papers mostly published in the present journal. The herbarium acronyms employed herein are the same as have been used in all previous installments of this series in this journal and elsewhere since 1930 and are fully explained in my "Fifth Summary of the *Verbenaceae*....." (1971), volume 2, pages 795 to 801.

TEIJSMANNIODENDRON Koord., Ann. Jard. Bot. Buitenz., ser. 2, 4: 19--32. 1904.

Synonymy: *Xerocarpa* H. J. Lam, Verbenac. Malay. Arch. 98. 1919 [not *Xerocarpa* (G. Don) Spach, 1840]. *Teysmanniodendron* Koord. apud H. Hallier, Meded. Rijks Herb. Leid. 37: 55. 1918. *Teijsmannodendron* Nicholson, Sympos. Ecol. Res. Humid Trop. Veg. 72, 76, 80, 82, & 86. 1965. *Teijsmanniodendron* Mikil, in herb.

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Trees; leaves decussate-opposite, palmately compound but often only 1-foliolate, petiolate, exstipulate (but rarely with a small leafy appendage at the petiole-base, deciduous; petioles often with a swollen apical articulation; leaflets 1--5, mostly petiolulate, the blades mostly coriaceous or rigidly chartaceous, marginally entire, sometimes slightly revolute, sometimes impressed glandular-punctate beneath; petiolules often with a swollen basal articulation; inflorescence cymose, determinate, the cymes usually opposite, aggregated in terminal panicles, rarely subspicate; bracts small; flowers perfect, hypogynous, more or less zygomorphic; calyx inferior, gamosepalous, mostly campanulate or ovoid-campanulate, persistent beneath the fruit, the rim usually 5- (rarely 4-) toothed, the teeth usually well developed, unequal, apically acute; corolla gamopetalous, bilabiate, infundibular or hypocrateriform, the tube cylindrical, subterete, usually short, slightly incurved, villous within on the upper half, usually somewhat ampliate and urceolate-campanulate apically, the limb distinctly bilabiate, mostly pubescent on both surfaces, 5- (or rarely 4-) lobed, the upper lip 2-lobed or sometimes entire, the lower lip usually more or less 3-lobed, the median lobe largest, all the lobes imbricate in bud, usually flat or the 2 posterior ones incurved, apically acute or obtuse; stamens 4 or rarely 5, distinctly didynamous, inserted at or below the middle of the corolla-tube, alternate with the petals, exserted, subequal, a fifth reduced to a sterile staminode in most cases or even absent; filaments filiform, separate, somewhat widened basally, unappendaged; anthers 2-locular, the thecae distinct, divergent or divaricate, dorsifixed near the apex, the apex dorsally confluent, anteriorly free, connivent, the connective sometimes glandular, scarcely extending beyond the thecae; disk inconspicuous; pistil one, compound, 2-carpellary; style terminal, solitary, apically divided into 2 short, very slender, acute arms; ovary superior, sessile, entire, apically obtuse, scarcely sulcate, incompletely 2-celled, apically 1-celled, basally 2-celled, becoming imperfectly 4-celled and 4-ovulate during anthesis; ovules 1 per cell, high-lateral or submedian-lateral, pendulous, hemianatropous; micropyle inferior; fruiting-calyx accrescent, the rim obscurely dentate or subentire; fruit large, drupaceous, dry, indehiscent, the exocarp either thick with scattered sclerenchymatic cells or thin and very brittle, or intermediate, by abortion usually 1-seeded.

Type species: *Teijsmanniodendron bogoriense* Koord.

This genus of some 21 recognized taxa is found naturally from

Burma and Thailand, through Malaya and Indochina, to Indonesia, the center of distribution apparently having been in Borneo.

Although originally proposed as *Teijsmanniodendron* by Koorders (1904), some authors insist on spelling the generic name, apparently on philologic ground, "*Teysmanniodendron*", e.g. Heyne (1917, 1927), Wangerin (1930), Fedde (1932), Den Berger (1949), Van Steenis (1963, 1969), Backer & Bakhuizen van den Brink (1965), Airy Shaw (1966), Meijer (1967, 1968), Van Steenis-Kruseman (1967, 1970), and Koster (in herb.). Kostermans (1951) adopts *Teijsmanniodendron* in the text of his review, but "*Teysmanniodendron*" on the cover of the separates of his paper. In the carbon copy of a paper preserved in my personal notes, entitled "On the orthography of the name Teysman" by Dr. Kostermans, it is stated that the man for whom this genus was named actually spelled his name "Teijsman" in all official documents preserved at Djakarta, Java, although his father, H. Theismann, signed his name "Teysman". Kostermans notes that "When his name is cited in the 'Natuurkundig Tijdschrift voor Nederl.-Indië' in the years around 1850, it is always spelled Teijsmann and it is evident from the use of the y in this periodical in capital as well as common-type of letter, that the ij was not used for lack of y. M. Treub, who introduced the first volume of *Teysmannia* in 1891 with a sketch of Teijsmann, put this name down consistently with ij, although the periodical was called *Teysmannia*. From this date on authors adopted the spelling with y and so it is spelled on Teysmann's monument in the Botanical Garden of Bogor. According to my opinion, the name should be written as adopted and consistently used by J. E. Teijsmann himself, an orthography still in use up to 1891." All of which, of course, in my own opinion, is irrelevant because the correct spelling of the generic name should be the original spelling adopted when it was first published.

In Supplement 3 of the "Index Kewensis" (1908) Prain placed the genus in the *Araliaceae* although Koorders originally (1904) correctly placed it in the *Verbenaceae*.

The genus is the type genus of the Tribe *Teijsmanniodendreae* Koord. of the *Verbenaceae* and is divided into two sections, Section 1 *Plurifoliolatae* Kosterm., with 3--5-foliolate leaves, and Section 2 *Unifoliolatae* Kosterm., with 1-foliolate leaves. Junell (1934) reduces the Tribe to Subtribe rank and notes that "diese Subtribus sicher von *Viticeae* abzuleiten ist. Der Fruchtknotenbau zeigt bei den beiden Gruppen grosse Ähnlichkeiten. Die Plazentation ist allerdings bei *Teijsmanniodendron* etwas abweichend, aber auch bei einigen *Vitex*-Arten finden wir eine ähnliche, jedoch nicht so ausgeprägte Plazentation". He regards *Petraeovitex* Oliv. as the connecting link between the two tribes. He continues: "Der Fruchtknoten ist von demselben Typus wie bei *Vitex*. Der Unterschied zwischen beiden liegt eigentlich in der Plazentation der Samenanlagen. Wie sich aus dem Längsschnitt des Fruchtknotens von *T. bogoriense* (Fig. 15) ergibt, gehen die Samenanlagen ganz oben in der Fruchtknotenöhle von den Plazenten aus. Von einem Funikulus kann man nicht reden; der chalazale Teil der herab-

hängenden Samenanlagen geht direkt in die Plazenta über. In Querschnitten (Fig. 153) durch den obersten Teil des Fruchtknotens sieht es jedoch aus, als ob die Samenanlagen an einem langen, gekrümmten Funikulus hängen würden, was jedoch nicht den Tatsachen entspricht. An tiefer liegenden Schnitten kann man sehen, dass die Samenanlagen an einer grossen Fläche an den Plazenten befestigt sind. Die Übergangspartie zwischen Samenanlage und Plazenta wird nicht oben zu schmaler, was zur Folge hat, dass in Schnitten durch den obersten Teil der Plazenten und der Samenanlagen die Verbindung zwischen diesen das oblige Bild ergeben kann. In dieser obersten Verbindungspartie befindet sich kein Leitbündel.

"Die Plazenten verwachsen schon im obersten Teil des Fruchtknotens. Etwas tiefer unten (Fig. 152) sind die Fruchtblattränder vollständig miteinander verwachsen und bilden eine unvollständige Scheidewand zwischen den beiden zu einem Fruchtblatt gehörigen Samenanlagen. Koorders.....äussert sich über diese Scheidewände folgendermassen: 'Indessen kommt eine unvollständige Vierfächerigkeit dadurch zu Stande, dass aus der Mitte der Fruchtknotenscheidewand zwischen den 2 Sa. eines Fruchtknoten-faches eine Wand flügelartig bis nahe an der Innenwand der Carpiden hervorstößt.'

"Von dem Samenanlagen abortieren drei, und die Frucht wirt somit einsamig. Koorders gibt an, dass die Frucht 'weder eine echte Steinfrucht noch eine aufspringende Kapsel, sondern nur kapselartig und nicht aufspringend' ist. Nach Koorders enthält die Fruchtwand Steinzellen, die jedoch nicht in einer Endokarpschicht angeordnet sind. 'Die ganze Fruchtwand ist trocken, holzig und ziemlich gleichmässig gebaut.'

"Der Grund dafür, dass Koorders *Teijsmanniodendron* nicht zu *Viticeae* zählen wollte, lag in dem abweichenden Fruchtbau der Gattung. Man darf jedoch in diesem Falle dem Bau der Frucht nicht allzu grosse Bedeutung zumessen. *Viticeae* umfasst übrigens in dieser Arbeit einige Gattungen, die keine Steinfrucht haben. *Petraeovitex* ist eine solche Gattung, bei der ja auch die Samenanzahl reduziert ist. Da jedoch zweifelsohne die Reduktion bei *Teijsmanniodendron* bedeutend weiter gegangen ist, scheint es am besten zu sein, einstweilen die Subtribus *Teijsmanniodendreae* beizubehalten. Ihr Ursprung ist sicher innerhalb *Viticeae* zu suchen. Bei *Vitex* liegt eine deutliche Tendenz, die Samenanzahl zu reduzieren, vor, und bei einigen Arten sind die Samenanlagen sehr hoch inseriert."

The genus *Xerocarpa* H. J. Lam (Verbenac. Malay. Arch. 98. 1919) is conserved in the International Code of Botanical Nomenclature over *Xerocarpa* Spach (Hist. Nat. Vég. Phan. 9: 583. 1840) of the *Goodeniaceae* and Airy Shaw (1966) still maintained it as a valid genus, but most recent workers reduce it to the synonymy of *Teijsmanniodendron*, and its type and only published species, *X. avicenniaefoliola* H. J. Lam, to the synonymy of *T. ahernianum* (Merr.) Bakh.

It should perhaps also be noted here that the Angely (1971) work referred to in the bibliography (above) is sometimes cited by its incorrect titlepage date of "1970", and the Schumann &

Lauterbach work (1900) is sometimes incorrectly cited as "1901".

Van Royen (1960) cites his nos. 5271 & 5463 as representing an unidentified species of *Teijsmanniodendron*.

In my opinion, *Vitex bulusanensis* Elm. and *V. padangensis* H. Hallier are actually species of *Teijsmanniodendron*, but more material is needed to confirm this suspicion. On the other hand, the *Binideh* 63159 and *Pitty & Ogata* 63240, distributed as *Teijsmanniodendron*, actually are *Vitex parviflora* A. L. Juss., while *Ampuria* SAN.40383 is not verbenaceous.

Vitex urceolata C. B. Clarke is a taxon that ought also to be studied more carefully to determine whether it may possibly belong in *Teijsmanniodendron*, to which genus it bears striking habitual resemblance.

A tentative artificial key to the taxa of *Teijsmanniodendron*:

1. Leaves palmately 2--5-foliolate. Sect. *Plurifoliolatae* Kosterm.
2. Petioles conspicuously winged or basally auriculate.
 3. Petioles centrally broadly cristate, the wing there to 10 cm. wide.....*T. pteropodum* f. *juv. cristatum*.
 - 3a. Petioles not broadly cristate.
 4. Petioles conspicuously auriculate at the base.....
T. pteropodum f. *juv. auriculatum*.
 - 4a. Petioles more or less narrowly alate, the wings often ampliate apically and/or basally.....*T. pteropodum*.
 - 2a. Petioles not winged nor auriculate.
 5. Lower leaflet-surface inconspicuously pilose, glabrescent, or glabrous.
 6. Petiole-base with a parallel appendage.....*T. glabrum*.
 - 6a. Petiole-base not appendaged.
 7. Leaflet-blades only thick-chartaceous, slightly bullate above.....*T. borneense*.
 - 7a. Leaflet-blades firmly coriaceous, not bullate.
 8. Leaflet-blades only to 5 cm. long; corolla dark-violet; mature fruit only 1--1.5 cm. long, with thin exocarp.
T. coriaceum.
 - 8a. Leaflet-blades to 12 cm. long; corolla pale-pink or yellowish-cream; mature fruit 1.5--5 cm. long, with thick exocarp.
 9. Stamens 4, didynamous; corolla pink; mature fruit 4--5 cm long.
 10. Leaves 2--4-foliolate.....*T. bogoriense*.
 - 10a. Leaves 5-foliolate.*T. bogoriense* var. *pentaphyllum*.
 - 9a. Stamens 5, arranged in a whorl, subequal; corolla cream-color or yellowish.....*T. ahernianum*
 - 5a. Lower leaflet-surface plainly pubescent beneath.
 11. Lower leaflet-surface densely rusty-tomentose.*T. kostermansi*.
 - 11a. Lower leaflet-surface short-pubescent.....*T. bintulense*.
 - 1a. Leaves 1-foliolate. Sect. Kosterm.
 12. Lower leaflet-surface with numerous tiny punctate depressions.
 13. Leaflet-blades bullate.....*T. unifoliolatum*.

- 13a. Leaflet-blades flat, not bullate.....*T. hollrungii*.
- 12a. Lower leaflet-surface without punctate depressions.
14. Secondary veins in 3, rarely 4, pairs.
15. Peduncles and branchlets slender; flowers pedicellate.
16. Petioles and branchlets always glabrous.
17. Leaflets basally acute to obtuse...*T. simplicifolium*.
- 17a. Leaflets basally cordate.....*T. simplicifolium* var. *cordifolium*.
- 16a. Petioles and branchlet-tips densely ferruginous-hirsute.....*T. simplicifolium* var. *kostermansi*.
- 15a. Peduncles and branchlets rather thick; flowers sessile.....*T. smilacifolium*.
- 14a. Secondary veins in more than 4 pairs.
18. Flowers sessile
19. Leaflet-blades rigidly coriaceous, basally rounded; secondaries 7--10 pairs, wide-spreading, sharply curved and more or less anastomosing along the margins.
20. Leaflet-blades to 39.5 cm. long and 16 cm. wide.....*T. subspicatum*.
20. Leaflet-blades 5--9 cm. long, 2.3--4.5 cm. wide.....*T. subspicatum* var. *parvifolium*.
- 19a. Leaflet-blades thinly coriaceous, basally subacute; secondaries only 5 or 6 pairs, obliquely spreading, slightly curve, not anastomosing marginally.....*T. novo-guineense*.
- 18a. Flowers pedicellate.
21. Leaflet-blades thinly chartaceous.....*T. peteloti*.
- 21a. Leaflet-blades thickly coriaceous.
22. Young fruiting-calyx urceolate, the teeth reflexed; leaflet-blades basally rounded, the younger ones pilose beneath.
23. Lower leaflet-surface not scabrous, glabrous when mature.....*T. holophyllum*.
- 23a. Lower leaflet-surface scabrous, ferruginous-pubescent even when mature.....*T. sinclairii*.
- 22a. Young fruiting-calyx campanulate, the teeth erect; leaflet-blades basally subacute, rarely subobtusate, even the young ones glabrous.
24. Leaflet-blades bullate above; Indonesia.....*T. sarawakanum*.
- 24a. Leaflet-blades flat above, not bullate; Indochina.....*T. pierrei*.

TEIJSMANNIODENDRON AHERNIANUM (Merr.) Bakh., Journ. Arnold Arb. 16: 74. 1935.

Synonymy: *Vitex aherniana* Merr., Bur. Govt. Lab. Manila Publ. 6: 18. 1904. *Xerocarpa avicenniaefoliola* H. J. Lam, Verbenac. Malay. Arch. 99. 1919. *Vitex curranii* H. J. Lam, Verbenac. Malay. Arch. 207. 1919. *Vitex bogoriensis* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 60. 1921. *Vitex bankae* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 62. 1921. *Vitex bogoiensis* H. J. Lam apud Fedde & Schust., Justs Bot. Jahresber. 53

(1): 1077, sphalm. 1932. *Xerocarpa aviceniifolia* H. J. Lam apud Green, Kew Bull. Misc. Inf. 1935: 541. 1935. *Vitex curranii* H. Lamb. ex Elm., Leaflet. Philip. Bot. 10: 3799, sphalm. 1939. *Vitex bogariensis* H. J. Lam ex Mold., Alph. List Inv. Names Suppl. 1: 28, in syn. 1947. *Vitex ahernianum* Merr. ex Mold., Résumé 383, in syn. 1959. *Xerocarpa avicenniaefolia* H. J. Lam ex Mold., Résumé 393, in syn. 1959. *Teysmanniodendron ahernianum* Bakh. ex Whitmore, Guide Forests Brit. Solom. Isls. 116, 117, & 204. 1966. *Vitex ahernii* Merr. ex Mold., Résumé Suppl. 18: 15, in syn. 1969. *Teijsmanniodendron ahernianum* Bakh. ex Mold., Fifth Summ. 2: 640, in syn. 1971. *Teijsmanniodendron ahernianum* Bakh. f. ex Foreman, Div. Bot. Dept. For. N. Guinea Bot. Bull. 5: 63. 1972.

Bibliography: E. D. Merr., Bur. Govt. Lab. Manila Publ. 6: 18. 1904; Prain, Ind. Kew. Suppl. 3: 176 & 189. 1908; H. J. Lam, Verbenac. Malay. Arch. 99--100 & 207--208. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 61. 1921; Bakh. & Lam, Bull. Jard. Bot. Buitenz., ser. 3, 4 (2): 285. 1922; H. J. Lam, Bull. Jard. Bot. Buitenz., ser. 3, 5 (2): 175. 1922; E. D. Merr., Enum. Philip. Flow. Pl. 3: 394. 1923; H. J. Lam, Engl. Bot. Jahrb. 59: 90. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 219. 1926; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1927; Heyne, Nutt. Plant. Nederl. Ind., ed. 2, 2: 1315. 1927; A. W. Hill, Ind. Kew. Suppl. 7: 252. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1077. 1932; Bakh., Journ. Arnold Arb. 16: 74. 1935; Green, Kew Bull. Misc. Inf. 1935: 541. 1935; Beer & Lam, Blumea 2: 218. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 279. 1938; Elm., Leaflet. Philip. Bot. 10: 3799. 1939; Mold., Alph. List Common Names 2, 10, 11, 13, 15, 17, 18, 20, 22, 24, 27, & 29. 1939; Mold., Suppl. List Common Vern. Names 10 & 14. 1940; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 576 & 577. 1941; Mold., Alph. List Inv. Names 52. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 62, 68, & 100. 1942; Mold., Phytologia 2: 114 & 118. 1944; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 142, 150, & 196. 1949; C. T. White, Journ. Arnold Arb. 31: 113. 1950; Kosterm., Reinwardtia 1: 75--77, 79, 84--88, & 106. 1951; Mold., Résumé 185, 198, 199, 202, 205, 222, 380--382, 393, & 470. 1959; Burkill, Dict. Econ. Prod. Malay Penins. 2: 2277. 1960; Maun, Philip. Journ. Forest. 16: 108. 1960; Mold., Résumé Suppl. 2: 13. 1960; Rickett & Stafleu, Taxon 9: 84. 1960; Whitmore, Guide Forests Brit. Solom. Isls. 116, 117, 142, & 204. 1966; Mold., Résumé Suppl. 17: 13 (1968) and 18: 7 & 15. 1969; Mold., Fifth Summ. 1: 318, 331, 333, 337, 339, 340, & 369 (1971) and 2: 640, 641, 712--714, 716, 735, & 911. 1971; Foreman, Div. Bot. Dept. For. N. Guinea Bot. Bull. 5: 14 & 63. 1972; Mold., Phytologia 28: 448 & 465 (1974) and 44: 221 & 222. 1979.

A small, medium, or large slender tree, to 27 [perhaps to 50] m. tall; trunk round, to 60 cm. in diameter at breast height, buttressed, the clear bole straight, curved, or often crooked, to 10 m. high; buttresses thin, small, plank- or flange-like, spreading to 1 m., to 2 m. high; wood hard or even extremely so, pale-yellow, taking an excellent finish, the slash hard and brown; sapwood white or yellowish, with a density of 0.47; heartwood blackish-brown; outer bark very thin, less than 1 mm. thick, smooth or with small

flaky patches, gray or grayish to light-brown or yellowish-gray-brown; inner living bark about 6 mm. thick, colorless, pale-brown or brown to light-yellow; branchlets round, grayish, rufous-pubescent, becoming glabrescent; leaves 2--5-foliolate; petioles terete, 3--12.5 cm. long, rufous-tomentose especially at the base and apex; petiolules 0.5--4.5 cm. long, all equal, furrowed above, thickened and rufous-tomentose only basally, otherwise glabrous; leaflet-blades chartaceous when young, coriaceous and rather rigid when mature, dark-green above, pale-green beneath, oblong, 5--35 cm. long, 2--13 cm. wide, smooth and shiny or densely and rather inconspicuously areolate above, pubescent beneath (especially on the midrib) when young, gradually glabrescent in age; secondaries 8--16; veinlet reticulation very dense beneath; inflorescence paniculate, composed of reduced, axillary, many-flowered cymes, 15--30 cm. long; peduncles 1 or 2 per axil, flattened, 5--12 cm. long, greenish-pilose or rufescent-tomentose; flowers rather small, sessile, sweetly odorous; calyx green, infundibular, 4--5 mm. long, rufous-sericeous or densely fulvous-puberulent or short-pubescent when young, eventually glabrescent (especially on the upper half) after the corollas are shed, the rim obscurely 5-dentate; corolla "dirty pale-yellow" or cream-color, the tube very short, basally glabrous, otherwise sericeous, the throat and base of the lip densely villous, the tips of the 5 petals "dirty pale-violet", the upper petals slightly convex (the hollow beneath), externally appressed-pilose, the lower lip flat or concave (the hollow on top), distinctly unguiculate, the margins irregularly fringed, covering the stamens and pistil until the last phase of anthesis; stamens 5, whorled, stiffly erect, rather thick; filaments white; anthers blue or purple to black; pistil white or blue, slightly surpassing the stamens; stigma short, bifurcate, the branch-tips curved outward and downward; ovary globose, glabrous, bilocular; fruiting-calyx enlarged, cupuliform, 5 mm. long, 5--8 mm. wide, truncate; fruit oblong or elliptic to pyriform, fleshy, 1.5--2 cm. long, 1--1.5 cm. wide, 1-seeded, at first green, later turning greenish-purple, black when ripe, shiny, striate; pyrenes black, oblong, about 1 cm. long, 5--7 mm. wide; exocarp thin, coriaceous.

The species is based on *E. D. Merrill F.B.1007* from Luzon, Philippine Islands, where it is said to be abundant. Kostermans has designated *Teijsmann s.n.* from Blinjoë, Banka, deposited in the Buitenzorg herbarium as sheet number 73033 as lectotype of *Vitex bankae* although Lam (1921) cited also *Teijsmann s.n.* [Djobus], *s.n.* [Menumbing], and *Grashoff 36* in his original description. *Herb. Hort. Bot. Bogor. XI.H.37*, from Banka, deposited in the Buitenzorg herbarium as sheet number 73047, is the type of *Vitex bogoriensis* H. J. Lam.

Xerocarpa H. J. Lam (1919) unfortunately is conserved by the International Code of Botanical Nomenclature over the genus of the same name proposed and described by Spach in 1840 in the *Goodeniaceae*.

Recent collectors have encountered *T. ahernianum* on low ridges and in deep soil along the sides of ridges, in rainforests and especially lowland rainforests, on hillsides and forested hillsides

near the seashore, in lowland swamp-forests, in primary and well-drained primary forests, and "scattered but rather common in scrub on stony ferruginous soil". Foreman (1972) calls it "one of the quite common mid-story trees [on Bougainville island], some specimens reaching a fair size". Whitmore (1976) says that "in some places seedlings form extensive carpets on the forest floor and old log-extraction roads; it is the commonest tree in the middle canopy [in the British Solomon Islands]". It has been found at 10--850 m. altitude, in flower from January to June as well as October and November, in fruit from February to August.

The corollas are said to have been "yellow" on *Paie & Sie S.32062*, "yellowish" on *Canicosa 45*, "dull-yellow" on *Clemens 7489 & 16624*, and "white, the lower petal purple" on *Leach NGF.34346*. Clemens, on his no. 7489, notes that the plant is attacked by an as yet unidentified fungus. It affords good timber, the wood being used for railroad ties, posts, polings, and all manner of heavy construction. *Koster BW.1113* exhibits leaves with unusually thin leaflet-blades. *Brass 3441* represents a form with only 3 leaflets, but it is not known if this is a consistent character.

Common and vernacular names reported for the species are "agug", "amamahit", "asiowarris", "dalipāpa", "dañgūla", "didigkalin", "dilipāpak", "duñgūla", "felfelo", "felofelo", "galipāpa", "igang", "igano", "kajoe melati", "kaju mēlati", "kalipāpa", "kolipāpa", "kulipāpa", "langola", "limalima", "lulukā", "malaigang", "mamahit", "mamahit", "melak", "melāk", "melak", "mongpong", "pamagsen", "sasalit" [the official name], "sasulit", "seupa", "tayupuk", "tehe", and "tēhē".

Kajewski makes the remarkable statement that the tree grows to "50 m." tall on Guadalcanal island, but this seems doubtful -- perhaps the notation is a misprint for "50 ft." Kostermans (1951) comments that in Borneo and Banka the tree does "not attain great size, examples with a bole of 30 cm. [in diameter?] are exceptional".

The Foreman (1972) reference cited in the bibliography (above) is often cited as "1971", the incorrect titlepage date. Similarly, the Fedde & Schuster (1927) reference is sometimes cited as "1929".

Lam (1919) cites *Ledermann 9510, 9667, 9789, 9792, 10427, and 10828* as *Xerocarpa avicenniaefoliola* H. J. Lam from New Guinea, *Curran 17463* as *Vitex curranii*, and *Grashoff 36* as *Vitex bankae* from Bangka. For *Vitex aherniana* Merr. he cites *Curran 1143* from Negros, *Escritor 20768* from Luzon, and *Rosenbluth 12236* from Lubang, Philippine Islands. He differentiates *V. curranii* by its 3 peduncles per leaf-axil, 5-foliolate leaves, and velutinous inflorescences, petioles, and petiolules, while *V. aherniana*, he feels, has only 1 or 2 peduncles per leaf-axil, 3-foliolate leaves, and the inflorescences, petioles, and petiolules only sparsely and minutely pubescent.

Material of *T. ahernianum* has been misidentified and distributed in some herbaria as *Schefflera* sp., *Shorea squamata* Benth. & Hook. f., and *Shorea squamata* Dyer.

Citations: PHILIPPINE ISLANDS: Camiguin: *Velasco s.n.* [Herb. Philip. Forest. Bur. 26626] (W--1375170). Leyte: *M. Ramos s.n.*

[Herb. Philip. Bur. Sci. 15377] (Bz--73037); *Wenzel 310* (W--568691, W--713918), *598* (W--714087). Luzon: *Canicosa 45* [Herb. Philip. Forest. Bur. 30307] (Ca--321026, N); *M. S. Clemens 7489* (Ca--285483), *16624* (Ca--285521); *H. M. Curran s.n.* [Herb. Philip. Forest. Bur. 10571] (Bi, Bz--73038); *Curran & Merritt s.n.* [Herb. Philip. Forest. Bur. 8339] (N); *Elmer s.n.* (N); *Escritor s.n.* [Herb. Philip. Bur. Sci. 20768] (W--568428); *Maule s.n.* [Herb. Philip. Forest. Bur. 372] (N, W--852187); *E. D. Merrill 1007* (N--isotype), *1762* (N, N, W--436713), *1766* (W--436717); *Manzano s.n.* [Herb. Philip. Forest. Bur. 26881] (Ca--205443); *Oro 251* [Herb. Philip. Forest. Bur. 30906] (N); *Ponce s.n.* [Herb. Philip. Forest. Bur. 28434] (Bz--73039), *s.n.* [Herb. Philip. Forest. Bur. 28437] (Bz--73040); *Sulit s.n.* [Philip. Nat. Herb. 2707] (Bz--72680, Ca--985407, Mi). Mindanao: *Foxworthy, Demesa, & Villamil s.n.* [Herb. Philip. Forest. Bur. 13536] (Bz--73042, Bz--73043); *Ramos & Convo-car 844* [Herb. Philip. Bur. Sci. 83935] (N); *Wenzel 3058* (Br, Bz--73026, Ca--356326, N). Negros: *H. M. Curran 1143* (Mu--4253, Ut--29159a, W--1133044), *s.n.* [Herb. Philip. Forest. Bur. 17463] (N, W--709990), *s.n.* [Herb. Philip. Forest. Bur. 22673] (Gg--31472, W--900085); *Danao s.n.* [Herb. Philip. Forest. Bur. 12412] (Br, W--711309, W--711310), *s.n.* [Herb. Philip. Forest. Bur. 15027] (W--711314); *Dias 6* [Herb. Philip. Forest. Bur. 29888] (Ca--268039, N); *A. Reyes s.n.* [Herb. Philip. Forest. Bur. 29825] (Ca--268040); *Whitford 1617* (N, W--706695), *1623* (Br). Panay: *Cortes & Knapp s.n.* [Herb. Philip. Forest. Bur. 23938] (W--1294192). Polillo: *Salvoza 228* [Herb. Philip. Forest. Bur. 29680] (Ca--256994). Samar: *Lesquety s.n.* [Herb. Philip. Forest. Bur. 23570] (W--1294727); *M. Ramos s.n.* [Herb. Philip. Bur. Sci. 24206] (W--1172055); *Sherfasee, Canabre, & Cortes s.n.* [Herb. Philip. Forest. Bur. 21078] (Cm, W--568678). Island undetermined: *E. D. Merrill Sp. Blanc. s.n.* (Bz--73041). GREATER SUNDA ISLANDS: Sarawak: *Paie & Sie S. 32062* (Z). LESSER SUNDA ISLANDS: Banka: *Anta 706* (Bz--72749); *Grashoff 36* (Bz--25644, Bz--73034, Bz--73035); *Teijsmann s.n.* [Bangka] (Bz--73031, Bz--73032, Er), *s.n.* [Blinjoe, Banka] (Bz--73027, Bz--73033, N--photo, Z--photo), *s.n.* [Djeboes] (Bz--73028), *s.n.* [Memoemieng] (Bz--73029, Bz--73030, N). MOLUCCA ISLANDS: Obi: *DeHaan 1829* (N, Ng--18881, Ng). Ternate: *DeHaan 296* [Boschbouwpr. BB.23798] (Bz--73045). NEW GUINEA: West Irian: *Janowsky 72* (Bz--726518); *Koster B.W.1113* (Ca--90475, Ng--20194); *Meijer Drees 150* [Boschbouwpr. BB.25047] (Bz--73055). Territory of New Guinea: *Leach NGF.34346* (Mu). NEW GUINEAN ISLANDS: Schouten: *Van Dijk 537* [Boschbouwpr. BB.30726] (Bz--73044). SOLOMON ISLANDS: Guadalcanal: *Kajewski 2715* (Bi, Bz--73049, Bz--73050, Bz--73051, N, N--photo, S, Si--photo, Z--photo). New Georgia: *Maenu'u s.n.* [Herb. Brit. Solom. Isl. Prot. 5964] (W--2578824). Ysabel: *Beer Coll. s.n.* [Herb. Brit. Solom. Isl. Prot. 5128] (W--2578639), *s.n.* [Herb. Brit. Solom. Isl. Prot. 7768] (W--2578265); *Brass 3441* (Bi, Bz--73052, Bz--73053, Bz--73054). CULTIVATED: Java: *Herb. Hort. Bot. Bogor. XI.H.37* (Bz--73046, Bz--73047, Bz--73048, Bz, N--photo, Z--photo).

TEIJSMANNIODENDRON BINTULENSE Mold., *Phytologia* 26: 355--356. 1973.

Bibliography: Mold., *Phytologia* 26: 355--356 & 366. 1973; Hock-

ing, Excerpt. Bot. A.25: 378. 1975.

This recently described species is based on *Chai S.31713* collected in a mixed dipterocarp forest on a low ridge in the Segan Forest Reserve, Bintulu, 4th Division, Sarawak, on September 17, 1972, deposited in my personal herbarium. The collector reports the vernacular name, "entaempulch".

Material of this species has been misidentified and distributed in some herbaria as *T. sinclairii* Kosterm., a unifoliolate species. Thus far the species is known only from the original collection.

Citations: GREATER SUNDA ISLANDS: Sarawak: *Chai S.31713* (Ld--isotype, Z--type).

TEIJSMANNIODENDRON BOGORIENSE Koord., Ann. Jard. Bot. Buitenz. 19: 20--30, pl. 2 & 3. 1904.

Synonymy: *Vitex longifolia* Merr., Philip. Journ. Sci. Bot. 5: 227. 1910. *Vitex flabelliflora* H. Hallier, Meded. Rijks Herb. Leid. 27: 50. 1918. *Teysmanniodendron bogoriense* Koord. apud H. Hallier, Meded. Rijks. Herb. Leid. 37: 55. 1918. *Vitex merrillii* H. J. Lam, Verbenac. Malay. Arch. 212--213. 1919. *Vitex euphlebica* Merr. ex H. J. Lam, Verbenac. Malay. Arch. 212, in syn. 1919. *Vitex flabellifolia* Hall. f. apud E. D. Merr., Enum. Born. Pl. 514. 1921. *Teijsmanniodendron longifolia* (Merr.) Beer & Lam, Blumea 2: 228. 1936. *Teysmanniodendron longifolium* (Merr.) Merr. ex Mold., Suppl. List Inv. Names 7, in syn. 1941. *Teysmanniodendron bogoriense* Koord. ex Mold., Alph. List Inv. Names 43, in syn. 1942. *Teijsmanniodendron bogoriense* Koord. ex Mold., Résumé 353, in syn. 1959. *Teijsmanniodendron bogoriensis* [Koord.] apud Kosterm., Reinwardtia 6: 166, in textu. 1962. *Vitex longifolium* Merr. ex Mold., Résumé Suppl. 15: 25, in syn. 1967.

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Verbenac., ed. 1, 63--67, 74, & 100. 1942; Mold., Phytologia 2: 114. 1944; H. N. & A. L. Mold., Pl. Life 2: 72. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 142, 146--149, 163, & 196. 1949; Kosterm., Reinwardtia 1: 75--77. 79, 80, 84--93, & 106. 1951; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Mold., Résumé 185, 191--195, 199, 202, 222, 353, 354, 383, 385, 386, & 470. 1959; Maun, Philip. Journ. Forest. 16: 108. 1960; Kosterm., Reinwardtia 6: 166. 1962; Backer & Bakh., Fl. Java 2: 602. 1965; Mold., Résumé Suppl. 15: 12 & 25. 1967; Mold., Fifth Summ. 1: 318, 327, 337, 339, & 369 (1971) and 2: 640, 641, 717, 721, 722, & 911. 1971; Versteegh, Meded. Landbouwhoges. Wagen. 71-19: 15 & 59. 1971; Mold., Phytologia 44: 222. 1979.

Illustrations: Koord., Ann. Jard. Bot. Buitenz., ser. 2, 4: pl. 2 & 3. 1904; Junell, Symb. Bot. Upsal. 1 (4): 99, fig. 151--153. 1934.

A slender, often tall, tree, usually glabrous throughout (except for the inflorescence); crown small; clear bole to 18 m. high, to 75 cm. in diameter at breast height, girth to 1.6 m., slightly channelled to 1 m., often fluted and buttressed, the buttresses rounded, to 2 m. high, narrow at ground level, 2.5--5 cm. thick, parallel to the bole, extending outwards for 1 m., basally concave; branches grayish or gray-brown, the ultimate ones somewhat compressed, glabrous; branchlets gray or ochraceous-cinereous in color, striate, the youngest sometimes rufescent-subvelutinous but eventually glabrescent, lenticellate and subverrucose with paler longitudinally elongate lenticels, compressed, marked between the opposite petiole-bases with a pair of opposite, transverse, elevated, stipular lines; bark varying from gray, grayish-brown, purplish-green, or beige to light-brown or yellowish-brown, very thin, hard, lenticellate, varying from smooth to rough, papery and somewhat peeling to scaly, flaky, or dippled, sometimes "patchy cream-brown and brown-green", greenish when cut, "the slash of dead bark resembling palm wood"; outer bark soft, brittle, about 1.6 mm. thick, thin, white or green to light- or pale-brown, grayish, or brown, forming thick, soft, papery scales; under bark dark-brown or green; inner bark very hard, 8--10 mm. thick, mottled, bright- or pale-yellow or yellowish to green with darker yellow streaks, white near the cambium, often pale-brown or greenish and yellow-brown on the back, within pale yellow-brown with coarse brownish longitudinal flecks or streaks, darkening rapidly on exposure, or cream-orange and granular or the "inner side of the living bark yellowish with orange-colored ridges"; wood soft or moderately hard, rather tough, pale-yellowish, straw-color, or pale-straw color to "dark-cream", "dirty-white". whitish, or light-brown; sapwood not well defined, white to yellowish or "creamy-brown", with a density of 0.43--0.49, with low durability; cambium brownish; heartwood rarely present, dark-yellow; sap not milky; twigs greenish-brown; leaves decussate-opposite, large, 2--4 (mostly 3) -foliolate; petioles terete or subterete, 1.5--10 cm. long, robust, narrowly sulcate above, more broadly grooved on the basal half, glabrous or sometimes subpulverulent-puberulent or rufescent-subvelutinous when young, eventually glabrescent, not alate nor shiny,

light-green; petiolules subterete, those of the lateral leaflets less than 1 cm. long, those of the middle leaflet(s) nearly 2 cm. long, light-green, not shiny, articulate, each basally pulvinate-thickened with a strong, brown or gray-brown, transversely ridged joint, glabrous or sometimes subpulverulent-puberulent or rufous-subvelutinous but eventually glabrescent; leaflet-blades subcoriaceous, oblong-lanceolate to broadly lanceolate or ovate-lanceolate, 8--25 cm. long, 4.3--11 cm. wide, the middle one (or ones) larger than the lateral ones, apically long-acuminate (the acumen slender), marginally entire, basally acute or acuminate and somewhat inequilaterally, dark-green above and with lighter colored venation, brownish in drying, somewhat shiny above, paler green beneath; midrib darker beneath; secondaries 7--10 per side, prominent and darker beneath, curvate-ascending, rather distant, anastomosing near the margins, the primary reticulation loose, the secondary reticulation abundant, clathrate-reticulate, thickly netted, darker and subprominent-puberulent beneath; inflorescence terminal, paniculate, solitary, to 30 cm. long and 20 cm. wide, equaling the leaves, rather few-flowered, sometimes subglabrate; peduncle and rachis to 15 cm. long, sometimes with a single branch from the base or with 7--9 branches issuing in flabelliform fashion, most of the branches issuing from above the middle, usually 2--4 in flabelliform fashion at each rachis node, yellowish-green or cream-color, the ultimate branches and branchlets usually more or less brown-pubescent, the peduncles, pedicels, and calyx often whitish or whitish-green; bracts greenish-white; flowers small, fragrant, fasciculate on the ultimate inflorescence-branchlets, usually in groups of 7, comprising a central short (to 1 mm.)-pedicellate one and 2 lateral shortly stalked groups of 3 each; bractlets small, deltoid or spatulate, 2--3 mm. long or less, 1--1.5 mm. wide, rather conspicuous, rufous-pubescent; calyx cupuliform or cyathiform, 1.5--2 mm. long and wide, usually with a small circular nectar-gland below its base, externally sparsely rufous-pubescent or sometimes subglabrate, the rim shortly 5-toothed, the teeth less than 0.5 mm. long and apically acute; corolla lilac or lavender to violet, externally and internally rufous-pubescent, bilabiate, the tube cylindric, 5--6 mm. long, very shortly puberulent or glabrescent, the throat villous, the limb 5-lobed, hairy on both surfaces, the upper (anterior) lip bifid, 5--7 mm. long, broadly spatulate, with narrowly obovate apically rounded lobes, barbate-villous, the lower lip trifid, 3 mm. long, with oblong apically acute or obtuse lobes; stamens didynamous, somewhat exerted; filaments somewhat pubescent, the longer pair about 8 mm. long, the shorter pair about 6 mm. long; anthers divergent in horseshoe fashion, deep-purple; pistil somewhat exerted; ovary obconic, glabrous, somewhat ribbed; fruiting-peduncles yellow-green or the older parts gray-brown, dull, finely and shortly gray-pilose, with lighter elongate lenticels; fruiting-calyx persistent, small, woody; fruit shiny, light-green or greenish to glaucous-green when young and with irregular darker stripes just above the fruiting-calyx, later yellowish-green with brown stripes, finally greenish-red, pale-red, or reddish-purple to black when ripe, round, 2--2.5

cm. long, fetid, bitter, smooth, with broad longitudinal grooves, apically somewhat flattened, with a central mucro, sometimes also with an annular ridge 6 mm. from the apical mucro; endocarp 2--4 mm. thick; seed attached apically; cotyledons thick, collateral; endosperm absent.

Collectors have found this plant growing in freshwater swamps, in primary, secondary, disturbed primary, and dipterocarp forests, primeval alluvial lowland, and tall rainforests, in forest undergrowth, on hillsides, lowland area slopes, low sandy ridges, and in flat or low undulating country, along creeks, and on sandstone, from sealevel to 700 m. altitude, in flower in every month of the year and in fruit from January to October.

Hoogland encountered it in tall secondary forests on sandy soil over boulders about 50--100 cm. above the watertable in Papua. Chai refers to it as "riparian plant among boulders on riverbanks and overhanging streams" in Sarawak. Hoogland, Brass, and Schramm report it as "common" or "rather common" in tall rainforests in New Guinea, where Koster also reports it as a "rather common tree". In Borneo Kostermans likewise reports it as "common". Its wood is reportedly used for timber, especially to make planks. Mair refers to the fruit as a "nut".

The corollas are said to have been "lavender" on Brass 723, "light-violet" or "pale-purple" on Kornassi 743, "mauve" on Foreman & Stocker LAE.60385 and Schodde 2651, "pale-purple" on Hoogland 5061 "violet" on Brass 3837 and Meijer SAN.22592, "blue" on Geneve s.n. and Kornassi 497, "light-blue and white" on Sinanggul SAN.39106, "blue-white" on Rutten 1898, "pale-whitish and blue" on Cudra A.1474, "yellow-purple" on Woerjantoro 67, "light-violet or pale-violet with a blue underlip" on Kjellberg 2746, "whitish-green" on Matusop 7417, "rose-red" on Ramlie 6, "purplish-white" on Seme-roe 17, "white to blue-white, upper lip pale-blue" on Rutten 2066, "very pale purple-white, lower lip purple except for much paler margins" on Hoogland 3275, "central lobe yellow and purple, the others dark-purple" on Sutriano 33, "yellow" on Schramm BW.1653, and "pale-white" on Keith 7122.

Vernacular names reported for this species are: "ampinoi", "aniai", "aticoco", "atikoka", "atikoko", "ballebal", "besoh", "boeloenasoe", "bulunasu", "etak", "gandarua putih", "gading batu" [=ivory-stone], "gragai", "gugba", "gundaroe sapoetih", "insuni", "kamadin", "kaoeba", "kauba", "keram", "kesoi", "koemang", "kokar", "kossij", "kossijdaj", "kossijt", "kotar", "kumang", "lansat behuang", "ludri", "madang paus", "mamanau", "manamu", "manuk-manuk", "mara belioeng", "mara beliung", "medang", "menaru", "mumuni", "pangajen asai", "parrapik", "pirok", "polajopo", "polojopo", "pongoli", "porako", "pudjo", "raenggapi", "rakas rakas", "saluang", "salunapid", "sikukok", "tikoko", "timiri", "tompira molaba" [=white tompira], "tompira poeti", "tompira puti", "wanoe", "wanu", and "wena dahita".

The species is based on *Herb. Hort. Bot. Bogor. IX.D.78* and *IX.D.78a* from a tree cultivated in the Botanical Garden at Buitenzorg, Java; *Koorders 42754b* & *42759b* [*Herb. Hort. Bot. Bogor XL.G.82* & *XL.G.82a*] are said to be spermatophytes. *Vitex merrillii* H. J. Lam is

based on *Fénix s.n.* [Herb. Philip. Bur. Sci. 15906] from Bataan, Mindanao, Philippine Islands, collected in August of 1912, and this is also the type collection of *V. euphlebica* Merr. *Vitex longifolia* Merr. is based on *Hutchinson s.n.* [Herb. Philip. Forest. Bur. 7574] from well-drained flatland forests on the Gibon River, 55 m. altitude, in the province of Surigao, Mindanao, collected in June of 1907. *Vitex flabelliflora* H. Hallier is based on *Jaheri 1539* from Sungei Talut, Penihier, in eastern Borneo, deposited in the Buitenzorg herbarium, and represents the more rufescent-subvelutinous form of the species, perhaps worthy of form rank. The *Teijsmanniodendron glabrum* Merr., often included in the synonymy of *T. bogoriense*, is actually a distinct and valid separate species.

Among the bibliographic errors in the literature of *T. bogoriense* may be mentioned that Bakhuizen (1929) cites the original publication as "sér. 3", page "19, & iv. fig. 2-3". The Fedde & Schuster (1929) reference is mistakenly cited by some authors as "1927", and the Bakhuizen (1922) reference is actually cited by him (1929) as "1921".

Beer & Lam (1936) cite Hallier 3032 and Herb. For. Res. Inst. BB.10504 & 13944 from Borneo, Herb. For. Res. Inst. BB.14274 from Amboina, Rutten 497, 1898, & 2066 from Ceram, and Brass 3837 and Herb. For. Res. Inst. BB.14560 & 15905 from New Guinea. Lam (1922) cites Boschpr. BB.2105 and *Semeroe 17* from Borneo, where, he says, the species grows "vor allem auf nassen Grund und längs Flüssen; kleiner Baum, Blüten violett-weiss, angenehm duftend; Holz wertlos."

Hallier (1918), citing his no. 3032, describes the species as: "Zweige braungrau. Blattstiel und Stiele der 3 Foliola glanzlos hellgrün, am Grunde mit je 1 starken braunen querrissigen Kniegelenk. Blätter glänzend dunkelgrün, mit heller Aderung, unterseits glanzlos hellgrün, mit dunkleren Mittel- und Fiedernerven und dickervigem, engmaschigem dunklerem Nervenetz. Fruchstiele glanzlos gelbgrün, fein und kurzgrau behart, die älteren Theile braungrau, mit helleren langen Lentizellen. Frucht glänzend hellgrün, am Grunde über dem Kelch unregelmässig dunkelgrün längs gestreift."

Kanehira (1942) cites Kanehira & Hatusima 12405, which, he says, "Agrees well with the original description excepting that [it] has glabrous branchlets and petioles, oblong leaves with less numerous lateral nerves and smaller flowers (stamens not didynamous) and fruits". He lists it from Borneo, Amboina, and Ceram.

Backer & Bakhuizen (1965) describe the species as having the "Young branchlets obtusely quadrangular, more or less densely hairy; petiole 1.5--10 cm, wingless; leaflets 2--4, usually 3, elliptic-oblong-lanceolate from a cuneate base, acuminate, coriaceous or papyraceous, shining dark green above, pale green beneath, glabrous on both surfaces, finely gland-dotted, 18--30 cm by 5.5--9 cm; petiolules 0.75--2.5 cm....Panicles lax, more or less densely pubescent, 18--30 cm long; calyx pubescent, c. 3.5 cm long, teeth acute; corolla violet, tube 5--7 mm; upper lip c 3 mm; median lobe of lower lip obovate, 10--11 mm long, lateral ones c. 3 mm; filaments

pubescent; anther-cells divaricating downwards; top of ovary vil-
lous; style c. 4 mm long; fruiting-calyx patent, c. 1.5 cm across;
fruit obovoid, 4--5 mm long." It seems obvious that the calyx
(during anthesis) dimension given in this description is erroneous
-- probably a clerical error for "mm" instead of "cm", a mistake
all too easily made when the metric system is used.

Koorders' (1904) illustrations of this species are excellent
and detailed, including a habit sketch, inflorescence, foliage,
flowers and their parts, seedlings, ovary section, and fruit.

Lam (1921) cites only *Teijsmann 11785* from Celebes. Merrill
(1923) cites *Cortez & Hernandez 24394*, *Fénix 15906*, *Hutchinson*
7574, *Miranda 20583*, *Miras & Oliveiros 24525*, and *Rafael & Ponce*
20752 from Mindanao, Philippine Islands. Hallier (1918) cites
only *Hallier B.3032* and the type collection. Lam (1919) cites
only an unnumbered Hallier collection and *Herb. Lugd.-Bat. 914196*
-88, 89, 90, & 91.

Kostermans (1951) cites the following collections: BORNEO:
Kalimantan: *Abdulhamid 70*, *Atjil 85*, *Pankeij 41*, *Ramlie 6*, *Semeroe*
17, *Van der Zwaan 772 & 1085*. Northeast Borneo: *Elmer 21320 &*
21616, *Matusop 7417*. Sabah: *Hallier B.3032*, *Jaheri 1539*, *Teijs-*
mann s.n. Sarawak: *Richards 2570*. MOLUCCA ISLANDS: Amboina:
Huka 18. Ceram: *Kornassi 743 & 797*, *Rutten 1898 & 2066*. Celebes:
Kjellberg 2746, *Laleno 39* [Boschpr. BB.19434], *Monoarfa 1* [Bosch-
pr. BB.13677], *Teijsmann HB.11785*, *Waturandung 260* [Cel.V.244] &
323 [Cel.V.244]. NEW GUINEA: Papua: *Brass 723 & 3837*. West Iri-
an: *Ilham 6*, *Kanehira & Hatusima 12405*, *Kostermans 180, 215, 312,*
& 2724, *Malessy 1*, *Soehanda & Ilham 38*, *Tetelepta 21*, *Van Eechoud*
10 & 62. NEW GUINEAN ISLANDS: Biak: *Van Dijk 563*. Japen: *Van*
Dijk 11, 69, 210, 277, 290, 308, 314, 325, & 464. CULTIVATED:
Java: *Koorders 42754* ♀.

Material of *T. bogoriense* has been misidentified and distribu-
ted in some herbaria as *T. bogoriense* f. *glabrum* (Merr.) Bakh.,
T. glabrum Merr., *T. pteropodum* (Miq.) Bakh., *Vitex pteropoda* Miq.,
Turpinia rotundifolia, and *Sterculiaceae* sp. On the other hand,
the *Lasan SAN.65646*, *Rundi SAN.43049*, *Sam SAN.61572*, *Singh SAN.*
27456, and *Wing SAN.32581*, distributed as typical *T. bogoriense*,
actually represent var. *pentaphyllum* Mold. and *Elmer 21320 & 21616*
are *T. glabrum* Merr.

Citations: PHILIPPINE ISLANDS: Mindanao: *Fénix s.n.* [Herb. Phil-
ip. Bur. Sci. 15906] (W--900332); *Genove s.n.* [Herb. Philip. For-
est. Bur. 30452] (Ca--324532, N); *D. R. Mendoza 598* [Philip. Nat.
Herb. 42425] (W--2450089, W--2450094); *D. P. Miranda s.n.* [Herb.
Philip. Forest. Bur. 20583] (W--901639); *Miros & Oliveros s.n.*
[Herb. Philip. Forest. Bur. 24525] (W--1293393); *Rafael & Ponce s.*
n. [Herb. Philip. Forest. Bur. 20752] (W--902704). Palawan: *Edaño*
1039 [Herb. Philip. Bur. Sci. 77401] (Ba, Ba, Mi, N). GREATER SUN-
DA ISLANDS: Celebes: *Kjellberg 2746* (Bz--73167, Bz--73168, N, S);
Laleno 39 [Boschbouwr. BB.19434] (Bz--73166); *Monoarfa 1* [BB.
13677] (Bz--73165); *Teijsmann 11785* (Bz--73169, Bz--73170), *H.B.*
11785 (Bz--73171); *Tobing E.264* [BB.24197] (Bz--73172); *Waturandung*
260 [Cel.V.244] (Bz--25641, Bz--73174), *323* [Cel.V.244] (Bz--
73173). Kalimantan: *Atjil 85* [3395; BB.10504] (Bz--73157); *H.*
Hallier B.3032 (Bz--73151, Bz--73152, N, N); *Hamid 70* [BB.12586]

(Bz--73161); *Jaheri 1539* (Bz--73154, Bz--73155, Bz--73156, N--photo, Z--photo); *Kostermans 7555* (Ng--16863), 7577 (N, Ng--16864), 10001 (N), 13886 (N); *Pangkeij 41* [BB.25135] (Bz--73160, Vi); *Ramalie 6* [BB.13944] (Bz--73163, Bz--73164, N); *Semaroo 17* [2505; BB.2105] (Bz--73162); *Zwaan 772* [BB.18518] (Bz--73159), 1085 [BB.19044] (Bz--73158). Sabah: *Binideh NT.94* [SAN.59762] (Id); *Charington SAN.22285* (Sn--40877); *Cuadra A.1474* (W--2187112); *Keith 7122* (W--2187496); *Meijer SAN.22592* (Z); *Muliadi A.843* (W--2210828); *Patrick NT.702* [SAN.39454] (Z); *Sinanggul SAN.39106* (Id), *SAN.57074* (Sn); *J. Singh SAN.31123* (Z); *Talip & Terimiji SAN.68359* (Kl--18428, N). Sarawak: *Chai S.34096* (W--2901359); *Pickles 3731* (W--2377113); *Richards 2570* (Bz--73144); *Soepadmo & Smith S.28200* (Kl--13897). MOLUCCA ISLANDS: Amboina: *Dolleschul s.n.* [Amboina] (V); *Huka 18* [BB.14274] (Bz--73175). Ceram: *Kornassi 497* (Bz--73181, Bz--73182, N, Ut--81116), 743 (Bz--73183); *Rutten 1898* (Bz--73179, Bz--73180), 2066 (Bz--73176, Bz--73177, Bz--73178). Ternate: *Tetelepta 21* [BB.15905] (Bz--73128). NEW GUINEA: North East New Guinea: *Herb. N. G. F. 506* (Ng--6584); *Hoogland 5061* (Ng--8327, W--2214220); *Mair 1801* (Ng--6586); *L. S. Smith 1205* (Ng--6585). Papua: *Brass 723* (Bz--73123), 3837 (Bz--73124, N); *Foreman & Stocker LAE.60385* (Mu); *Hoogland 3275* (A, Ng--16883); *Schodde 2651* (Ba). West Irian: *Eechoud 10* [BB.31074] (Bz--73126), 63 [BB.31125] (Bz--73127); *Ilham 6* [BB.33255] (Bz--73088); *Kanehira & Hatusima 11498* (Bz--73129); *Koster BW.1356* (Ca--90457); *Kostermans 180* [BB.33398] (Bz--73082, Bz--73083), 215 [BB.33423] (Bz--73253), 312 [BB.33499] (Bz--73084), 2724 [BB.33671] (Bz--73089, Bz--73090); *Lundquist 108* [BB.32827] (Bz--72626); *Malesij 1* [BB.14560] (Bz--73125); *Schram BW.1653* (Ng--20217), *BW.1816* (Ng--20105), *BW.1833* (Ng--20212), *BW.1866* (Ng--20197), *BW.2760* (Ng--20216); *Soehanda 6* [BB.33255] (Bz--73087); *Soehanda & Ilham 38* [BB.33285] (Bz--73085, Bz--73086). NEW GUINEAN ISLANDS: Biak: *Van Dijk 563* [BB.30749] (Bz--73130, E--1239959). Japen: *Van Dijk 11* [BB.30237] (Bz--73131), 69 [BB.20294] (Bz--73132), 210 [BB.30431] (Bz--73139, Vi), 277 [BB--30498] (Bz--73133), 290 [BB.30511] (Bz--73134, Um--21118), 308 [BB.30529] (Bz--73135), 314 [BB.30535] (Bz--73136), 325 [BB.30545] (Bz--37137), 464 [BB.30662] (Bz--73138). CULTIVATED: Java: *Bakhuizen 2222* (Ut--24923); *Herb. Hort. Bot. Bogor. IX.D.78* (Bz--26567--cotype, Bz--26568--cotype, N--cotype), *IX.D.78a* (Bz--26569--cotype, N--cotype), *XI.G.82* (Bz--26571--spermatype, Bz--26579--spermatype), *XI.G.82a* (Bz--26572--spermatype); *Herb. Mus. Bot. Upsal. s.n.* [Hort. bot. XI.G.82] (S--spermatype, S--spermatype); *Koorders 42192b* (Bz--25642), 42754b [Herb. Bot. Bogor. XI.G.82] (Bz--73140--spermatype, Bz--73141--spermatype, Bz--73142--spermatype, N--photo of spermatype, Z--photo of spermatype), 42759b [Herb. Hort. Bogor. XI.G.82a] (Bz--73143--spermatype), *s.n.* [Herb. Hort. Bogor. 78.IX.D] (Ca--235860--cotype); *Sutriano 33* [Herb. Hort. Bogor. XI.G.82] (Ba--spermatype, N--spermatype); *Woerjantoro 67* [Herb. Hort. Bogor. XI.G.82] (Ba--spermatype).

TEIJSMANNIODENDRON BOGORIENSE var. *PENTAPHYLLUM* Mold., *Phytologia* 14: 400. 1967.

Bibliography: Hocking, *Excerpt. Bot. A*, 12: 425. 1967; Mold., *Phy-*

tologia 14: 400. 1967; Mold., Résumé Suppl. 15: 12. 1967; Mold., Biol. Abstr. 49: 2290. 1968; Mold., Fifth Summ. 1: 327 (1971) and 2: 911. 1971.

This variety differs from the typical form of the species in having at least most of its leaves 5-foliolate.

It is based on *Cuadra s.n.* [North Borneo Forest Dept. A.877] from rolling land, Compt. 13, Kabili-Sepilok Forest Reserve, Elopura Forest District, Sandakan, Sabah, collected on August 5, 1948, and deposited in the United States National Herbarium at Washington.

Collectors describe the plant as a tree, 40--180 feet tall, the clear bole straight, 15--40 feet high, 1 1/2 to 7 feet in girth, to 35 cm. in diameter at breast height, fluted; crown about 25 feet; outer bark gray or reddish-brown to brown-white, gray-brown, light-black or blackish-brown, or greenish, smooth or scaly, thin, not fissured or only slightly so; inner bark yellow, yellowish, or ochre to red-brown or pale-brown, about 1 cm. thick; cambium brown to light-green; sapwood yellow, pale-yellow, or yellowish to brown or white (or "pale-white"); buttresses to 6 feet long; leaflets shiny dark-green above, dull and paler beneath; flowers fragrant; fruit (immature) yellowish-green. They have found the tree growing in yellow or black soil of secondary forests on hillsides, in sandstone soil of primary forests on riverbanks, in logged-over areas, and on the sides of ridges, at 50--700 feet altitude, flowering in August, and fruiting in May and September.

The corollas are said to have been "whitish" on *Lasan SAN.65646*, "pinkish" on *Sam SAN.61572*, and "green" [error for fruit?] on *Wing SAN.32581*.

Material of this variety has been misidentified and distributed in some herbaria as typical *T. bogoriense* Koord., *T. glabrum* Merr., and *T. pteropodum* (Miq.) Bakh.

Citations: GREATER SUNDA ISLANDS: Sabah: *Cuadra s.n.* [North Borneo Forest Dept. A.877] (W--2187094--type); *Lasan SAN.65646* (Z); *Rundi SAN.43049* [NT.4] (Sn--40876, Z); *Sam SAN.61572* [NT.900] (Z); *Shea & Minjulu SAN.76176* (Sn); *J. Singh SAN.27456* (Ld, Sn); *Termiji SAN.72867* (Sn--47485); *Wing SAN.32581* (Ld).

TEIJSMANNIODENDRON BORNEËNSE Mold., Phytologia 26: 366, nom. nud. 1973; sp. nov.

Bibliography: Mold., Phytologia 26: 366. 1973.

Arbor; foliis plurifoliolatis longipetiolaris; laminis foliolorum distincte petiolulatis ellipticis coriaceis 30--40 cm. longis 11--15 cm. latis basaliter cuneatis marginaliter integris utrinque glabris supra subbullatis subtus pallidioribus; petiolis crassiusculis 7.5--10 cm. longis glabris lenticellatis; petiolulis 2.5--3.5 cm. longis glabris lenticellatis; inflorescentiis axillaribus vel supra-axillaribus erectis ubique dense minuteque puberulis; pedunculis ca 12 cm. longis complanatis minute puberulis apicaliter ampliatis; inflorescentiae ramis erectis 8--9 cm. longis, ramulis paucis parvis plerumque bifructiferis divergentibus vel adscendentibus; fructis pedicellatis, pedicellis ca. 2 mm. longis.

Tree, 20 m. tall; clear bole to 10 m. high, 40 cm. in diameter at breast height; buttresses to 2 m. high, 0.5 m. long, narrow over the ground; bark beige or yellowish, papery, 0.5 m. thick, smooth; living bark dark-yellow, 1 cm. thick; wood pale-yellowish, rather tough; branchlets gray; leaves 3-foliolate, decussate-opposite; petioles stout, 7.5--10 cm. long, glabrous, rather prominently lenticellate, apically and basally ampliate, subterete, somewhat flattened above; petiolules rather stout, 1.5--3.5 cm. long, glabrous, flattened above, rather prominently but sparsely lenticellate; leaflet-blades thickly chartaceous, pale beneath, elliptic, 19--40 cm. long, 7--15 cm. wide, apically acute or short-acuminate, marginally entire, basally cuneately acute, slightly bullate above, glabrous on both surfaces, their articulations gray-brown; inflorescence "whitish-green", terminal on short 2-leaved branchlets about 15 cm. long, long-pedunculate; peduncles flattened, 10--12 cm. long, very finely and obscurely puberulent, apically ampliate like the petioles and there bearing several (3) erect branches, each 8--9 cm. long and densely but minutely puberulent throughout, each branch with a few pairs of short divergent or ascending branchlets, each usually 2-fruited after anthesis; fruits pedicellate, the pedicels about 2 mm. long, green (when immature).

The species is based on *Kostermans* 7555, collected on sandstone on Balikpapan peak (G. Beratus), Borneo, at 640 m. altitude, on July 16, 1953, and is deposited in the Britton Herbarium at the New York Botanical Garden. Thus far it is known to me only from the type collection.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Kostermans* 7555 (Ba--isotype, N--type).

TEIJSMANNIODENDRON CORIACEUM (C. B. Clarke) Kosterm., *Reinwardtia* 1: 80--84, fig. 2 & 3. 1951.

Synonymy: *Vitex coriacea* C. B. Clarke in Hook. fl. Fl. Brit. India 4: 586. 1885. *Vitex n. 13* Hook. f. & Thoms. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 586, in syn. 1885. *Vitex venosa* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 61. 1921. *Teijsmanniodendron coriaceum* Kosterm. apud Ashton, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 188. 1965. *Vitex quinata* var. *fructu majoribus* Ramas, in herb.

Bibliography: C. B. Clarke in Hook. f., Fl. Brit. India 4: 586. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1213. 1895; Brandis, Indian Trees, imp. 1, 504. 1906; Gamble in King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 846. 1908; H. Hallier, Meded. Rijks Herb. Leid. 37: 50. 1918; H. J. Lam, Verbenac. Malay. Arch. 200--201 & 369. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 58 & 61. 1921; Ridl., Fl. Malay Penins. 2: 630--632. 1923; Heyne, Nutt. Plant. Nederl. Ind., ed. 2, 2: 1320. 1927; A. W. Hill, Ind. Kew. Suppl. 7: 252. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1077. 1932; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 431, & 434. 1938; Mold., Suppl. List Comm. Vern. Names 3, 6, 11, 14, 15, 18, & 23. 1940; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 60, 61, 63, & 103. 1942;

Mold., *Phytologia* 2: 118 & 123. 1944; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 1213. 1946; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 129, 138--140, 143, 200, & 203. 1949; Kosterm., *Reinwardtia* 1: 75, 79--84, & 106, fig. 2 & 3. 1951; Anon., *Kew Bull. Gen. Ind.* 293. 1959; Mold., *Résumé* 166, 177, 178, 181, 185, 188, 192, 194, 195, 382, 390, & 460. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 1213. 1960; Ashton, *Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg.* 188. 1965; Mold., *Phytologia* 17: 32. 1968; Poore, *Journ. Ecol. Brit.* 56: 171 & 196. 1968; Corner & Watanabe, *Illustr. Guide Trop. Pl.* 769. 1969; Brandis, *Indian Trees*, imp. 2, 504. 1971; Mold., *Fifth Summ.* 1: 284, 298, 303, 306, 318, 327, & 331 (1971) and 2: 640, 716, 731, & 911. 1971; Mold., *Phytologia* 44: 221--223. 1979.

Illustrations: Kosterm., *Reinwardtia* 1: 81 & 83, fig. 2 & 3. 1951; Corner & Watanabe, *Illustr. Guide Trop. Pl.* 769. 1969.

A treelet, 8--10 m. tall, or medium-sized tree, to 30 m. tall; trunk erect, slender, round in cross-section, to 60 cm. in diameter at breast height; bole to 16 m. high, seldom exceeding 30 cm. in diameter; crown much-branched, very wide-spreading, to 5 m. high; branchlets terete, slender, curvate, the youngest parts puberulous; bark gray to pale-brown or brown, smooth or fissured; inner bark "dirty-blackish" or "pale dirty-ochre"; wood light- or pale-brown; sapwood orange-ochre; heartwood rather durable (durability class II/III) and comparatively strong (strength class II), with a density of 0.73--0.87; leaves 3-foliolate or 1-foliolate on young (to 1 m. tall) specimens; petioles 2.5--5 cm. long, semi-lunate in cross-section, sulcate above, apically and basally incrassate, not alate, glabrous; petiolules usually with distinctly swollen articulations; leaflets oblong or oblong-lanceolate, rigidly coriaceous, apically acute or obtuse, basally acute, marginally entire, glabrous on both surfaces, not glanduliferous or only minutely so beneath, in drying usually gray above and more or less bullate, conspicuously reticulate on both surfaces with the veinlet reticulum thick and prominently elevated beneath, the terminal leaflet 7.7--20 cm. long, 2.7--9 cm. wide, and on petiolules 6.2--13 mm. long, the lateral leaflets 5.3--6.3 cm. long, 2--2.6 cm. wide, and on petiolules 5--6 mm. long; inflorescence axillary (penultimate) or terminal, panicle, the upper ones solitary, the lower ones binary in each leaf-axil, sparsely ferruginous- or fulvous-pubescent, in all 4--15 cm. long, 1.5--7.5 cm. wide, strict, the branches elongate and ascending; peduncles 2.3--6 cm. long; cymes small, opposite, few-flowered, clustered on the elongate panicle-branches, condensed almost to clusters, the lower ones 4 per node (the 2 upper ones larger, 5--12-flowered, 1.5--3 cm. long, on peduncles 0.7--1.8 cm. long, the 2 lower ones smaller, 2--4-flowered, on peduncles 5--7 mm. long), the upper ones binary at each node, small, 1--5-flowered, on peduncles 5--10 mm. long; bracts linear to oblong, 2--4 mm. long, fulvous-pubescent, deciduous; flowers about 8 or 9 mm. long, slightly fragrant or with a not very agreeable scent; calyx subsessile, campanulate or broadly infundibular, 1.5 mm. long, externally sparsely pubescent or subglabrate, the rim

during anthesis conspicuously 5- (rarely 6-) dentate, the teeth deltoid, about 0.5 mm. long, apically obtuse; corolla somewhat zygomorphic and bilabiate, mostly violet or dark-violet with a bright-yellow hairy spot on the inner side of the lower lip, 6--9 mm. long, externally fulvous-pubescent or densely and minutely puberulent except for the lower part, the tube narrowly infundibular, 5--5.5 mm. long, internally glabrous but with a ring of hairs at the stamen insertion, the limb 5-lobed, the upper 4 lobes small, deltoid, 1.5--2 mm. long and wide, apically subacute, pubescent on both surfaces, the lower lobe larger, rigidly barbulate at the middle, 2.5--4 mm. long, 2.5--3.5 mm. wide, venose, marginally irregularly sinuate-undulate; stamens didynamous, 5 and 6 mm. long, inserted about 2 mm. from the base of the corolla-tube, exerted; filaments laterally compressed basally, sparsely fulvous-pubescent; style purple, 1 cm. long, long-exserted; stigma pale-purple, shortly bifid, the lobes horizontally divergent or slightly recurved; ovary cream-color, glabrous; fruiting-calyx enlarged, cupuliform, its rim subtruncate; fruit drupaceous, teretely ellipsoid, about 12 mm. long and 6 mm. wide, yellow or orange-yellow to orange or yellow-brown when immature, black when ripe, glabrous, 1-seeded, the exocarp and pericarp thin.

Collectors have found this plant growing in forests, especially virgin or primary and evergreen forests on mountain slopes, on low sandy hills or sandy ridges, in red, sandy, clay, or granitic-sandy soil, at 5--500 m. altitude, in anthesis and fruit from July to December, as well as in March and April.

The species is based on *Griffith 6065* and *Maingay 1203* from the Malay Peninsula, deposited in the Kew herbarium. The type of *Vitex venosa* is *Grashoff 890* from the Banjuasin and Kubu countries, Palembang, at 20 m. altitude, collected in flower on December 24, 1915.

Kostermans (1951) reports the species common in the higher parts of Banka and Borneo, avoiding "the lower moister parts, as well as the valleys". Seedlings are seen on *Zwaan 172*. The corollas are said to have been "heliotrope-color" on *Grashoff 890*, "purple, base of lower lip yellow inside" on *Zwaan T.411*, and "pale-purple with a dark-yellow spot at base of inside of lower lip" on *Kostermans 10181*. Clarke (1885) asserts that the pistil is "fulvous-pubescent". Burkill (1961) reports the species used to make "a protective medicine after childbirth" and the wood used in Malacca for house construction. He notes that the species is found naturally from Dedah to Singapore in Malaya.

Nomenclature names reported for the species are "bantou" [applied also to *Symplocos*], "boehoenei", "connaropsis laurel", "jali batu", "gading", "kajoe kahomboek gaeling", "kaju gading", "kaju krasak", "kerintjing daoen", "kerintjing daun", "krasag", "krindjing daun talang", "leban", "medang pupoi", "melabumbong", "meryan batu", "rock meryan", "tinjau bloekau", "tindjau blukau", and "urat rusa" [applied also to *Millettia*].

Fletcher (1938) cites *Kerr 7100* from Thailand and gives the species' general distribution as "Burma, Malay Peninsula (type -- Malacca), Sumatra." Lam (1921) gives the distribution only as

"Malay Peninsula". Clarke (1885) cites *Griffith 6065* both under this species and under *Vitex gamosepala* W. Griff., probably indicating a mixture having been distributed under the one number.

A letter to me from Dr. A. Kostermans, dated September 10, 1951, says in part that "*T. coriaceum* was discovered as far as Sangkulirang up north [in eastern Borneo]. It seems to be distributed all along the belt of Quaternary sands, which extends along the east coast of Borneo. Furthermore inland, where this sandy soil is replaced by limestone, it is absent. But it is here where *T. pteropodium* grows, the latter species is absent on the sandy soils." In his 1951 work he cites the following collections: MALAYSIA: Johore: *Derry 1029*. Kedah: *Ridley 5555*. Malacca: *Derry s.n.*; *Goodenough 1285*; *Holmberg 861*. Pahang: *Hamid 5727*. Penang: *Burkill 3287*; *Curtis s.n.*; *Haniff 3735, s.n.*; *Nauen S.F.35847*; *Strugnell S.F.11176*; *Symington S.F.28013*. State undetermined: *Wray s.n.* GREATER SUNDA ISLANDS: Borneo: *Kostermans 4411*. Sumatra: *Batten-Poole s.n.*; *Dorst s.n.* [172.T.I.P.706]; *Grashoff 890*; *Van der Zwaan s.n.* [T.3.P.529, T.411, T.576]; *Verduyn Lunel 8* [T.B.1072]; *Versteegh & Noer Kamal 308* [BB.32232]. LESSER SUNDA ISLANDS: Banka: *Kostermans 756*; *Kostermans & Anta 1337, 1350*; *Oetoei 77* [BB.8060]; *Teijsmann s.n.*

Material of *T. coriaceum* has been misidentified and distributed in some herbaria as *T. hollrungii* (Warb.) Kosterm., *Vitex celebica* Koord., *V. glabrata* R. Br., *V. heterophylla* Roxb., *V. heterophylla* var. *undulata* C. B. Clarke, *V. holophylla* Baker, *V. quinata* (Lour.) F. N. Will., *V. sp.*, and even *Glycosmis* sp. On the other hand, the *Talip SAN.65886*, distributed as *Teijsmanniodendron coriaceum*, actually represents *T. pendulum* Kosterm., while *Pierre 37* is *T. pierreii* Mold., *Corner 31625* and *Elmer 11602* are *Vitex quinata* var. *puberula* (H. J. Lam) Mold., and *Krukoff 4244 & 4339* and *Yates 1609* are *V. urceolata* C. B. Clarke.

Citations: MALAYA: Malacca: *W. Griffith 6065/1* (Cp--cotype, E--photo of cotype, Mu--693--cotype, N--photo of cotype, Pd--cotype, S--cotype, Ut--11512--cotype, Z--cotype, Z--photo of cotype), *s.n.* [Malacca, 1845] (Br). Pahang: *Soepadmo 843* (Ac, Kl--14455). Penang: *Burkill 3287* (Ca--219523); *Haniff 3735* (Bz--73077). Perak: *Scortechini 2082* (N). Singapore: *T. Anderson 183* (Br, Pd). GREATER SUNDA ISLANDS: Celebes: *Heyne 2455* (Bz--23838); *Teijsmann 22* (Bz--23842), *23* (Bz--23843). Kalimantan: *Kostermans 10181* (Ba, N. W--2335694); *Oehoep 3532* [Boschproefst. BB.10912] (Bz--23811, Bz--23812). Sabah: *Meijer SAN.43828* (Ld), *SAN.53314* (Z); *M. Ramos 1869* (Bz--23813, S). Sumatra: *Dorst s.n.* [Boschproefst. 172.T.I.P.706] (Bz--73056, Bz--73057, Bz--73058, Bz--73059, Bz--73060, Bz--73061, Bz--73062); *Grashoff 890* (Bz--73066, Bz--73067, N--photo, Z--photo); *Verduyn Lunel 8* [Boschproefst. TB,1072] (Bz--73063, Bz--73064, Bz--73065); *Versteegh & Noerkamal 308* [Boschproefst. BB.32232] (Bz--73068); *Voogd 502* (Bz--24222); *Zwaan 172* [T.3.P.529] (Bz--73075, Bz--73076), *529* [Thorenaar 3.P.529] (Bz--73071, Bz--73072, Bz--73073, Bz--73074), *576* (Bz--73070), *T.411* (Bz--73069, N). LESSER SUNDA ISLANDS: Banka: *Anta 756* (Bz--72633), *1337* (Bz--72750, Bz--72751),

1350 (Bz--72752, N); *Kostermans & Anta 1337* (Bz--73184, Bz--73185), *1350* (Bz--73186, Bz--73187); *Oetoei 76* [Boschproefst. BB. 8060] (Bz--73080); *Teijsmann 22* (Bz--23865), *s.n.* [Muntok] (Bz--73079), *s.n.* [Soengei-lest] (Bz--73078). LOCALITY OF COLLECTION UNDETERMINED: *Herb. Martius s.n.* (Br).

TEIJSMANNIODENDRON GLABRUM Merr., Univ. Calif. Publ. Bot. 15: 263. 1929.

Synonymy: *Teysmanniodendron glabrum* Merr. ex Kosterm., Reinwardtia 6: 183, fig. 10. 1962. *Teijsmanniodendron bogoriense* f. *glabrum* (Merr.) Bakh. ex Mold., Résumé Suppl. 15: 23, in syn. 1967.

Bibliography: E. D. Merr., Univ. Calif. Publ. Bot. 15: 263. 1929; A. W. Hill, Ind. Kew. Suppl. 8: 234. 1933; Junell, Symb. Bot. Upsal. 1 (4): 98. 1934; Fedde & Schust., Justs Bot. Jahresber. 59 (2): 417. 1939; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 65 (1942) abd ed. 2, 145, 146, & 196. 1949; Kosterm., Reinwardtia 1: 88--90 & 106 (1951) and 6: 166--167 & 183, fig. 10. 1962; Mold., Fifth Summ. 2: 640 & 641. 1971.

Illustrations: Kosterm., Reinwardtia 6: 183, fig. 10. 1962.

A small to large glabrous or subglabrous tree, often burly, to 32 m. tall; trunk straight or crooked, often gnarled, to about 15 cm. in diameter at breast height, girth to 2.3 m.; clear bole to 19 m. high; crown to 10 m.; buttresses to about 1 m. high; bark smooth or scaly to flaky, often excrecently roughened, whitish, grayish, or gray to pale-yellow, brownish-yellow, greenish-brown, or even chocolate, 1.2--2.5 cm. thick; outer bark thin, smooth, white or grayish to pale yellow-gray, pale-brown, pale-yellow, or pale-ochre; inner bark brittle, whitish or yellowish to yellow or yellowish-brown; wood soft, yellowish-tinged or yellowish-white; slash yellow; sapwood white to yellow or brownish; cambium yellow; sap "dirty-blackish"; central pith often rotting away in age; main branches terete, pale, similar to the trunk; ultimate branchlets more or less compressed, 3--5 mm. in diameter, freely re-branched; leaves 3-foliolate, "descending"; petioles terete, 2--6 cm. long, not at all winged; petiolules 1--3 cm. long; leaflets coriaceous, oblong to oblong-elliptic or ellipsoid, often sharply folded or conduplicate, 9--15 cm. long, 4--7 cm. wide, subequally narrowed at both ends, apically distinctly acuminate (the tip often strongly recurved), basally acute, more or less shiny above, much paler or yellowish-green beneath, not glanduliferous, often obscurely pustulate, brown or olive-brown in drying; secondaries 6 or 7 per side, curvate, conspicuous beneath; more or less conspicuous, erect, obtusely oblong stipular appendages at the petiole-base; inflorescence paniculate, the panicles terminal and penultimately axillary in the upper leaf-axils, erect, about 20 cm. long, pedunculate, many-flowered, "pale yellowish-green", their primary branches few (usually 4), to 7 cm. long, flabellate-ly arranged, the younger parts sparsely pubescent; flowers mostly in triads, the 2 lateral ones pedicellate, the central one sessile; terminal peduncles usually 4, as long as the inflorescence itself;

bracts and bractlets lanceolate, about 3 mm. long, apically acuminate, glabrous or subglabrous; calyx cupuliform, about 2.5 mm. long, externally glabrous or subglabrous, the rim dentate, the teeth triangular-ovate, about 0.5 mm. long, apically acute; fruiting-peduncles green and erect; fruit ellipsoid or ovoid-ellipsoid, green or pale-green when immature, later pale-gray to brown or chestnut-color, 2.5--3 cm. long, smooth, glabrous, shiny, apically obtuse, about 2 cm. in diameter, the pericarp about 2.5 mm. thick, subcrustaceous; seed solitary.

This species is based on *Elmer 21320* from near Tawao, Sabah, Borneo. Merrill (1929) notes that "Although the petioles are not at all winged, this, from its fruit characters, is clearly a *Teijsmanniodendron*, and is manifestly closely allied to the type of the genus, *T. bogoriense* Koord. It is distinguished from that species chiefly by its smaller fruits and its glabrous or nearly glabrous inflorescences. It is not impossible that it has been previously considered in *Vitex*; by Lam's arrangement of the species it keys out to *Vitex flabelliflora* Hallier f." Actually, it is most closely related to *T. coriaceum* (C. B. Clarke) Kosterm., from which its stipular appendages at the petiole-bases at once distinguish it. Kostermans (1962) says that "It may be differentiated from *T. bogoriensis* by the smoother leaves (smooth to touch) and also by the wing-like appendages at the petiole base, which are attached only at the base and [are] ligulate in outline. These were overlooked by Merrill and by me." in his 1951 work Kostermans regarded *T. glabrum* as conspecific with *T. coriaceum*. In his 1962 work he cites for *T. glabrum* the following collections: Sabah: *Elmer 21616*; *Herb. Brit. N. Borneo Forest Dept. 7122, A.810, SAN.19226, SAN.21419*. Sarawak: *Richards 2570*. He mistakenly regards *Elmer 21616* as the type collection, when Merrill clearly designated *21320* as the nomenclatural type in his original publication, although, admittedly, the labels accompanying *21616* are inscribed "n. sp."

Collectors have found this species growing in red-brown or dark-black soil, sandy loam, or blackish soil on hillsides, on wooded plains, flat land, and undulating country, in primary forests, at dry forest edges, and on hillside ridges, at 6.5--116 m. altitude, in anthesis in February, May, June, and October, and in fruit in June, August, and October. Brass reports it "common" in rainforests in Papua. Nicholson & Sam report finding a tree of this species with "29 ft. girth breast height", but this hardly seems possible. The corollas are said to have been "white-gray" on *Sinanggul SAN.56228* and "white-green" on *Saikeh & Tuyak SAN.83422*. The stipular appendages at the petiole-base, so characteristic of this species, are not apparent on *Sinanggul SAN.56228* or *Nicholson & Sam SAN.16103*.

The holotype specimen is mixed with at least one leaf of a *Strychnos* species or of something menispermaceous, judging from the leaf venation.

Kostermans (1951, 1962) asserts that Bakhuizen considered this taxon to be a "variety" of *T. bogoriense* Koord., but as yet I have

been able to find evidence only of his regarding it as a "form" of that species.

Material of *T. glabrum* has been misidentified and distributed in some herbaria as *T. bogoriense* Koord., *T. coriaceum* (C. B. Clarke) Kosterm., *T. pteropodum* (Miq.) Bakh., and even as *Blumeodendron tokbrai* Kurz. On the other hand, the *Binidoh* NT.94 [SAN. 59762], *Sinanggul* SAN.39106, and *Singh* SAN.31123, distributed as *T. glabrum*, seem actually to be *T. bogoriense* Koord., *Rundi* SAN. 4304 and *Wing* SAN.32581 are *T. bogoriense* var. *pentaphyllum* Mold., and *Talip* SAN.65886 is *T. pendulum* Kosterm.

Citations: GREATER SUNDA ISLANDS: Sabah: *Aban* SAN.71549 [NT. 235] (Sn--42133); *Arshid* SAN.81284 (Sn--41535), *SAN.82741* (Sn--51167), *SAN.87629* (Sn--55182); *Binson & Bongsu* NT.494 (Sn--63006); *Charington* SAN.24426 (Ld); *Elmer* 21320 (Bi--isotype, Bz--73145--isotype, Ca--312129--type, Du--165427--isotype, Mu--isotype, N--isotype, N--photo of isotype, S--isotype, Ut--86045--isotype, Z--photo of isotype), 21616 (Bi, Bz--73146, Ca--312137, Du--165353, Mi, Mu, N, S, Ut--86141, W--2605907, Z); *Madani* SAN.51670 (Ld); *Meijer* SAN.47231 (Ld); *Nicholason* SAN.21788 (Z); *Nicholson & Bobong* SAN.29859 [NT.1024; Herb. Forest Dept. 40758] (Z); *Nicholson & Sam* SAN.16103 [NT.27; Herb. Forest Dept. 40753] (Ld); *Patrick* NT.814 [SAN.39713] (Z); *Saikheh & Tuyok* SAN.83422 (Sn--51194); *Sinanggul* SAN.56228 (Ld), *SAN.57016* (Z); *Talip & Lakising* SAN.73082 (Sn--52326).

TEIJSMANNIODENDRON HOLLRUNGII (Warb.) Kosterm., *Reinwardtia* 1: 103--105. 1951.

Synonymy: *Vitex simplicifolia* C. B. Clarke in Hook. f., Fl. Brit. India 4: 586. 1885 [not *V. simplicifolia* Oliv., 1875]. *Vitex hollrungii* Warb., Engl. Bot. Jahrb. 18: 208. 1894. *Vitex clarkeana* Gamble in Ging & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra); 845. 1908. *Vitex punctata* Merr. apud H. Hallier, Meded. Rijks Herb. Leid. 37: 51. 1918 [not *V. punctata* Schau., 1847, nor Vahl, 1955]. *Vitex hollrungii* Warb. apud Dop in Lecomte, Fl. Gén. Indo-chine 4: 825. 1935. *Teijsmanniodendron monophyllum* Kurata, Bull. Tokyo Univ. Forests 35: 203, textpl. 2. 1947. *Vitex hollrungii* K. Schum. ex Mold., Résumé Suppl. 3: 42, in syn. 1962. *Teijsmanniodendron hollrungii* Kosterm. apud Whitmore, Guide Forests Brit. Solom. Isls. 204. 1966.

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H. J. Lam in Bakh. & Lam, Nova Guinea 14, Bot. 1: 168. 1924; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1926; Fedde, Justs Bot. Jahresber. 47 (2): 423. 1929; Dop in Lecomte, Fl. Gén. Indochine 4: 825--826. 1935; Mold., Geogr. Distrib. Avicenn. 40. 1939; Mold., Prelim. List Inv. Names 52. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 457. 1941; Mold., Suppl. List Inv. Names 11. 1941; Kanehira & Hatusima, Bot. Mag. Tokyo 56: 116. 1942; Mold., Alph. List Inv. Names 53 & 55. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 1214. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59, 61, 63--67, 75, & 103. 1942; Kurata, Bull. Tokyo Univ. Forests 35: 293. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129, 138--140, 143, 146, 200, & 203. 1949; C. T. White, Journ. Arnold Arb. 31: 113. 1950; Kosterm., Reinwardtia 1: 75--77, 79, 95, 97, 99, 100, & 103--106. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 250. 1953; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 457. 1959; Mold., Résumé 177, 181, 186, 192--195, 198, 199, 202--204, 353, 382, 384, 385, 389, & 470. 1959; G. Taylor, Ind. Kew. Suppl. 12: 141. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1214. 1960; Mold., Résumé Suppl. 3: 42. 1962; Burkill, Dict. Econ. Prod. Malay Penins. 2: 2278. 1966; Whitmore, Guide Forests Brit. Solom. Isls. 142, 148, & 204. 1966; Mold., Résumé Suppl. 17: 13. 1968; Mold., Fifth Summ. 1: 303, 306, 328, 331, 337, 339, & 340 (1971) and 2: 640, 641, 715, 719, 726, 727, & 911. 1971; Hartley, Dunstone, Fitzgerald, Johns, & Lamberton, Lloydia 36: 294. 1973; Farnsworth, Pharmacog. Titles 9 (1): xxvi. 1974; Mold., Phytologia 44: 222 & 223. 1979.

A tree, usually rather small, to 25 m. tall, or shrub-like, to 3 m. tall, or even somewhat scandent, when arborescent with a clear, cylindrical, straight (occasionally crooked) bole to 10 m. high, with thick, steep buttresses to 2 feet long often present; crown usually small and irregular; trunk 6--35 cm. in diameter at breast height, with a girth to 75 cm.; bark smooth or scaly, white or whitish to grayish or gray, soft, concolorous, peeling off in large irregular flakes; outer bark pale- or light-gray; inner bark light-green or yellowish to pale-red or brown; cambium yellow or gray; sapwood white or grayish to yellow; branchlets rather stout, round to rather sharply tetragonal, dark-brown (in drying), the youngest parts usually also deeply sulcate in drying, plainly lenticellate with numerous, very small, elongate, light-colored lenticels, puberulous or minutely pulverulent-puberulent to glabrate; pith large, solid, tetragonal, white; nodes somewhat swollen, very distinctly annulate; principal internodes 3.5--4.5 cm. long; leaves decussate-opposite, 1-foliolate; petioles rather slender, black in drying, mostly about 1.2 cm. long, subglabrate or very obscurely pulverulent, apically plainly articulate; petioles obsolete; leaflets sessile or practically so, the blades firmly chartaceous or coriaceous, dull dark-green or bright-green above, lighter beneath, lanceolate, 15--25 cm. long, 5--13 cm. wide, apically long-acuminate, marginally entire, basally acute or obtuse, glabrous on both surfaces or very obscurely and minutely pulverulent-dotted beneath, conspicuously impressed-punctate or

glandular-dotted beneath, the punctations usually surrounded by a slightly elevated margin; midrib rather slender, flat or slightly subimpressed above, rounded-prominent beneath, nigrescent in drying; secondaries very slender, 15--20 per side, close together, rather straight and ascending or slightly arcuate, rather indistinctly arcuate-joined in many irregular loops near the margins; vein and veinlet reticulation very abundant, all but the finest parts more or less subprominent above, all subprominent beneath; inflorescence axillary (in the uppermost pair of leaf-axils) and terminal, paniculate; peduncles rather stout, 4.5--7.5 cm. long, sharply tetragonal or flattened, brunnescent or nigrescent in drying, rather densely rusty-puberulent or -pubescent, the sympodia similar in all respects but more slender; terminal panicles compound, to 37 cm. long and 4 cm. wide, the branches elongate, with about 4 distant lateral and central cymes, each 13--21 cm. long, ascending, many-flowered, the axillary panicles confined to the uppermost pair of leaf-axils and simple or compound, usually equaling the terminal ones in length; bractlets few, inconspicuous, caducous, linear, 3--5 mm. long, puberulent; prophylla obsolete or very tiny and setaceous; pedicels obsolete or to 1 mm. long and puberulent; flowers fragrant; calyx pale-green to "greenish-black" or "dirty yellowish-green with a pale-yellow tube", fulvous- or rusty-hairy, scaly, dark-brown in age; corolla 2.5 mm. long, bilabiate, with 4 smaller lanceolate lobes and a much larger spatulate one, white to blue or purple, ochraceous-tomentose, the middle lobe of the lower lip usually purple-lilac, basally yellow; stamens didynamous, one pair much longer than the other, yellow; anthers dark-brown; pollen yellowish-white; stigma yellowish-white; fruit spherical or ovoid, to 2 cm. long and wide, at first green, greenish, or bluish-green to dark-green, eventually bluish-black or black when ripe, ochraceous brown or dark-gray in drying, apically depressed, spongy, covered with a yellowish-brown powder.

The corollas are said to have been "white" on Aet 730 and Aet & Idjan 351, "violet and white" on Robinson 1867, "purple" on Bartlett 7160, Dewol & Talip SAN.80369, Native collector 2268, and Pleyte 839, "pink" on Madani SAN.33190, "lilac" on Salverda 30 and Wyatt-Smith s.n., "blue" on Goklin 20, Sales 3731, and Wood 2163, "yellowish" on Ridley 2151, "light-purple" on Yates 2135, "white, basal lobe lilac" on Floyd 6481, "white, lip purplish with a yellow spot" on Leeuwen 11260, "white, lip yellowish with a central lilac spot" on Lam 1224, "creamy-white with pinkish tinge at base of petals" on Royen 3095, "mauve with a pale-yellow spot in the throat" on Corner s.n., "lip blue with whitish hairs, lobes pale-purple" on Versteeg 1025, "lobes pale-cream, throat yellow, lip lilac with a yellow base and pale-lilac center" on Lam 617, "yellowish, with blue lip" on Gjellerup 312a-d, "yellow, lip blue" on Moszkowski 22 & 142, "cream-color, mid-lobe of large lip suffused with mauve" on Walker & White 153, and "lobes greenish outside, cream inside, lip lilac with a yellow base" on Maxwell 78-247.

The species is based on Hollrung 377 from on the banks of the

Daigun River at Hatzfeldhafen, in the former Kaiser Wilhelmsland [Australian New Guinea], collected in fruit in October of 1886, and deposited in the Buitenzorg herbarium. It is the type species of Section *Unifoliolatae* Kosterm., characterized by unifoliolate leaves.

Lauterbach (1900) cites only the type collection and regarded the species as endemic to New Guinea. Actually it is very widely distributed throughout the Malay Peninsula, through Indonesia, to New Guinea and the Solomon Islands. Kostermans (1951) remarks that "The most conspicuous character is the presence of numerous tiny holes (glands) in the lower leaf-surface. These holes are usually surrounded by a slightly elevated margin. In leaf-shape and leaf-texture the species is very close to *T. subspicatum* (Hall. f.) Kosterm, but besides the differences in pilosity of the inflorescence, the gland-holes of the lower leaf-surface are not present in the latter species." He cites the following collections for *T. hollrungii*: MALAYA: Johore: Corner SF.28642, SF.33693, & s.n.; Lake & Kelsall 4059; Ngadiman SF.34711. Pahang: Evans SF.13174; Mohamad SF.17132; Ridley SF.11325. Penang: Ridley 2151. Perak: Curtis 1611 & s.n.; Ridley 7990 & s.n.; Spare SF.36010. GREATER SUNDA ISLANDS: Celebes: Rachmat 792. Kalimantan: Hallier B.134, B.1138; Teijsmann HB.8372, HB.11596, HB.11629; Van Wijk 3; Winkler 3436. Sabah: Sales 3731. Sarawak: Daud & Tachun SF.36085. LESSER SUNDA ISLANDS: Banka: Teijsmann s.n. MOLUCCA ISLANDS: Amboina: C. B. Robinson 1867. Buru: Teijsmann HB.1831. Ceram: Kornassi 878. Sula: Hulstijn 32. NEW GUINEA: Papua: Hollrung 377. West Irian: Janowsky 491; Kostermans 258 [BB.33457]; Lam 617, 1224; Matatula 150 [BB.21941]; Sal-verda 30 [BB.22105]; Teijsmann HB.17470, HB.17471; Versteeg 1025. NEW GUINEAN ISLANDS: Japen: Van Dijk 351. Misool: Teijsmann s.n.

Sparre reports the species as "a common riverside shrub" in Perak, while Corner found it to be frequent in the brackish tidal zone of rivers in Johore. Hartley and his associates (1973) refer to it as a bushy tree in the scrub back of ocean beaches. Whitmore (1966) calls it an "ill-formed tree in well-drained lowland forests" and refers to it as an "uncommon small tree in coastal swamps" in the Solomon Islands.

The *Vitex punctata* of Schauer and that attributed to Vahl, referred to in the synonymy (above), are synonyms of *Vitex cofassus* Reinw. The *V. holophylla* Baker and *V. subspicata* Hall. f., often included in the synonymy of *T. hollrungii*, actually belong to that of *T. holophyllum* (J. G. Baker) Kosterm. and *T. subspicatum* (H. Hallier) Kosterm. respectively.

The King & Gamble (1908) citation in the bibliography of *T. hollrungii* (above) is often cited as "1909" and that of Schumann & Lauterbach (1900) and "1901", apparently in error.

Collectors have encountered *T. hollrungii* in black, brownish, sandy, and swampy soil in freshwater or brackish swamps, albatross rookeries, coastal swamp forests, primary and secondary forests, open places in mixed dipterocarp forests, on plains and flatlands,

in riverside thickets,, on freshwater or tidal to brackish riverbanks, and "near beaches, almost among the mangroves", at altitudes of from sealevel to 335 m., in anthesis from October to February and April to August, in fruit from May to March. Floyd mistakenly describes the fruit as a "pome" and reports the species "not used" by the natives of New Britain.

Vernacular names recorded for the species are "bundo", "entabuloh", "fufufu", "kaju(ta)kolok ampit", "kaporan", "kapor kaporan", "kapur kapur-ran", "kolok ampib" [=head of ricebird], "luhampit", "lulu", "luluka", "matatari", "mempisang", "metatari", "pokok rusa", "sagotby", "sĕmantoh", and "tjĕndĕnĕkerĕ".

Clarke (1885) comments that "Wight supposed this to be *Vitex macrophylla* R. Br. (now removed to *Gmelina* by Bentham); and it is so very like it, except in having narrow leaves, that it appears unnatural to refer the two plants to different genera." White (1950) says "I would regard it as intermediate between *Gmelina* and *Vitex* as it has the single leaves of the former and the flower of the latter genus. The fruits are also very distinctive. I hesitate to make a new genus, however, as Lam (.....1919) and later Lam and Bakhuizen van den Brink (.....1921) who have seen much material are content to leave it in *Vitex*. [In their] conception of the species it has a wide range from Malacca through the Malay Archipelago to New Guinea and the Solomon Islands."

Hallier (1918) avers that the fruit is "kugelig, 2 cm dick, am Grunde kurz birnförmig verjüngt, von gelbbraunen Mehl bedeckt." He cites Hallier B.134 & B.1138, DeVriese s.n., and Teijsmann 11429 from West Borneo, Korthals s.n. and Winkler 3436 from Southeast Borneo, DeVriese s.n. from Buru, and Hollrung 377 and Versteeg 1025 from New Guinea.

Hartley and his associates (1973) cite for *T. hollrungii* their nos. 10433 & 11074. White (1950) cites only Walker & White B.S.I.R. 153 from the Solomon Islands. King & Gamble (1908) cite King's Collector 8788, Ridley 7990, and Scortechini 1383 from Perak, Griffith 6046 from Malacca, Lake & Kelsall s.n. from Johore, Beccari 166, Haviland 1580, and Motley 1269 from Borneo, and Curtis 1611 from Pangkore Island (in the Dinding Islands).

Lam (1919) cites only Teijsmann 1831 from Buru and Gjellerup 312 and Moszkowski 22 & 143 and Riggenbach 22 from New Guinea. He distinguishes *Vitex clarkeana* and *V. hollrungii* as follows:

1. Midlobe of lower corolla-lip twice as long as the lateral lobes, undulate.....*V. clarkeana*.
- 1a. Midlobe of lower corolla-lip five times as long as the lateral lobes, entire..... *V. hollrungii*.

Dop (1935) cites only Pierre s.n. from Cochinchina, but gives the species' overall distribution as Malacca, Sumatra, Banka, Borneo, Celebes, the Molucca Islands, and New Guinea. Ridley (1923) cites the species from "Riverbanks, Johor, Sungei, Sembrong (Kelsall), Pahang, Pekan, Pianggu, Endau (Evans), Muar, Sungei Pauh (Fox). Dindings, Pangkor (Curtis); Bruas; Telok Sera. Perak, Bernham River (Kunstler).

Lam (1921) cites Teijsmann s.n. from Banka, Jaheri s.n. and Teijsmann 8372 from Borneo, Vuuren 792 from Celebes, Robinson 1867

from Amboina, and *Jaheri s.n.* & *Teijsmann s.n.* from New Guinea. He notes that "The synonymy still seems somewhat doubtful as regards to *V. subspicata* and *V. holophylla* [especially the former species has leaves which do not exactly conform with those of *V. Hollr.*, being more gradually acuminate. It seems, however, rather probable that all these forms belong to a single species with a large extension; it may be that it is rather polymorphic, but in the materials extant at present, we could not separate any distinctly distinguishable forms, the extremes (as e.g. *V. subspicata* and the type of *V. Hollrungii*) being joined by a uninterrupted series of transition forms." In spite of this, I agree with Kostermans in maintaining three separate species here.

Material of *T. hollrungii* has been misidentified and distributed in some herbaria as *T. holophyllum* (J. G. Baker) Kosterm., *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Vitex holophylla* Baker, *V. punctata* Schau., *Lagerstroemia flos-reginae* Retz., *Lagerstroemia* sp., *Anacardiaceae*, and *Terebinthaceae*. On the other hand, the *Beccari llll*, distributed as *T. hollrungii*, actually is *T. holophyllum* (J. G. Baker) Kosterm., *Pierre 37* is *T. pierrei* Mold., *Chai & al. s.n.* [Herb. Sarawak Forest Dept. S.33142] is *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Chai S.34719* is *T. subspicata* (H. Hallier) Kosterm., *Hoogland 3405* and *Hoogland & Macdonald 3422* are *Gmelina dalrympleana* var. *schlechteri* (H. J. Lam) Mold., and *Bourne & Bourne 2328* is *Vitex cofassus* Reinw.

Citations: MALAYA: Johore: *Corner 28187* (Mi), *28642* (Bz--73230), *33693* (Bz--73231); *Maxwell 78-247* (Ac). Perak: *Sparre 36010* (Bz--73232). GREATER SUNDA ISLANDS: Celebes: *Rachmat 792* (Bz--73103, Bz--73104, Bz--73105). Kalimantan: *Endert 1431* (Bz--72631); *H. Hallier B.134* (Bz--25707, Bz--73111), *B.1138* (Bz--73112); *Herb. Bogor. 73106* (Bz); *Matatula 157* [BB.21948] (Bz); *Salverda 30* [BB.22105] (Bz); *Teijsmann 11596* (Bz--73115, Bz--73116), *11629* [Herb. Hort. Bot. Bogor. 1798 b & c] (Bz--73110), *HB.8372* (Bz--73113); *Van Dijk 3* (Bz--73107, Bz--73108); *Winkler 3436* (Bz--73109). Sabah: *Ampuria SAN.36492* (Sn--40879); *Apostol s.n.* [D. D. Wood 2163] (Ca--268910); *Banang SAN.52006* [NT.39] (Sn--40884); *Brand SAN.25286* (Z); *Dewol & Talib SAN.80369* (Sn--50441); *Goklin 20* [D. D. Wood 1845] (Ca--244290); *Madani SAN.33190* (Sn, Z); *Meijer SAN.22620* [Herb. Forest Dept. 40765] (Z), *SAN.25148* (Ld); *Sales 3731* (Bz--73117, Ca--347007); *Sinanggul SAN.57450* (Z); *Taha 3897* [field no. 487] (Ca--347183, Pd); *Wyatt-Smith s.n.* [Kepong field no. 80278] (W--2210608). Sarawak: *Beccari 166* (Mu--1535, N--drawing, S. V); *Chai S.34719* (Z); *Hose 331* (N--photo, Ph, Z--photo); *Native collector 359* (N--photo, Ph, W--1290519, Z--photo), *2668* (Ph, W--1290870). Sumatra: *H. H. Bartlett 7160* (Mi, Mi, N, W--1552136); *Teijsmann 11629* [1798a] (Bz--73114, N); *Yates 2133* (Bz--73120, Ca--300516, Mi, N). LESER SUNDA ISLANDS: Banka: *Teijsmann s.n.* (Bz--73118, Bz--73119). MOLUCCA ISLANDS: Amboina: *C. B. Robinson 1867* (Bz--73097, N, W--775253, W--1294191). Buru: *Teijsmann HB.1831* (Bz--73098, Ut--11561, Ut--11562). Ceram: *Kornassi 878* (Bz--73099, Ut--80736). Mangle: *Hulstijn 32* (Bz--73100, Bz--73101, Bz--73102). NEW GUI-

NEA: North East New Guinea: *Hollrung* 377 (Bz--73196--type, Mb--isotype, N--photo of isotype, N--photo of type, Z--photo of isotype, Z--photo of type). Papua: *Jaheri s.n.* [11/4/1901] (Bz--73188, Bz--73189, Ut--58723). West Irian: *Aet* 730 (Ba, Bz--72753, Ng--16949); *Feuilletau de Bruyn* 866 (Ut--80738); *Janowsky* 491 (Bz--73191, Bz--73192, Bz--73193, Bz--73194, Bz--73195); *Kos-termans* 258 [BB.33459] (Bz--73204, Bz--73205); *H. J. Lam* 617 (Bz--73198, Bz--73199, Bz--73200, Bz--73201, Bz--73202, Bz--73203, Ca--234900, Ut--80739), 1224 (Bz--25660, Bz--73197, N, Ut--80737); *Leeuwen* 11260 (Ng--16928); *Matatula* 150 [BB.21941] (Bz--73211); *Pleyte* 839 (Ng--16948); *Royen* 3095 (Ng--16940); *Teijsmann* 17470 (Bz--73206, Bz--73207, Bz--73208), 17471 (Bz--73209, Bz--73210); *Versteeg* 1025 (Bz--25661, Bz--73190, Ut--13191). NEW GUINEAN ISLANDS: Japen: *Aet & Idjan* 351 (Bz--72629, Bz--72630), 705 (Bz--72627, Bz--72628). Misool: *Pleyte* 839 (Bz--72632, Er, N); *Teijsmann s.n.* (Bz--73293, Bz--73294). BISMARK ARCHIPELAGO: New Britain: *Floyd* 6481 (Ng, Ng--16919). SOLOMON ISLANDS: New Georgia: *Maenu'u s.n.* [Herb. Brit. Solom. Isl. Prot. 6454] (W--2578871). CULTIVATED: India: *Herb. Madras* 2328 (N).

TEIJSMANNIODENDRON HOLOPHYLLUM (J. G. Baker) Kosterm., *Reinwardtia* 1: 97--99, fig. 4. 1951.

Synonymy: *Vitex holophylla* J. G. Baker, *Kew Bull. Misc. Inf.* 1896: 25--26. 1896. *Teijsmanniodendron holophyllum* Kosterm., *Gard. Bull. Singapore* 17: 8. 1958. *Teijsmanniodendron holophyllum* Mikil, in herb.

Bibliography: J. G. Baker, *Kew Bull. Misc. Inf.* 1896: 25--26. 1896; *Thiselt.-Dyer*, *Ind. Kew. Suppl.* 2: 194. 1904; *Gamble* in *King & Gamble, Journ. Asiat. Soc. Beng.* 74 (2 extra): 844--845. 1908; *H. J. Lam, Verbenac. Malay. Arch.* 176--177. 1919; *H. J. Lam* in *Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3*, 3: 52. 1921; *Ridl., Fl. Malay Penins.* 2: 631--632. 1923; *Kosterm., Reinwardtia* 1: 75, 80, 96--99, & 106, fig. 4. 1951; *Mold., Résumé* 181, 191, 194, 384, & 470. 1959; *G. Taylor, Ind. Kew. Suppl.* 12: 141. 1959; *Mold., Résumé Suppl.* 3: 24 (1962) and 18: 8. 1969; *Mold., Fifth Summ.* 1: 306 & 328 (1971) and 2: 719 & 911. 1971; *Mold., Phytologia* 44: 222. 1979.

Illustrations: *Kosterm., Reinwardtia* 1: 98, fig. 4. 1951.

A tree, 8--26 m. tall; clear bole straight, to 19 m. high; crown 5.5--10 m.; trunk to 43 cm. in diameter at breast height; girth 1--2 m.; bark smooth or somewhat scaly, corky, brittle, about 1.25 cm thick, mostly dark-green or the outer bark gray, grayish, or whitish to pale-yellow or pinkish-brown, smooth or flaky; inner bark green or greenish to yellowish, yellow, or pale-brownish; wood medium-hard; sapwood white to pale-yellow or yellow; branchlets slightly pubescent or hirsute to glabrous (in age); leaves unifoliolate; petioles 2--6 cm. long; leaflet-blades usually slightly bullate, not pitted beneath, basally rounded, pilose-tomentose beneath when young, glabrous in age; secondaries 6--10; inflorescence usually with 2 lateral and subopposite

spreading branches near the base, hirsute to subglabrous; flowers pedicellate; fruiting-calyx urceolate, the rim dentate, the teeth reflexed; corolla usually beautifully deep-purple or white, velvety; fruit dark-green or greenish-brown when young, dark-brown or bluish when mature, 2--2.2 cm. in diameter.

This species is based on *Greagh s.n.* and *Low s.n.* from Sandakan, Borneo, deposited in the herbarium of the British Museum (Natural History) in London.

Collectors have found the species growing in primary or secondary forests, on hillsides or ridge-tops, along the sides of rivers, and in virgin jungles, in sandy, dark-brown, blackish, or black, sometimes ultrabasic, stony soil, at altitudes of 70--265 m., in anthesis in February, March, June, and September and in fruit in June, July, and September.

The corollas are said to have been "white" on *Ambullah SAN. 36054*, "whitish" on *Gibot NT.431*, and "purplish" on *Sundaling SAN. 78454*.

The Gamble (1908) reference in the bibliography (above) is often cited as "1909". *Teijsmanniodendron holophyllum* var. *pubescens* Mold. is a synonym of *T. sinclairii* Kosterm.

On the Buitenzorg sheet of *Henderson 20408* Kostermans has noted "If this specimen is indeed conspecific with *Vitex holophylla* Baker, it should be called *Teijsmanniodendron holophyllum* (Baker) Kosterm., nov. comb. It is distinct from *Vitex subspicata* Hallier [= *Teijsmanniodendron subspicatum* Kosterm.] because: 1. branchlets pilose, 2. flower stalked, 3. calyx urceolate and teeth reflexed."

Gamble (1908) cites, besides the type collection, *Ridley 4031* from Johore and *Beccari llll* from Sarawak. Lam (1921) includes *Vitex holophylla* in the synonymy of *T. hollrungii*, although in his 1919 work he kept it distinct. Kostermans (1951) cites the following collections: MALAYA: Johore: *Lake & Kelsall SF.4031*. GREATER SUNDA ISLANDS: Anambas: *Henderson SF.20408*. Kalimantan: *Jaheri s.n.*; *Zwaan 609* [BB.12144].

Material of *T. holophyllum* has been misidentified and distributed in some herbaria as *T. hollrungii* (Warb.) Kosterm. and *Vitex subspicata* H. Hallier. On the other hand, the *Banang SAN.52006*, distributed as *T. holophyllum*, actually is *T. hollrungii* (Warb.) Kosterm., *Meijer 37424* and *Talip SAN.52795* are *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Chai SAN.21641*, *26651*, *29346*, *29798*, & *29799*, *Martyn SAN.21619*, and *Mikil SAN.28097* are *T. simplicifolium* Merr., *Leopold & Henry SAN.48580* [TN.253], *Mikil SAN.46647* [Herb. Forest Dept. 40847], *Nicholson SAN.28829*, *Sam SAN.28834*, and *J. Singh SAN.34721* [NT.332] are *T. simplicifolium* var. *kostermansi* Mold., *Sinanggal SAN.39981* is *T. smilacifolium* (H. H. W. Pearson) Kosterm., and *Meijer SAN.39328* is the type collection of *T. subspicatum* var. *parvifolium* Mold.

Citations: GREATER SUNDA ISLANDS: Anambas: *M. R. Henderson 20408* (Bz--73229, N). Kalimantan: *Beccari llll* (Bz--73225, Bz--73226, Mu--1533, N--drawing, N--photo, S, V, Z, Z--photo). Sabah: *Ambullah SAN.36054* (Ld), *SAN.36086* (Z); *Beneng NT.39* [Herb. Forest Dept. 52006] (N); *Dewol S. & Alexius M. SAN.88377* (Sn--56282);

Donggop & Gombio SAN.81759 (Sn--47886); *Gibot NT.431* [Herb. Forest Dept. Sandakan 61846] (Z); *Mujin SAN.39226* (Ld); *Sin SAN.58106* (Ld); *Sinanggul 58105* [SAN.41654] (Z); *Sundaling SAN.78454* (Sn--47936); *Talip 52795* (N), *SAN.54780* (Sn); *Talip & Termiji SAN.62427* (Sn--40785).

TEIJSMANNIODENDRON KOSTERMANSI Mold., *Phytologia* 4: 57. 1952.

Bibliography: Kosterm., *Reinwardtia* 1: 95. 1951; Mold., *Phytologia* 4: 57. 1952; Mold., *Résumé* 194 & 470. 1959; G. Taylor, Ind. Kew, *Suppl.* 12: 141. 1959; Mold., *Fifth Summ.* 1: 328 (1971) and 2: 911. 1971.

A tree; branchlets slender, rusty-pubescent when young, glabrous in age; dead bark smooth, gray, about 0.5 mm. thick; living bark about 7 mm. thick, yellow in cross-section; sapwood white; heartwood lacking; principal internodes 6--10 cm. long; nodes swollen, annulate, very distinctly articulate; leaves 3--5-foliate; petioles medium-stoutish, 3--5.5 cm. long, rusty-pubescent, deeply carinate or canaliculate above; petiolules stout, 1--2 cm. long, rusty-pubescent, basally amplate, canaliculate above; leaflet-blades subcoriaceous, light-green on both surfaces, obovate-oblong, 8--20 cm. long, 3--10 cm. wide, apically short-acute or short-acuminate (the tip itself obtuse), marginally entire, basally acute or cuneate, smooth and glabrous (except for the midrib) above, drying dull-gray, very densely rusty-pilose or -pubescent beneath; midrib flat above, strongly prominent beneath; secondaries slender, 4--7 per side, flat and obscure above, prominent beneath and arcuate-ascending, not anastomosing; tertiaries rather few, loosely reticulate, the reticulation indiscernible above, the larger portions prominulous beneath, abundant; flowers and fruit unknown.

The above description is taken, in large part, from Kostermans (1951) who recognized the new species but refrained from formally naming it because of the lack of flowering and/or fruiting material. It is fitting and proper that it be named in his honor. He comments that the species "Differs from the other species of this section [*Plurifoliolatae* Kosterm.] in the dense rusty tomentum of the lower leaf-surface".

The species is based on *Lot Obi 75* [BB.10495] from near Matara Djañ, at 100 m. altitude, in the Puruktjañ Subdivision, southern Kalimantan, Borneo, deposited in the Buitenzorg herbarium. The collector notes that it is a rare tree at the type locality, the local vernacular name for it being "kohokontak". The species is thus far known only from the original collection.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Obi 75* [3386; BB.10495] (Bz--73271--type, Bz--73272--isotype, N--isotype, N--photo of type, Z--photo of type).

TEIJSMANNIODENDRON NOVO-GUINEENSE (Kaneh. & Hatus.) Kosterm., *Reinwardtia* 1: 103 [as "*novoguineense*"]. 1951.

Synonymy: *Vitex novo-guineensis* Kaneh. & Hatus., *Bot. Mag. Tokyo* 56: 116--117, fig. 8. 1942. *Vitex novo-guineensis* Kaneh. & Hatus. ex Kosterm., *Reinwardtii* 1: 103, in syn. 1951. [to be continued]

NEW TUBER-BEARING SOLANUM FROM COLOMBIA

By C.Ochoa(I)

SOLANUM CACETANUM Ochoa sp.nov.

Herbaceum, tuberiferum. Plantae usque ad 1.20 m vel plus altae, robustae, caules basi profunde pigmentati, atrovio-
lacei, basi circiter 2 cm crassi, simplici, vel ramifi-
ficati, erecti aut procumbenti, glabri atque alati; alae
laete, virides, rectae aut sinuatae, 1 mm latae. Stolo-
nes 3-4 m longo, usque ad 5 mm crassos, albi, plerum-
que subterranei, nonnumquam plus minusve partim supra
terram adscendentes et novam plantam producentes, vel
tubera longa, subcylindrica aut ovalia alba, 4-5 cm lon-
ga, gesta. Folia profunde viridia, imparipinnata, 24-
28-35 cm longa, 13-16-20 lata, 4-5-juga et 2-6 foliolis
interjectis instructa, petioli 4-9 cm longi; foliola an-
guste elliptico-lanceolatae, apice acuto, subacuminato
aut acuminato, opaca, obscure viridia, supra pilis paucis
et infra minus dense obtecta, pallide viridia. Foliolum
terminale 7.0-9.5 x 2.7-3.7 cm, basi cuneatum vel subcu-
neatum. Foliola lateralia primi jugis 6.0-9.0 x 2.3-3.5
cm, inaequilatera, sessilia aut brevissime petiolulata;
folioli secundi jugis similia vel sensim majora 7.0 -
9.5 x 2.4-3.2 cm basi oblique rotundata, petiolulo 3-4 mm
longo, petioluli ab primo jugo usque ad penultimo longi-
tudine gradatim majora, penultimi jugi 18-22 mm longa. Fo-
liola pseudostipulacea asymmetrica anguste elliptico-
lanceolata aut subfalcata, 10-15 x 6-8 mm. Inflorescentia
terminales aut lateralis, cymoso-paniculata vel cymosa,
7-10-flora vel plus, pedunculi 5-6 cm longi, 1.5 mm cra-
ssi, subpigmentati, glabrescenti; pedicelli brevi, valde
pigmentati, in medium vel paulo subtus articulati. Calyx
5 mm longus, colore obscure violaceo (fere nigro) pigmen-
tatus, tamquam pedicelli glabratus, lobi late elliptico-
lanceolati, apice breviter acuminati. Corolla rotata, alba
12-16 mm diam., stella luteo-viride. Columna antherarum
asymmetrica, parva, conico-elliptica, antherae 4 mm lon-
gae, anguste lanceolatae, basi cordatae, filamenta 0.5-
0.8 mm longa, alba, pilis brevibus perpauca instructa.
Stylus 6.5-7.0 mm longus, 1.5 mm exsertus, basi usque
ad 1/3 dense papillosus, stigma capitatum, parvum. Ova-
rium longum conicum. Fructus longi conici, apice acuti,
virides (solum immature videbam). Species ad seriem Coni-
cibaccatam pertinet. COLOMBIA: Departamenti Caquetá, //
(I) Taxonomy Department, CIP, P.O. Box 5969, Lima-PERU.

orientis Alaska montis, circa Villa Cludia, 2700 m supra mare, in habitat nemoralibus, collectum C.Ochoa 14117, Julius 25, 1980. HOLOTYPE: In Herbarium Ochoanum. ISOTYPUS: CIP.

SOLANUM OROCENSE Ochoa sp.nov.

Herbaceum, tuberiferum?. Plantae 50-70 cm vel plus altae caules 3-6 mm crassi pilis albidis pluricellularibus ob-
siti, caules cylindrici, alati, alas rectas, perangustae, difficiliter perspiciendis. Folia imparipinnata 6.4-9.0 x 4.2-6.5 cm, 3-4-juga foliolis lateralis et 2-6 foliolis interjectis, foliola in utraque pagina etiam rachis et petioli pilis brevissimis dense praedita, foliola facie superiore densissime obtecta et velutina; pili flavi vel straminei, foliola anguste elliptico-lanceolatae, subsessilia vel brevissime petiolulata. Foliolum terminale lateralibus primi et secundi jugis solum paulo majus, 3.3-4.7 x 1.2-1.4 cm apice conspicue acuminatum, acumen longum acutum basi rotundatum. Foliola primi jugis 2.6-3.8 x 0.8-1.0 cm, apice acuminata, acumina acuta, longa, basi rotundata, petioluli 1-2 mm longi, vel basi oblique rotundata, Foliola secundi jugis similia sed ultimi jugis visibiliter minora. Folia pseudostipulacea late falcata 5-6 x 3.0 mm. Inflorescentia cimosa 7-10-flora, pedunculus tenuis 3-4 cm longus, basi 1-2 mm crassus, densissime pilosus tamquam pedicelli et calyx, pedicelli 1/3 supra articulati, pedicellus superior 7-8 mm longus, inferior 18-22 mm longus. Calyx parvus 3-4 mm longus, lobi late elliptico lanceolati, apice apiculati. Corolla rotata, 12-16 mm diam alba; antherae elliptico-lanceolatae, 2.8-3.2 mm longae, basi cordatae, filamenta longa, 1.5-2.5 mm, glabra, albida stylus 7 mm longus, 2 mm exsertus. Ovarium longum conicum. Fructus longi, conici, apice acuti, flavido virides 12-15 mm longi, basi 6-7 mm crassi solum immaturi videbam. Specie ad seriem Conicibaccata pertinet. COLOMBIA: Vecinitatis Departamentis Norte de Santander et Cesar, Jurisdicciones, Montis Oroque, 3700-3900 m supra mare, collectum Hernando García Barriga et R. Jaramillo M. 20724, Julius 22-27, 1974 HOLOTYPE: COL. ISOTYPUS: Herbarium Ochoanum.

SOLANUM SUCUBUNENSE Ochoa sp.nov.

Herbaceum, tuberiferum. Plantae 40-60 cm altae, caules plerumque simplices, graciles, 5 mm vel plus crassi, anguste alati, alae rectae, pilis albis sparsis praediti. Stolones longos, 1-2 mm crass, albid, tubera alba 2.5-3.0 cm longa, ovalia. Folia imparipinnata 14.0-20.0 x 6.0

-12.0 cm, 2-3-juga foliolis lateralis et 2-4 foliolis interjectis; petioli 4-7 cm longi, supra sparse pilosi sicut rachis, foliola elliptico-lanceolata, superne obscurius viridia, atque raro pilosa quam subtus, pilis brevioribus densioribusque praedita. Foliolum terminales apice acutum vel subacuminatum, basi rotundatum, 5.5-7.0 x 2.2-3.5 cm. Foliola primi jugis 5.2-5.8 x 2.3-2.5 cm, apice acuto aut subacuminato, aut paulo oblique rotundata, petiolulo 1.5-2.0 mm longo. Foliola secundi jugis 2.3-5.0 x 1.3-1.7 cm, ultimi jugis (num quando adsunt) visibiliter minora suborbicularia atque sessilia, foliola interjecta 2-4 mm longa, suborbicularia vel late elliptica, membranacea. Folia inferiora prope basim fere simplices aut foliola duo, 2 mm longa gerentes. Foliolum terminale late elliptico aut suborbiculato 6.0 x 5.0 cm. Inflorescentia cymosa 6-8-flora, pedunculus 10-12 cm longus, basi 2 mm crassus, sparse pilosus tamquam pedicelli et calyx. Pedicelli $1/3$ supra articulati, pedicellus superior 6 mm longus, inferior 15-20 mm longus; calyx 5-6 mm longus, lobi late elliptico-lanceolati, acumina brevissima. Corolla violacea, rotata, 3 cm diam. Columna antherarum cylindrico-conica, antherae 5.5-6.0 mm longae, anguste lanceolatae, basi cordatae, filamenta 0.6-1.0 mm longa, alba, in angulis interfilamentis pilosi stylus 8.5 mm longus, 2.5 mm exsertus, basi usque ad $2/3$ papillis dense obsitus, stigma capitatum, styli apice vix crassius; ovarium longum conicum. Species ad seriem Conicibaccata pertinet. COLOMBIA: Departamenti Cauca, Macizo Colombiano, Valle de Las Papas, vecinitatis Valencia, Los Andes, 2910 m supra mare, circa ripa Rio Sucubun, collectum Idrobo, Pinto et Bischler 3821, Sept.11-21, 1958. HOLOTYPUS: COL.

BOOK REVIEWS

Alma L. Moldenke

"McGRAW-HILL MODERN SCIENTISTS AND ENGINEERS" Volume 1 A--G, Volume 2 H--O, Volume 3 R--Z, compiled by Sybil P. Parker, Editor-in-Chief and staff, x & 465, vii & 449 and vi & 452 pp., artist-retouched photographs for almost all entries. McGraw-Hill Book Co., New York, N. Y. 10020. 1980. \$110.00 slipcased.

Under much the same editorship this publishing house recently produced the fine McGraw-Hill Encyclopedia of Science & Technology. Rearranging this material according to the doers rather than the deeds and still cross-referencing them very effectively is the achievement of this trio of volumes. Thus the valuable content is made easily accessible to many more hunters of information. Still earlier the biographical forerunner of this work was the 2-volume sexist-titled "Modern Men of Science". With about 300 new entries, with revisions of about half of the original articles and with topical (26 botanists) and analytical indexes, "McGraw-Hill Modern Scientists and Engineers" is limited to 20th Century workers, including more than 200 Nobel Prize Winners, men and women, from the United States and abroad.

School, public, institutional, technical, and newspaper libraries the world over could use both of these works to good advantage.

"ANNUAL REVIEW OF PLANT PHYSIOLOGY" Volume 31, edited by Winslow R. Briggs, v & 724 pp., 66 b/w fig., 57 photos & 13 tab. Annual Reviews Inc., Palo Alto, California 94306. 1980. \$17.00 U.S.A., \$17.50 elsewhere.

The biographical prefatory chapter by Anton Lang is very interesting, as these professionally autobiographical surveys typically are. Especially for those folks who, as various kinds of biologists, know something of the scientific contributions of these honored writers but have not known them personally or professionally, these prefatory chapters serve to flesh out their bones and years as well as ideas. Lang's comments on the U. S. higher educational system are important to consider. The 21 well prepared and documented papers include such topics as: efficiency of symbiotic N_2 -fixation in legumes, light-regulating of chloroplast enzymes assuring that "each pathway is fully active only during the time of greatest need", leaf senescence showing that "the diversity of living things is matched by the variety of deaths that await them", temperature response of photosynthesis which indicates that the C_4 pathway "evolved polyphyletically in hot and water-limited environments", plastid replication in which chloroplasts specialized for light

harvesting are given their "due" as "the most important organelles of biology as they are the ultimate source of most of our past and present fuel and of our current food supplies."

"HOW GRASSES GROW" Second Edition, by R. H. M. Langer, iv & 66 pp., 32 b/w fig., 3 photos, & 11 tab. Studies in Biology No. 34. University Park Press, Baltimore, Maryland 21202. 1979. \$5.95 paperbound.

The Institute of Biology in London (SW7 5HU) has prepared these 117 booklets, entitled "Studies in Biology", so that "teachers and students can learn about significant developments". The present one would be useful in technical, agriculture and animal husbandry courses, upper classes in high schools in farming and cattle areas the world over and for the English-reading adult student on his own. The book has chapters on the structure, growth, flowering, seed set, and physiological adaptations of cereal and pasture grasses. It discusses the production of "man-made" plants like triticale from a cross of hexaploid or tetraploid wheat with diploid rye with its F_1 hybrid sterility compensated for by the use of colchicine. The reference sources have been updated and are well selected. The text language is well chosen for clarity.

"WATER BIRDS OF CALIFORNIA" by Howard L. Cogswell, iv & 412 pp., 12 color pl., 5 b/w contour identification pl., 47 fig. & 1 map. University of California Press, Los Angeles and Berkeley, California 94720 & New York, N. Y. 10017. 1977. \$5.75 paperback.

This is one of the excellent California Natural History Guides prepared carefully enough to help and please the professional ornithologist or other scientist and presented clearly and directly enough to guide and enrich the interested amateur. The accuracy of the illustrations by Gene Christman enhances the text. The notes on behavior are very useful, as are the Graphic Calendars showing habitat distributions by months and rare sighting records.

"FLOWERS AND PLANTS OF WESTERN AUSTRALIA" Revised Edition, by Rica Erickson, A. S. George, N. G. Marchant & M. K. Morcombe, 231 pp., 567 color photos. A. H. & A. W. Reed PTY, Ltd., Sydney & Wellington. Distributed in U.S.A. by Charles E. Tuttle Co. Inc., Rutland, Vermont 05701. 1979. \$39.95.

To the beautiful first edition of 1973 have been added some minor corrections, nomenclatural changes, more bibliography, additional plates and ecological description of the Kimberley so that now this expanded coverage includes "most of the settled regions of Western Australia, and provides an insight into the plants of one very dif-

ferent from the remainder". The excellent color illustrations are still wisely grouped according to common habitats. Legends provide scientific and common names, blooming times, plant families and brief pertinent notes.

For the many U.S. botanists and family members who will be attending the International Botanical Congress next year in Australia this book (and others in this series also distributed by Tuttle) make wonderful worthwhile gifts that do not have to be toted in suitcases.

"THE FLORA OF ALDABRA and Neighbouring Islands" by F. R. Fosberg & S. A. Renvoige, v & 326 pp., 53 b/w plates & 2 maps. Kew Bulletin Additional Series VII. Her Majesty's Stationery Office, London WCIV 6HB. 1980. £15 net paperbound.

This careful floristic study covers Aldabra Atoll with its research station maintained by the Royal Society since 1969, Assumption Island with no lagoon, Cosmoledo Atoll and the Astove Atoll, all off the eastern coast of Africa north of Madagascar. The introduction gives a brief history of plant collecting and land use. Of 274 recorded angiosperms 176 are likely native and of these 42 are endemic, and of the 87 introduced taxa about half are weeds and the other half cultivated. My review copy ends with page 326, thereby missing the pages on mosses and the indexes to botanical and vernacular names. The illustrations are of particularly fine quality.

"WIRKUNGSMECHANISMEN VON HERBIZIDEN UND SYNTHETISCHEN WACHSTUMS-REGULATOREN" edited by H. R. Schütte, 381 pp., 71 b/w tab. & 92 fig. Gustav Fischer Verlag, Jena 69, P.f. 176. 1980. DDM 32,00.

This book contains 69 papers in Russian and German and a lone one in English from Bulgaria by four authors on the "Influence of Some Cytokinines of Purine and Urea Type on the Productivity of Mint". The results obtained show that the fresh weight and essential oil yield may be increased significantly after a foliar spray with these cytokinines before digging up the rootstocks.

The papers included were all presented at the XII Symposium Wissenschaftlichen Koordinierungs-konferenz convened in Mühlhausen in 1979 by the Institut für Biochemie der Pflanzen, the Akademie der Wissenschaften der DDR, and the Pädagogischen Hochschule.

Each paper carries its own bibliography.

"GENERAL ZOOLOGY" Sixth Edition, by Tracy I. Storer, Robert L. Usinger, Robert C. Stebbins and James W. Nybakken, ix & 902 pp., 16 color & 171 b/w photos, 444 b/w fig., 19 tab., 2 color & 1 b/w map. McGraw-Hill Book Company, New York, N. Y. 10020.

1979. \$17.95.

Fortunately the Storer-Usinger influence is still strongly felt in this edition, maintaining its excellence and making it well worth the price of purchase. The latter two current co-authors have modernized the systematics and taxonomy well and have presented the arrangement of groups effectively. As has been the modern trend, the frog is embedded in the treatment of the amphibians and relegated to "lab" sessions, and zoology is introduced, not through animals, but with biochemistry, cytology, histology, various body systems, meeting the different life functions. The last three chapters in this general part of the text are on heredity, genetics, ecology, distribution, evolution, and are very well presented. The second part of the text is devoted to a phylogenetic survey of the animal kingdom, culminating effectively in a consideration of the human animal, population and environment. Greater use is made of neatly and accurately drawn figures than was done in the previous editions.

"TREES OF CENTRAL FLORIDA" by Olga Lakela & Richard P. Wunderlin, 208 pp, 115 b/w photo pl. & 1 map. Banyan Books, Inc., Miami, P. O. Box 431160, Florida 33143. 1980. \$14.95.

"The purpose of this (helpful) book is to enable a person to identify the common native (and naturalized) trees of subtropical Florida. It encompasses Volusia through Broward counties on the Atlantic coast and west to the Gulf shores, with the following vegetational formations: (1) extensive pine flatwoods, (2) xerophytic pine-oak forests now often metamorphosed into citrus groves, (3) mangroves (with pneumatophores misspelled), (4) coastal stands of dune formation, (5) swamp forests and hammocks, (6) sand-pine scrub forest, and (7) grasslands from wet prairies to developed pastureland. Identifications are directed through an easily workable key based mainly on vegetative characteristics and clear photographs of leafy branches often with flower and/or fruit. Sunshine State visitors, retirees, students, teachers and even trained botanists will appreciate this well prepared book.

"GROWING CALIFORNIA NATIVE PLANTS" by Marjorie G. Schmidt, ix & 366 pp, 8 color plates, 72 b/w line draw., & 33 tab. California Natural History Guides No. 45, University of California Press, Los Angeles & Berkeley, California 94720. 1980. \$15.95.

Because of this carefully prepared and enthusiastically presented book and horticultural articles in magazines like "Sunset" and its books, today's "professionals and home gardeners are finding new and exciting uses for native plants.....[making] full use of California's wild plants". Some have been saved from "progress", as, for instance, Nevin's Barberry from the now house-covered San Fernando

Valley and the San Francisco Manzanita, saved almost by its last tendril by being snatched from the old Laurel Hill Cemetery. Native plants with their growing needs are suggested for different types of gardens, as in hedges, desert regions, coastal areas, etc.

"ENERGY, EARTH AND EVERYONE: Energy Strategies for Spaceship EARTH", revised and Expanded Edition, by Medard Gabel, 264 pp., 176 b/w fig., 8 photos, 17 tab. & 41 maps. Anchor Press of Doubleday Company, New York, N. Y. 10017 & Garden City, N. Y. 11530. 1980. \$10.95 paperbound.

This impressive second edition carries the same message as the first but with more documentation and effective illustration that "what was (and is) done crudely by oil can be done exquisitely with hands-on human attention to an amazingly long list of other energy sources throughout the world." The many map projections, all on the same R. Buckminster Fuller's Dymaxion Sky-Ocean-World projections, are very effectively used. The tables and charts of the world's energy treasures are convincing, but they do not and cannot indicate the "cost" in energy that would have to be spent to get the geothermal, wind, solar, bioconversions, tidal and other forms functioning where and as man's needs require.

"ALL THE TREES AND WOODY PLANTS OF THE BIBLE" by David A. Anderson, 294 pp., 92 b/w photo, 8 fig. & 8 maps. Word Books, Publishers, Inc., Waco, Texas 76703. 1979. \$10.00.

This thoughtful, well illustrated "text is primarily restricted to a summary discussion of biblical trees and woody plants and the role these plants played in the life of the (many pastoral and agricultural) people in this period". The author has been an appreciative reader of the Bible all his life and has recently completed his professional life as a forester. This reviewer very much appreciates his conservation emphasis. The sycamore or mulberry fig name, *Ficus sycomorus*, is misspelled, as is also the possible crown-of-thorns, *Paliurus*. The bibliography for more advanced reading omits Tristram's and Post's older, very detailed studies as well as Zohary's new serially-issued definitive "Flora Palaestina". The author's interpretations of the Flood and its effects are interesting.

"THE FORESTS OF THE SEA -- Life and Death on the Continental Shelf" by John L. Culliney, xiv & 433 pp., 6 b/w maps & 25 line draw. Anchor Books of Doubleday Press, Garden City, New York 11530. 1979. \$5.95 paperbound.

The beauty, wonder and richness of the plant and animal life that abounds in the nourishing protection of the miles of kelp-"forested" continental shelves are effectively described by the marine biologist author as are also the serious threats of over-fishing and the creation of "carelessly operated mines, grossly littered highways, heat sinks, and cesspools for industrialized society.....How tragic if something wonderful should become apparent when it is too late to save its living source." This book should be recognized as a reprint of the Sierra Club's well received original publication.

"EXPLORERS OF THE BODY" by Steven Lehrer, x & 471 pp, 22 b/w photo. Doubleday & Company, Garden City, New York 11530. 1979. \$12.95.

The author, himself a Johns Hopkins trained doctor and radiologist, writes of the greatest revolutionary discoveries in the art of healing and of the men and women responsible for them. The ten chapters detail the human foibles, genius, dedication, serendipity and difficulties of all sorts as parts of the very readable stories of these outstanding medical contributions and their contributors. Often the interesting "window dressing" occupies as many pages as the actual contribution does.

"AMENITY GRASSLAND -- An Ecological Perspective" edited by I. H. Rorison & Roderick Hunt, xi & 261 pp., 2 color & 43 b/w. photo, 33 fig., 30 tab. & 1 map. Wiley-Interscience Publications of John Wiley & Sons, Chichester, Toronto, Brisbane and New York, N. Y. 10017. 1980. \$54.00.

The expert contributors of the 14 papers are all from the British Isles and were convened by the Natural Environment Research Council to consider: (1) standards of management, (2) establishment and renovation, (3) species and cultivar selection, (4) mowing and growth control, (5) fertilizing, (6) wear, (7) weed control, and (8) use of semi-natural areas. Pertinent ecological theories are expounded and parallel implications for management "are suggested to help counter the long-recognized fact that inadequate (low-cost) site preparation leads to expensive long-term maintenance". This is an important publication.

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