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A NEW SUBSPECIES AND OTHER NOMENCLATURAL CHANGES
IN THE SOLIDAGO ARGUTA COMPLEX

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Since the treatment of the Solidago arguta complex will be published in parts with the keys and description of taxa last, it has become necessary to propose the following changes and new subspecies. Table 1 provides the synonymy to facilitate usage of several current treatments.

SOLIDAGO ARGUTA ssp. BOOTTII (Hook.) G. Morton, stat. nov. S. boottii Hook. Comp. Bot. Mag. 1: 97. 1835. as to type, not of authors.

The fragmentary type on a mixed sheet is clearly identifiable as the specimen collected by Drummond in Louisiana. The few remaining upper cauline leaves possess hairs on the abaxial midvein, which indicates that the name should be applied to those plants that were previously referred to as S. strigosa Small. This application is further supported by the fact that all herbarium specimens from Louisiana have hairs on the midveins.

SOLIDAGO ARGUTA ssp. CAROLINIANA (Gray) G. Morton, stat. nov. S. arguta var. caroliniana Gray, Syn. Fl. N. Am. 1(2): 155. 1884.

This taxon is composed of both diploid ($2n=18$) and tetraploid ($2n=36$) individuals. In my dissertation I considered individuals of the different ploidy levels as distinct entities and annotated them as S. vaseyi Heller ($2n=36$; basionym, S. arguta var. caroliniana) and a new taxon under S. arguta, using the subspecific epithet austrina ($2n=18$). Additional material that has come to my attention indicates that the distinctiveness was due more to the populations available for study than to the actual situation.

SOLIDAGO ARGUTA ssp. PSEUDOYADKINENSIS G. Morton, ssp. nov.

Caules e caudice verticali brevissimo perenni lateralites adscendentes-erecti (rhizomate horizontali nullo); folia basalia elliptica, glabra, laminis plerumque minus quam 3 cm latis, saepissime 4 ad 6-

plo longioribus quam latis, in petiolum alatum contractis; involucris 4-6.5 mm altis; ligulis plerumque 4-6; achaeniis strigosis. $2n=18$.

TYPE: North Carolina; Bladen County, sandhill, 5.2 mi. south of Ammon on Route 242, July 18, 1969, G. Morton #3765. Holotype TENN; Isotypes NY, GH, SMU.

DISTRIBUTION: Open woods, wooded borders and clearings, usually in sand or sandy soils; Piedmont and Coastal Plain of North Carolina and northern South Carolina extending also into southeastern Virginia and northeastern Georgia.

This new subspecific name is necessary because the various names previously used are now attributed to other taxa.

SOLIDAGO X YADKINENSIS (Porter) Small (pro sp.)
S. yadkinensis (Porter) Small, Bull. Torr. Bot. Club 22: 368. 1895. S. boottii var. yadkinensis Porter, Bull. Torr. Bot. Club 19: 129. 1892.

The anthers of the disk florets of the holotype are without pollen. Although the holotype could be referable with some stretching to S. arguta ssp. pseudoyadkinensis, the series of specimens collected by Small a year later at the same location clearly indicates that all the collected specimens are part of a hybrid swarm. One of the parents is S. stricta or a closely related species. The other parent might possibly be found among S. juncea, S. arguta ssp. caroliniana or ssp. pseudoyadkinensis. The holotype is some stage of backcrossing with the latter type of parent.

SOLIDAGO X NEUROLEPIS Fernald (pro sp.) S. neurolepis Fernald, Rhodora 38: 212. tab. 421, 422. fig. 1. 1936.

Only two specimens are known for this taxon. The pollen stainability is reduced (78%) in the holotype. The morphology is intermediate enough to suggest that the parents might be sought among S. ulmifolia or S. rugosa ssp. aspera and S. arguta ssp. arguta or ssp. caroliniana.

Acknowledgements

I would like to thank Mr. Rupert Barneby of the New York Botanical Garden for assistance with the Latin description and also Dr. Arthur Cronquist of the same institution for helpful comments after reading the manuscript.

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- Radford, A. F., H. E. Ahles & C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill.
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Table 1. COMPARATIVE SUMMARY OF SYNONYMY IN TREATMENTS IN USE TODAY AND THAT PRESENTED IN THIS PAPER.

Morton	Mackenzie in Small (1933)	Fernald (1950)	Crong. in Gleason & Crong. (1963)
<u>S. arguta</u> ssp. <u>arguta</u> *	<u>S. arguta</u>	<u>S. arguta</u>	<u>S. arguta</u>
<u>S. arguta</u> ssp. <u>caroliniana</u> *	<u>S. boottii</u> <u>S. yadkinensis</u> , in part	<u>S. boottii</u>	<u>S. boottii</u> var. <u>boottii</u> and var. <u>caroliniana</u> , in part
<u>S. arguta</u> ssp. <u>boottii</u>	<u>S. strigosa</u>	<u>S. strigosa</u>	<u>S. strigosa</u>
<u>S. arguta</u> ssp. <u>pseudoyadkinensis</u> *	<u>S. yadkinensis</u> , in part	<u>S. yadkinensis</u> , in part	<u>S. boottii</u> var. <u>caroliniana</u>
<u>S. X yadkinensis</u> *	<u>S. yadkinensis</u> , in part	<u>S. yadkinensis</u> , in part	<u>S. boottii</u> var. <u>caroliniana</u> , in part
<u>S. X neurolepis</u>	Not yet named	<u>S. neurolepis</u>	Out of range

* Ahles in Radford, Ahles & Bell (1968) considers all of these taxa as S. arguta.

Notes on Meo and Yao Poppy Cultivation

James A. Duke¹

December 6, 1971, I visited a Meo village near Chiangmai, Thailand, and December 16, 1971, a Yao village north of Van Vieng, Laos. The following observations are based on these visits and conversations with area officials.

The White Meo village of 24 families was founded in 1969. The houses, with timber sidings, dirt floors, and one of 4 types of rat-infested thatch roofs, were permeated with smoke from trixylic fires. Rice had been harvested and some was being sun-dried. Popped rice was strewn on altars, characteristic of the houses.

Within three miles of the village were at least five poppy (Papaver somniferum L.) fields (Fig. 1), three with a few plants already in flower. Most flowers were white, but some were purplish. The Meo did not like early sporadic flowering, attributing this to poor soil conditions. Some poppies grew in the stubble of corn, harvested a few weeks earlier. Intercropped with the poppy was an occasional taro or fruit tree. Some fields were separated from the road by fences lined with pleasantly aromatic plants of marihuana, Cannabis sativa L., 2.5 m tall, with short internodes and swollen nodes. Dried Cannabis was offered for sale.

Meo, Yao, Thai and Lao called marihuana canja or cansha, and opium fin. Marihuana leaves were used in soups in southeast Asia. Opium was used medicinally and there was some addiction, estimated at about 10 percent among the Meo, 15 percent among the Yao. In the hills, crude opium commanded about \$25.00 to \$80.00 per kilogram. Many Meo and Yao planted poppies as a money crop, paying other ethnic groups for rice and staples.

In Laos, thanks to AID officials, I visited a Yao village at an elevation of about 1,000 m. Mr. Fletcher H. Poling and Mr. Seng Dao of the USAID/Lao Economic Affairs Division, having completed a short study, stated that the 28-year-old village had 28 families. The houses resembled Meo houses, but had tin roofs. According to Poling and Dao's data, the head of the average family of 9 members was about 50 years old. A family averaged about 15 chickens, 8 pigs, 2 cows, and 1 duck. There was about one horse for every two families, one buffalo for every four families. An average family produced annually about 1,800 kg

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rice, \$45.00 worth of vegetables, and 10 kg opium, reportedly worth more than \$750.00.

Castor bean, citrus (especially pummelo), coffee, guava, orange, purging nut, and tobacco were cultivated in or near the village. Most rice was grown below the village while other vegetables, fruits, and poppies were grown in the karst hills above the village. Rather dense stands of Ageratum, Cassia, and Sambucus occurred just outside the village. Steep trails ascended through cloud forest and bamboo brake in the limestone karst to the poppy fields.

The interconnected poppy fields had been used for about three years and would probably be used for about seven more. A youth was clearing a forested area nearby, which, after burning toward the end of the dry season, was to be sown to poppy in 1972. As in the Meo field, charred stumps remained in the poppy fields. Frequent large, bare spots, resulting partly from poor seeding, partly from intensive cultivation, were said to make poppy fields recognizable in aerial photographs. The mixture of crops in these Yao poppy fields should give them different photogrammetric signatures from the nearly monospecific Meo poppy fields. The Yao poppy fields (Fig. 2) had more than 25 interspersed crops, among them, amaranth, balsam pear, banana and related spp., bean, betel, cabbage, Chinese radish, corn, cucumber, dill, eggplant, fennel, ginger, guava, kale, lemongrass, mint, mustard, onion, papaya, pea, pineapple, radish, string bean and possibly yard-long string bean, sugarcane, sweet potato, taro and yam bean.

Poppy seeds were broadcast periodically for several weeks starting in November and early December. Seedlings, young plants, flowering and fruiting specimens and harvested specimens all occurred in one field. Unlike the Meo, these Yao preferred to stagger the planting to stagger the harvest. Like Meo, the Yao weeded carefully, and thinned out the seedlings. Unlike some ethnic groups, the Meo and Yao did not eat the seedlings. In these fields, white flowers were more frequent than purplish flowers, which outnumbered carmine flowers. Fringed petals were occasional, in all colors, as was spotting near the base of the petals. The Yao believed that purplish-flowered poppies bloomed sooner and had a darker, but equally potent, latex. At harvest, pods were slit vertically on one side with a three-bladed knife, preferably shortly after noon. Early the next day, the exuded latex was scraped off into a small container with a spatula. On the third day, the other side of the capsule was lanced. At the village, the latex was mixed with water and boiled in a bronze pail, then strained, and boiled until thick. Cooled opium, kneaded into a dough-like consistency, was said to keep for several years, enabling the farmer to hold some back for favorable prices.

The Meo and Yao, unlike Turkish peasants, did not use the seeds for oil or condiment. For the next year, the Yao selected seeds from the biggest pods, dried them in the sun for a day or so, and stored them in the "attic" in split bamboo containers, not directly over the fire. Poisoned rice was spread to prevent rats from eating the poppy seed.

Broad conclusions should not be drawn from a study of too few poppy fields. A look at one group of Meo fields in Thailand and Yao fields in Laos indicated that cultural conditions, intercropping patterns, photogrammetric signatures and poppies themselves may vary widely in the poppy fields of southeast Asia.



Fig. 1. Meo Poppy Field Near
Chiangmai, Thailand (December, 1971)
(Cannabis sativa was frequent along fence lines)



Fig. 2. Yao Poppy Field North of
Van Vieng, Laos

ADDITIONAL NOTES ON THE GENUS ACANTHOLIPPIA. III

Harold N. Moldenke

ACANTHOLIPPIA Griseb.

Additional & emended bibliography: Pereyra, Bol. Univ. Nac. Tucumán Mus. Hist. Nat. 8: 1--7, pl. 1 & 2. 1926; G. Klein, Handb. Pflanzenanal. 2 (1): 762 (1932) and 3 (1): 601, 637, & 645. 1932; Wangerin in Just, Bot. Jahresber. 54 (1): 1171 [367]. 1932; Covas & Schnack, Revist. Argent. Agron. 14: 229. 1947; Fester, Martinuzzi, Retamar, & Ricciardi, Rev. Fac. Ing. Quim. 24: 37. 1955; Darlington & Wylie, Chrom. Atl. 324. 1956; Cabrera, Revist. Invest. Agric. Buenos Aires 11: 327, 339, 343, 359, 366, 369, & 397, fig. 1. 1957; R. C. Foster, Contrib. Gray. Herb. 184: 168. 1958; Anon., Dict. Cat. Nat. Agric. Lib. 38: 102. 1968; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl. 714. 1969; Tét-ényi, Infrasp. Chem. Taxa Med. Pl. 109. 1970; Moldenke, Fifth Summ. 1: 4, 181, 190, 191, 194, 377, & 387 (1971) and 2: 553--557, 559, 564--567, 693, 753, & 844. 1971; Hueck & Seibert in Walter, Vegetationsmonog. Einz. Gros. 2a: 65. 1972; Moldenke, Biol. Abstr. 53: 5798. 1972; Moldenke, Phytologia 22: 294--298 (1972) and 23: 433 & 503. 1972; Rogerson, Rickett, & Becker, Bull. Torrey Bot. Club 99: 156. 1972; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. & Techn. 12 (1): 2. 1972.

It should be noted that the Cabrera (1957) reference in the above bibliography is dated "1958" on the printed index card in the New York Botanical Garden library, a reprint from the Torrey Botanical Club's Index to American Botanical Literature. Perhaps this is the date of its receipt at that library. The title-page of the number involved is plainly dated "1957".

ACANTHOLIPPIA DESERTICOLA (R. A. Phil.) Moldenke

Additional synonymy: Lippia trifida var. gracilis Phil. in Reiche & Phil., Fl. Chil. 5: 300. 1910.

Additional & emended bibliography: Reiche & Phil., Fl. Chil. 5: 298, 300, & 301. 1910; Cabrera, Revist. Invest. Agric. Buenos Aires 11: 397. 1957; R. C. Foster, Contrib. Gray Herb. 184: 168. 1958; Moldenke, Fifth Summ. 1: 181, 190, 194, & 377 (1971) and 2: 553, 559, 565, 567, & 844. 1971; Moldenke, Biol. Abstr. 53: 5798. 1972; Moldenke, Phytologia 22: 295 (1972) and 23: 433. 1972.

ACANTHOLIPPIA HASTULATA Griseb.

Additional & emended bibliography: Pereyra, Bol. Univ. Nac. Tucumán Mus. Hist. Nat. 8: 1--7, pl. 1 & 2. 1926; G. Klein, Handb. Pflanzenanal. 2 (1): 762 (1932) and 3 (1): 601, 637, & 645. 1932; Wangerin in Just, Bot. Jahresber. 54 (1): 1171 [367]. 1932; Cabrera, Revist. Invest. Agric. Buenos Aires 11: 339, 343, 359, 369, & 397, fig. 1. 1957; Anon., Dict. Cat. Nat. Agric. Lib. 38: 102. 1968; Moldenke, Fifth Summ. 1: 181, 194, & 377 (1971) and 2: 556 & 844. 1971. [to be continued]

NOTES ON BRAZILIAN POLYGALACEAE

John J. Wurdack

U. S. National Herbarium, Smithsonian Institution

POLYGALA OPIMA Wurdack, sp. nov.

In systemate Chodatii *P. spectabili* DC. affinis, foliis obovato-oblongis vel oblongo-ellipticis apice plerumque obtuso vel rotundato inflorescentiae bracteis brevioribus differt.

Suffrutex 15-30 cm altus unicaulis vel e basim 1-3-caulis; caulis striatus sparse pilis incurvis 0.1-0.2 mm longis obsitus glabrescens inferne lignosus; folia crassiuscula (3.5-)5-10 (11.5) X (1.5-)2.5-6 cm obovato-oblonga vel oblongo-elliptica, apice obtuso vel rotundato minute (0.2-0.3 mm) apiculato, basi cuneata et in petiololum indistinctum usque ad basim decurrentia, sparse vel modice ciliolata (ciliis 0.1-0.2 mm longis gracilibus) alioqui glabra vel subglabra (costa supra et subtus interdum pilis perpauca obiecta), nervis primariis utrinque 10-12 ascendentibus costaque subtus crassiusculis nervulis inconspicuis; stipulae cornigerae 0.5-0.8 X 0.5-0.7 mm truncatae. Racemi 5-11 cm longi grandiflori axe sicut pedicellis sepalis exterioribusque sparse inconspicueque puberuli, pilis gracilibus incurvis ca. 0.1 mm longis, bracteis plerumque 1-2 mm longis lanceatis deciduis, spineis cornigeris 0.7-0.9 X 0.4 mm conico-cylindricis truncatis. Pedicelli 5-10 mm longi; sepala exteriora libera sparse ciliolata suborbicularia rotundata duo 3.5 X 2.7-3 mm subplana uno 6 X 7 mm naviculare; alae minute papillose 13-15 X 12-13.5 mm ovato-orbiculares, apice paulo retuso, margine glabro. Petala lateralia glabra ca. 25 X 2-3.5 mm, apice rotundato; carina ca. 19 mm longa glabra. Stylus ca. 15 mm longus basaliter per 10 mm 0.3 mm latus apicem versus 1 mm latus et curvatus ad stigmata 1.5 mm latus, stigma inferiore includens; capsula 9 X 8 mm obcordata glabra; seminis corpus 5 X 2.5 mm, carunculo terminali 1.2 mm alto, appendice dorsali 4 X 1.2 mm semen 2/3 aequante.

Type Collection: H. S. Irwin, R. Souza, & R. Reis dos Santos 10816 (holotype US 2530401; isotype NY), collected in cerrado ca. 15 km south of Corumbá de Goiás, Serra dos Pirineus, Goiás, Brazil, elev. 1000 m, 30 Nov. 1965. "Fleshy herb ca. 15 cm tall. Calyx purplish green; corolla cream, apically yellow; fruiting calyx deep purple."

Paratypes (all Brazil): Distrito Federal (elev. 700-1225 m): Irwin & Soderstrom 6156, from Catetinho; Irwin & Soderstrom 5725, from 15 km east of Brasília; Irwin, Souza, & dos Santos 9017, from 1.5 km east of Sobradinho; Irwin, Souza, & dos Santos 10108, from 3 km north of Sobradinho; Irwin, Souza, & dos Santos 10583, from 12 km east of Braslândia. Goiás (elev. 800-1150 m): Irwin & Soderstrom 7512, from Serra do Caiapó ca. 60 km south of Caiaponia; Irwin, Souza, & dos Santos 10565, from Serra do Rio

Prêto 3 km east of Cabeceiras; Irwin, Grear, Souza, & dos Santos 13826, from Serra dos Cristais ca. 25 km south of Cristalina; Irwin, Grear, Souza, & dos Santos 14245, from Serra Geral de Goiás ca. 35 km north of Formosa; A. Macedo 4785 (US), from Anápolis; Irwin, Maxwell & Wasshausen 19367, from Pico dos Pirineus. Minas Gerais: A. Macedo 4290, from Uberlândia.

Polygala spectabilis has thinner acuminate leaves, well-defined petioles 0.3-0.5 cm long, and subulate inflorescence bracts 3-8 mm long. Polygala autranii Chodat (isotype NY) has fine-setulose (hairs 0.4-0.5 mm long) stems and leaves, as well as inflorescence glands narrowly cylindrical and 1.5 mm long. All other species in Sect. Ligustrina except P. anatina Chodat have smaller flowers and/or acuminate leaves; that Peruvian exception (from the description and type photo) has obtusish leaves and large flowers, but ciliate alae, narrowly cylindrical inflorescence glands 1 mm long, and a projecting lower stigma. It is somewhat surprising that such an abundantly collected species as P. opima has not heretofore been described, but the foliar character seems definitive.

POLYGALA HEBECLADA DC. var. IMPENSA Wurdack, var. nov.

Foliorum laminae anguste ovatae vel ellipticae 2-5 X 1.3-2.4 cm. Floris alae 8.5-9 mm longae.

Type Collection: H. S. Irwin, R. Souza, & R. Reis dos Santos 10449 (holotype US 2530423; isotype NY), collected in cerrado ca. 8 km east of Cabeceiras, Serra do Rio Prêto, Goiás, Brazil, 16° S, 47° W, elev. 1000 m, 18 Nov. 1965. "Erect herb to 40 cm tall. Outer perianth greenish violet without, lavender within; inner perianth lavender-purple."

Paratypes (both Goiás): Irwin & Soderstrom 7367, from ca. 50 km. south of Caiapônia on road to Jataí, Serra do Caiapó, elev. 800-1000 m; Irwin, Souza, & Reis dos Santos 10780, from ca. 14 km. south of Corumbá de Goiás, Serra dos Pirineus, elev. 975 m.

The typical variety of P. hebeclada and the minor departures described by Chodat have linear to lance-linear leaves to about 0.5 cm wide and alae 5-6.5 mm long (i.e. only about $\frac{1}{2}$ the area in var. impensa). Despite this gigantism, no qualitative difference in floral structure is noticeable.

Certainly, two species are involved in P. hebeclada sensu Chodat, one with short erect pedicels even in fruit, the other with longer slender pedicels recurved in fruit. From the Macbride photographs, the former is P. hebeclada DC. (left-hand sprig in Macbride photo 34962, annotated -- fide Macbride -- by Candolle. The central sprig in this photograph also seems to be P. hebeclada, although apparently a part of the St. Hilaire collection of P. hyssopifolia St. Hil. & Moq., while the right-hand branchlet shows pendulous pedicels). In publishing P. hyssopifolia in 1828, St. Hilaire and Moquin cited P. hebeclada (published in 1824) as a synonym; the following year in Flora Brasiliae Meridionalis, they synonymized P. hyssopifolia under P. hebeclada. St. Hilaire and Moquins' name of 1828 thus

is illegitimate, quite apart from the probable species mixture in St. Hilaire's collection. If my interpretation of P. hebeclada is correct, the next available name for the cernuous-fruited species is P. rhodoptera Mart. ex Bennett (placed by Chodat in synonymy under P. hebeclada). Polygala hebeclada and P. rhodoptera are sympatric, ranging from Goiás and Mato Grosso to Paraná in Brazil and eastern Bolivia.

POLYGALA IRWINII Wurdack, sp. nov.

In habitu P. bracteata A. W. Benn. et P. cuspidata DC. affinis inflorescentiae bracteis terminalibus ellipticis differt.

Caulis 30-45 cm altus inferne plerumque simplex ad apicem ipsem multiramis apicem versus angulatus et paulo alatus primum sicut inflorescentiae axis sparse puberulus pilis 0.1 mm longis erectis glabrescens. Folia numerosa inferne 4-verticillata et obovato-oblonga superne alterna et elliptica vel oblongo-elliptica (1-)2-2.5(-3.5) X (0.5-)0.8-1.2(-1.5) cm, apice late acuto vel obtuso, basi late acuta mucronata (macro acutissimo 0.3-0.4 mm longo), breviter (0.5-0.8 mm) alato-petiolata modice pellucido-punctata sparsissime caduceque ciliolata (ciliis 0.05-0.1 mm longis), venis secundariis utrinque ca. 6 inconspicuis. Racemi numerosi densiflori plerumque 1.5-3 X 1-1.5 cm, pedunculis ca. 1 cm longis; bractee caulinae terminales abaxiales 1.7-3 X 1-1.6 mm ovato-ellipticae, apice hebeti-acuto, adaxiales 0.7-1.3 X 0.3-0.5 mm lanceatae. Pedicelli ca. 0.3 mm longi; sepala exteriora libera sparse ciliolata orbiculari-ovata sparse croceo-maculata, apice lato vel hebeti-obtusio, duo 1.7-1.9 X 1.6-1.7 mm, uno 2.2 X 1.9 mm; alae 5 X 3.3 mm obovato-ellipticae modice croceo-maculatae glabrae, apice rotundato non cuspidato. Petala lateralia 4 X 1.7-1.9 mm glabra, apice per 2.5 mm libero rotundato; carina (crista exclusa) ca. 3.5 mm longa, crista e flabellis duobus 0.5-0.8 mm longis paulo (0.2 mm) lobulatis composita. Styli pars gracilis ca. 0.8 mm longa, apice expanso 0.9 X 0.8 mm, stigmatibus supero ca. 0.5 mm eminente infero semi-incluso. Capsula 2.8 X 1.6 mm oblonga glabra croceo-maculata; semina (carunculo excluso) 2.3 X 0.8 mm cylindracea nigra sparse pilis minutis praedita, carunculo terminali 0.6 mm alto, appendicibus descendentibus 1.8 mm longis ca. 0.5 mm quam semine brevioribus.

Type Collection: H. S. Irwin, J. W. Grear, Jr., R. Souza, & R. Reis dos Santos 16847 (holotype US 2530414; isotype NY), collected in cerrado ca. 87 km north of Xavantina, Serra do Roncador, Mato Grosso, Brazil, elev. 550 m, 2 June 1966. "Herb to ca. 30 cm tall. Perianth pale green. Fruit green. Frequent."

Paratypes (both Mato Grosso): Irwin, Grear, Souza, & Reis dos Santos 16275, from cerrado, Rio Turvo ca. 210 km north of Xavantina, Serra do Roncador; Hatschbach 32027 from S. José da Serra (mun. Cuiaba).

In both related species, the abaxial of each subtending bract pair is narrowly lanceate and 2.5-5 X 0.4-1 mm, the terminal part of the inflorescence thus being conspicuously comate; in all material examined of P. cuspidata sensu Chodat,

the crest is of 2-3 pairs of lobes, rather than the one pair found in P. irwinii. Perhaps P. bracteata and P. cuspidata are synonymous, Chodat not having seen the Pohl syntypes of Bennett's species. Bennett had synonymized P. cuspidata under P. timoutou Aubl., apparently without seeing the type in the Geneva herbarium, and described P. comata Mart. ex Benn. which Chodat synonymized under P. cuspidata. Regardless of the distinctness from one another of these earlier-published species, P. irwinii is certainly not equatable with any of them. Polygala hygrophiloides S. Moore differs (ex descr. and photo) from P. irwinii at least in the smaller stature (ca. 15 cm), smaller (2 X 0.4-0.7 cm) lanceate leaves, long-pedunculate (to 6 cm) racemes, and appendage only 1/3 as long as the seed. Cárdenas 4561 (US), from between San Micerato and Santiago de Chiquitos, Bolivia, resembles P. irwinii in inflorescence bracts, but differs in the relatively narrower leaves, longer racemes, and bilobed crest; this Bolivian material was distributed as P. cuspidata, but is rather probably undescribed.

POLYGALA VITELLINA Wurdack, sp. nov.

In systemate Chodatii ut videtur P. subtili H.B.K. distanter affinis, floribus maioribus flavidis differt.

Herba glabra 20-35 cm alta apicem versus pauciramosa. Folia alterna remota 2-4 X 0.3-0.5 mm oblongo-lineariter tenuia sicut caulis inconspicue guttulis aureis obsita. Inflorescentia capitata 0.8-1.5(-2) X 0.7-0.8 cm, apice vix comato, bracteolis 0.6-0.8 X 0.2-0.4 mm lanceatis caducis adaxialibus non guttatis abaxialibus sparse aurantiaco-maculatis, pedicellis 0.5-0.7 mm longis. Sepala exteriora obtusa anguste elliptica vel elliptico-ovata basim versus sparse croceo-maculata, duo 1 X 0.4-0.5 mm, uno 1.4-1.5 X 0.8-0.9 mm; alae oblongo-ellipticae (apice obtuso) 2.9-3 X 1.3 mm trinervatae apicem versus sparse croceo-maculatae. Petala lateralia 2.3-2.5 X 0.7 mm carinae cristam paulo superantia, apice rotundato; carinae pars libera (crista exclusa) ca. 0.6 mm longa croceo-maculata, cristae flabellis 4 hebetibus 0.4 mm longis composita. Stigma superum penicillatum, inferum tuberculatum; styli pars infera 0.6 mm longa, pars expansa 0.4 mm longa; ovarium obconicum croceo-maculatum; capsula oblongo-obovata 1.5 X 0.8 mm; semina 0.6 X 0.35 mm ovato-ellipsoidea minutissime apiculata nigra glabra exappendiculata.

Type Collection: H. S. Irwin, J. W. Grear, Jr., R. Souza, & R. Reis dos Santos 16314 (holotype US 2530417; isotype NY), collected at gallery margin ca. 86 km north of Xavantina, Serra do Roncador, Mato Grosso, Brazil, elev. 550 m, 31 May 1966. "Erect herb ca. 25 cm tall. Perianth yellow-orange."

Polygala subtilis has much smaller (alae ca. 1 mm long) white flowers on pedicels 0.2-0.3 mm long. Polygala microspora Blake also has considerably smaller flowers and persistent bracteoles, while P. saprophytica Chod. ex Grondona is smaller (11-15 cm tall) with broader (1 mm) leaves, longer racemes, 5-7-lobed carina, and alae shorter than the carina. Actually,

P. vitellina has much the general aspect of *P. tenuis* DC. (with much more prominent 7-lobed crest and relatively narrower alae only 2/3 as long), with seeds as in the glabrous element of that species (vide infra). Closer still is *P. herbiola* St. Hil. & Moq., with pinkish flowers, carinal crest of ca. 4 pairs of lobes up to 1.3 mm long, and puberulous seeds. The latter species was moved by Chodat to the *Trichospermae*, having been previously placed by Bennett near *P. tenuis*; Chodat noted that the floral details are like those of *P. longicaulis* H.B.K. and its allies, but the seeds are anomalous in this relationship. *Polygala herbiola* has been collected several times in Goiás and the Distrito Federal by Irwin and his colleagues (5179, 11474, 12388, 12431, 13295) and may be the closest relative of *P. vitellina*.

POLYGALA TENUIS DC., Prodr. 1: 329. 1824.

Chodat (using Greek letters only) distinguished several varieties of this rather widespread species by flower color and robustness of habit; the salient specific feature is the small estrophiolate seed. Among the recent planalto collections, several have completely glabrous seeds (*Irwin, Souza, & Reis dos Santos 9758* and *Irwin, Grear, Souza, & Reis dos Santos 13497* p. p., from Serra dos Cristais, Goiás; *Irwin, Souza, & Reis dos Santos 10233* p. p., from Gama, Distrito Federal; *Irwin, Souza, Grear, & Reis dos Santos 17219*, from 75 km south of Xavantina, Mato Grosso), but are otherwise indistinguishable from the more commonly collected material with puberulous seeds. Without examination of the types of the Chodat variants, it does not seem advisable to describe the glabrous-seeded form; in two of the collection numbers (*10233, 13497*), individual sprigs have either glabrous or puberulous seeds. In Chodat's arrangement, the seed feature would key collections such as 9758 to near *P. subtilis* H.B.K., *P. microspora* Blake, and *P. saprophytica* Chod. ex Grondona; all these species have smaller flowers and/or shorter leaves.

A NEW HYALOSCYPHA FROM NEW YORK

MARTHA SHERWOOD

Plant Pathology Herbarium
Cornell University, Ithaca, N. Y.

Hyaloscypha cincinnata Sherwood *sp. nov.* (Figure 1)

Apothecia hyalina, vix 150 μm lata, sessilia. Pili numerosi, 35-52 μm longi, basi bulbosa 3.5-5.0 μm lati, sursum in apicem tenuem minute circinatum angustati. Asci 8-spori, 4.0-5.5 X 20-26 μm , late clavati, poro iodo tincto non caerulescente. Spori hyalini, unicellulares, lunati, 1.5-2.0 X 4.0-5.5 μm .

Hab. in ligno taxonomico indeterminato.

Holotypus: CUP 53226, Lost Gorge (Hendershot Gulf near Swan Hill road) stage 28, Schuyler County, N.Y., M.A. Sherwood



Figure 1

Hyaloscypha cincinnata X1500. (a) ascus (b) spores (c) hairs.
Drawn from type with the aid of a Wild drawing tube

no. 1316, Sept. 13, 1973.

Etymology: *cincinnata*: curly-haired.

Hyaloscypha cincinnata may be distinguished from other species in the genus by the coiled hairs and lunate spores. Coiled hairs are relatively rare in the Hyaloscyphaceae. The hairs of the present species are quite distinct from the loosely coiled hairs of *Velutaria griseo-vitellina* (Fckl.) Fckl. or *Lasiobelonium miniopsis* (Ell.) Dennis, and are closer to those of *Hyaloscypha* than *Unguiculella*. Paraphyses were not seen in our material.

The author wishes to acknowledge the assistance of Richard Korf in preparing the manuscript and of William Dress in supplying the Latin diagnosis.

EPIPHYLLUM STEYERMARKII, A NEW CACTACEAE FROM VENEZUELA

Leon Croizat

The genus Epiphyllum (Phyllocactus of authors) comprises, in accordance with the treatment of Backeberg (Das Kakteen Lexicon, 1965), some 20 species, whose geographic distribution is the following: 4 endemics from Mexico (Nayarit, Jalisco, and two from Oaxaca), 3 from Guatemala, 3 from Honduras, 6 from Costa Rica, 2 from Panamá, 1 (E. strictum) from southern Mexico to Panamá, 1 (E. hookeri) in Venezuela, Trinidad, Tobago, and the Guianas, 1 (E. oxypetalum) from Mexico and Guatemala to Venezuela and Brazil, 1 (E. phyllanthus) distributed from Panamá to Colombia, Venezuela, Guyana, Brazil, Ecuador, Peru, Bolivia, and Paraguay.

According to Backeberg the genus Marniera is placed close to Epiphyllum, being distinguished, in his opinion, by the presence of spines on the ovary, these spines being completely absent in Epiphyllum. Backeberg (op. cit.) refers to two species of Marniera, M. chrysocardium from Chiapas, Mexico, and M. macroptera of Costa Rica. The flower and the ovary of these two species are illustrated by Backeberg (op. cit. figs. 222-224) in such a manner which leaves no doubt as to the character, which in his opinion, separates Epiphyllum and Marniera.

The pattern of geographical distribution in Epiphyllum is, in general, of a very common type: its species follow a path leading west and south in Mexico along the length of Central America, thence forking upon reaching Colombia, whereupon one branch extends paralleling the Caribbean coast and the Atlantic to the Guianas, and very probably to eastern Brazil, while the other branch follows the Andes from Ecuador to Paraguay and across Peru and Bolivia. According to Angely (Flora Anal. Fitogeogr. Esta. Sao Paulo 1: 94. 1969) 3 species of Epiphyllum reach southeastern Brazil (E. phyllanthus, E. opuntioides, and E. acuminatum). There is no doubt that E. phyllanthus is a species of Epiphyllum, but E. opuntioides belongs to the genus Epiphyllanthus (Britton & Rose, Cactaceae 4: 180. 1923), while E. acuminatum is synonymous, according to Britton & Rose (op. cit. p. 189), with E. oxypetalum, the native "Flor de Baile" (sensu stricto) of Venezuela. Actually, it appears, then, that only one species of true Epiphyllum is native to southeastern Brazil, this being E. phyllanthus, which has the most extensive distribution in the entire genus. It remains to be established whether this cactus has reached southeastern Brazil by way of Bolivia and Paraguay or from the Guianas. However that may be, we have a fairly complete idea of the geographical distribution of Epiphyllum and of Marniera. In the type of distribution presented here, it is not at all rare that Costa Rica and the area between Guatemala and Panamá are particularly rich in possessing distinct

species. Also, it is usual to find disjunctions between the south of Central America and the north of Colombia and Venezuela (Croizat, Panbiog. vol. 1: 289, fig. 33. 1958).

About three years ago, Dr. Julian A. Steyermark brought me a cactus which he found in sterile condition growing in the selva de Guatopo National Park, Edo. Miranda, Venezuela, which I judged to be a plant belonging to the genus Epiphyllum. This plant was grown in a hanging basket and flowered on April 27, 1973. I was greatly surprised to find that the ovary of this Epiphyllum was covered with spines on its areoles, and for this reason it would have to be placed in the genus Marniera of Backeberg. The geographical distribution of Marniera, then, would extend from Mexico through Costa Rica to Venezuela.

Since the geographical distribution of Epiphyllum and Marniera coincide with one another, it would appear that the character of spines on the ovary is insufficient to separate these very similar Cactaceae into distinct genera. Although Backeberg was a profound student of the Cactaceae and his classification probably merits the greatest respect by botanists interested in this family, nevertheless it is obvious that his genera still need to be revised as far as possible to natural groups of species. Many petty genera, such as Marniera, still abound in this family. Marniera evidently constitutes a minor group within the circumference of Epiphyllum sensu lato. When we review the generic categories of Backeberg (op. cit. 23), we find that he places under his "Untersippe Euphyllacacti" six other genera, in addition to Epiphyllum, namely: (1) Cryptocereus with the ovary possessing spines and glochids, represented by 3 species in Mexico (Chiapas), Costa Rica, and Ecuador (Cafnar, Azuay); (2) Marniera (see above) with the ovary more or less covered with small spines; (3) Lobeira with the ovary merely pubescent, but without spines or glochids, represented by 1 species from Chiapas, Mexico; (4) Epiphyllum (Phyllocactus) with the ovary glabrous. These four genera are placed under the heading "Bluten trichterig" as contrasted with his grouping under "Bluten ~~trichterig~~ glockig-trichterig" which contains Eccremocactus, Pseudonopalxochia, Nopalxochia, genera distinguished by characters of night-flowering versus day-flowering, presence of scales or spines or their absence on the ovary, and size of ovary. In short, we find that the four genera with infundibuliform (trichterig) flowers (Epiphyllum, Marniera, Cryptocereus, and Lobeira) occur in the extreme south of Mexico (Chiapas), and, again, are found together occurring in Costa Rica, Ecuador, and Venezuela. These four genera differ in no other character except that of presence or absence of indument, spines, or glochids on the ovary. Although future discoveries may show that these differences deserve to be recognized as valid generic categories, I am inclined at present to refrain from recognizing Marniera generically as such, and regard it instead as a subgenus of Epiphyllum.

Subgenus MARNIERA (Backeberg) Croizat, stat. nov.

Marniera Backeberg

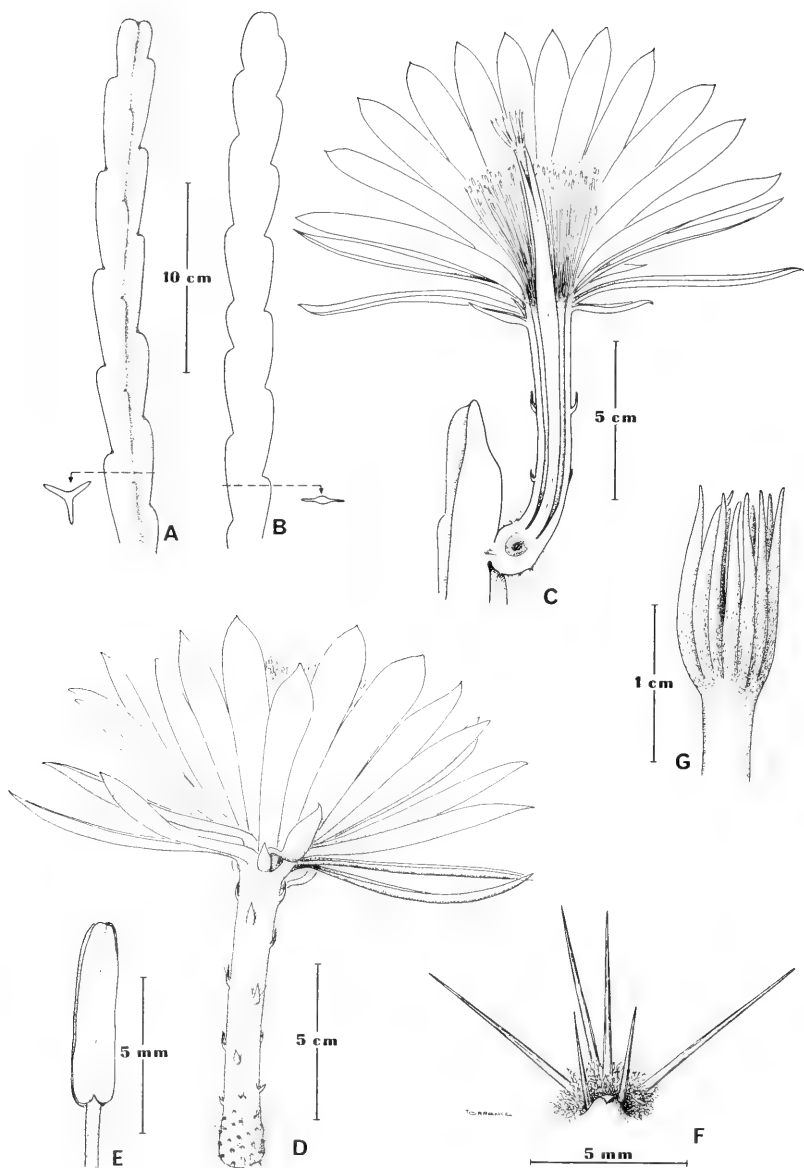
EPIPHYLLUM (subg. Marniera) STEYERMARKII Croizat, n. sp.

Planta epiphyta, habitu caespitoso, ramis complanatis vel triquetris, pendulis, parce radicanibus, 2-3 metralis, 2-2.5 cm. latis, 2- vel 3-costatis, leviter crenatis, crenis decurrentibus, 3-6 cm. distantibus; floribus nocturnis, rotatis albidis 15-20 cm. longis, ca. 15 cm. latis, perianthi segmentis internis ligulato-vel lineari-lanceolatis acutis ad acuminatis, 6-7.5 cm. longis, 0.8-1 cm. latis, basi roseis, usque ad 16; segmentis externis usque ad 13, oblanceolato-vel lineari-lanceolatis acutis, 6.5-7 cm. longis 0.8-1 cm. latis; segmentis extremis basi segmentorum exteriorum carnosius reductis multo minoribus, linearibus vel ligulatis, acutis, infimis 10-12 mm. longis, 4-5 mm. latis, caeteris 17-45 mm. longis, 5-9 mm. latis; staminibus numerosis, albidis, filamentis albidis gracillimis, 6-8 cm. longis, antheris pallide luteis gracilibus linearibus erectis 5-6 mm. longis; stylo ad 12 cm. longo crasso, laciniis pallide viridibus crassiusculis ad 2 cm. longis; floris tubo subcylindrico 6.5-8 cm. longo, 12-13 mm. diam., striis 8 segnato, squamulis secus tubum lanceolatis vel lanceolato-triangularibus acuminatis 1-1.5 cm. inter se distantibus (quam maxime ad 3 cm.), 6.5-8 mm. longis 1.5-2 mm. latis, squamulis in ovario confertis minutis ovatis acutis, ad 2 mm. longis, 1.2-1.5 latis; aculeis in axillis squamularum tubi 5-12, in ovario 3-8, 3-5 mm. longis, pallide brunneis albicantibusve 5-8 mm. longis, areolis parcius lamulosis; ovario obovoideo vel suborbiculari-obovoideo, 1.6-2 cm. longo, 1.6-2 cm. lato, striis squamularum 8.

Type collection: Selva de Guatopo, Parque Nacional de Guatopo, Estado Miranda, Venezuela, flowering in garden of Dr. and Mrs. Leon Croizat, Quinta Cactilandia, Chapellin, Caracas, 27 April, 1973, originally collected by Julian A. Steyermark 108741 (holotype VEN).

Explanation of figures

Figs. A-G. Epiphyllum steyermarkii Croizat: A, portion of a 3-angled stem; B, portion of stem with two sides; C, flower, vertical section, showing attachment to stem; D, flower, showing exterior; E, upper portion of stamen; F, bristles on ovary, with subtending scale and hairs; G, upper part of pistil, showing stigmas and top of style.



TILLANDSIA ADAMSII

A New Jamaican Species

Robert W. Read

During the preparation of "The Flowering Plants of Jamaica" I had the good fortune of working with its author. While reviewing various keys to the bromeliads it was my pleasure to make certain suggested changes and additions as a result of my own field studies. One problem, also noted by Dr. Lyman B. Smith, was in need of further more intensive study, but neither of us was able to work with it at the time. Now, as a result of a careful reevaluation of Tillandsia canescens Swartz I am privileged to describe a new species from Jamaica named in honor of Dr. C. Dennis Adams, botanist-author, with regrets that it could not have been included in his "Flora".

Jamaica supports a pronounced endemic bromeliad flora (30.7% or 82 out of a total of 267 species), therefore it should not be surprising that one more endemic species can be added. As with other recently described endemic taxa, T. adamsii appears to be restricted to shaded limestone crags (rarely epiphytic) in the Cockpit Country of western Jamaica.

Although most closely resembling T. canescens, T. adamsii also has certain characteristics in common with T. valenzuelana. Tillandsia adamsii is readily distinguished from the latter by having dark brown, abruptly expanded leaf sheaths and a distinctly inflated pseudobulbous rosette. From T. canescens, T. adamsii is distinguished by the more pronounced pseudobulbous rosette, with the leaf sheaths much darker brown, and the scape bracts lacking blade-like appendages. From both species T. adamsii can be readily separated by the outwardly arched and spreading floral bracts which are twice the length of the sepals - at least the lowermost ones - at anthesis.

TILLANDSIA ADAMSII R. W. Read; species nova: Subg. Platystachys. T. canescenti Swartz affinis sed inflorescentia simplici, bracteis floralibus multo longioribus et arcuatis extrinsecus, bracteis scapi exappendiculatis et vaginis foliorum atrofusis ab ea recedens.

TYPE: JAMAICA; C. D. Adams 12,850.

Plants stemless, less than 35 cm high; leaves numerous, up to 24 cm long, the blades linear-triangular, but abruptly enlarged at the sheath, forming a slightly inflated pseudobulbous rosette; leaf blades up to 1 cm broad at the apex of the sheath, densely and minutely appressed-cinereous-lepidote throughout; sheaths dark brown appressed-lepidote, broadly ovate, 2-4 cm long, 2-3 cm wide; inflorescence simple, about 4-8 flowered, greatly exceeding the leaves, the flowers arranged distichously;

scape erect, slender; scape-bracts erect, imbricate, slightly longer than the internodes, mostly, if not entirely, lacking blade-like appendages, the lowermost often with inconspicuous, tiny, linear, blades up to 1.5 cm long, the bracts pink or reddish, those near the base lepidote, becoming glabrate to glabrous apically on the inflorescence, where they almost blend into the floral-bracts in form and color; floral-bracts ecarinate, glabrous, pink to reddish at anthesis, 2-2.8 cm long, twice to three times the length of the internodes, greatly exceeding the sepals, not imbricate, nor obscuring the slightly flexuous rachis, the apex curving back slightly, giving the fertile portion of the spike a distinctive flared effect, often sterile apically; flowers subsessile, erect; sepals not carinate, symmetric, glabrous, about 1.0-1.3 cm long, to 3.5 mm wide, apically acute; petals magenta to lavender-rose, to about 3 cm long, acute, narrowly oblanceolate, meeting basally; stamens exerted at anthesis; anthers versatile, lobed basally, appearing tridentate apically; ovary trigonal to 1.1 cm long, ovules restricted to the lowermost 1 mm, upper portion empty; style 2.5-3 cm long, exerted, 3-parted apically for about 1.5 mm; stigmas very slightly flared, hardly distinguishable; capsule cylindric, abruptly acuminate, 2.0-2.4 cm long.

Distribution: Jamaica, Parishes of Trelawny and St. James, on shaded limestone crags and ledges or occasionally epiphytic, 609-670 m elev.; endemic.

Specimens examined: St. James: White Rock Hill, 1 mile south of Sweet Water, 10 March 1956, G. R. Proctor 11743 (IJ; Photo US). Trelawny: Island View Hill, Wilson Valley district, 1.5 miles north of Warsop, 26 June 1960, G. R. Proctor 21334 (IJ; US); $5\frac{1}{2}$ miles N.W. of Troy, 8 May 1966, C. D. Adams 12,850 (US, HOLOTYPE).

Plate I



Type Specimen

TILLANDSIA ADAMSII

2541718

Tillandsia adamsii R. W. Read

NOTES ON BROMELIACEAE, XXXV

Lyman B. Smith

KEY TO TILLANDSIA AND SIMULATORS,

SUPPLEMENT II

Thanks largely to the collecting and publications of Professor Eizi Matuda, Dr. Edmundo Pereira, and Professor Werner Rauh, I am obliged to write a second supplement to my Tillandsia key (Phytologia 20: 121. 1970) after only four years. Supplement I immediately followed the original key on p. 157. As in the first supplement, there is an indication of the species relation to the original key and that is followed in a second section by whatever note or description is necessary. The notes below are intended as the final ones before completion of the manuscript of Tillandsia for my monograph.

In a number of cases Professor Rauh has given me previews of his new species to enable me to place them in my key. These are in press and are not validly published here since they lack Latin diagnoses. So far I have not examined several types of new species proposed by Dr. Pereira and by Professor Matuda and for lack of evidence am unable to place them in my key.

In the following supplementary sections to the key, species to be added or substituted are marked with an asterisk.

Subkey I

- 28(1). Floral bracts carinate and incurved toward apex.
28a. Spikes about 7-flowered; sepals glabrous. Ecuador, Peru.
(T. straminea).....T. purpurea
28a. Spikes 3-flowered including a sterile apical one; sepals
lepidote. Brazil. (cf. also III-19(2)).....*T. sucrei
- 33(1). Inflorescence simple.
33a. Floral bracts to 21 mm long; leaf-blades narrowly triangular. Mexico.....T. albida
33a. Floral bracts ca. 4 mm long; leaf-blades filiform. Peru.
*T. schunkei
- 39(1). In place of T. calocephala write *T. nana

Subkey II

- 29(2). Inflorescence amply bipinnate; scape elongate.
29a. Spikes all erect; inflorescence dense and narrow. Hispaniola.....T. baliophylla
29a. Spikes all but the terminal decurved; inflorescence very
lax and broad. Mexico.....*T. superinsignis
- 36(2). Sepals covered by the floral bracts.

- 36a. Inflorescence not over 5 cm long; sepals not over 20 mm long. Mexico, Peru.....T. lepidosepala, T. reducta
- 36a. Inflorescence to 50 cm long, simple, 2-3 cm wide; sepals to 30 mm long. Mexico.....*T. califanii
- 37(1). Inflorescence 3-5 cm long, simple or with a single small lateral spike.
- 37a. Scape distinct; scape-bracts longer than the floral bracts; flowers all exactly distichous. Mexico...T. lepidosepala
- 37a. Scape very short; scape-bracts shorter than the floral bracts; lower flowers slightly more than distichous. Guatemala.....*T. velickiana
- 49(1). Floral bracts strongly nerved.
- 49a. Sepals exerted; spikes linear, about 15 cm long. West Indies.....T. lineatispica
- 49a. Sepals included; spikes lanceolate or narrowly lanceolate, 5-8 cm long. Mexico.
- 49b. Primary bracts scarcely larger than the floral bracts or the inflorescence simple.....*T. maritima
- 49b. Primary bracts more than half as long as their axillary spikes; inflorescence always compound.....*T. hintoniana
- 57(1). Floral bracts prominently nerved.
- 57a. Upper scape-bracts distichous; leaf-blades 12-18 mm wide. Peru, Ecuador.....T. lindenii, T. umbellata
- 57a. Upper scape-bracts polystichous; leaf-blades 35 mm wide. Guatemala.....*T. nervata
- 83(2). Leaf-sheaths ferruginous (or dark brown).
- 83a. Sepals connate only posteriorly; (stamens exerted). Florida, West Indies and Mexico to northern South America. T. fasciculata
- 83a. Sepals equally connate into a tube for half their length, 4 cm long; (stamens included). Mexico....*T. beutelspacheri
- 89(1). Spikes thick; posterior sepals alate-carinate. Mexico.
- 89a. Floral bracts dull, laxly lepidote throughout, verrucose when dry as if somewhat fleshy.....T. intumescens
- 89a. Floral bracts lustrous and glabrous except the lepidote apex, even.....*T. langlasseana

Subkey III

- 10(1). Sepals lepidote. Mexico.
- 10a. Scape short, almost hidden by the leaves; leaf-sheaths 10-15 mm long, not at all inflated.....T. lepidosepala
- 10a. Scape elongate; leaf-sheaths 60 mm long, subinflated, dark castaneous.....*T. subinflata
- 14(2). Floral bracts ecarinate, nerves about equally developed.

- 14a. Upper scape-bracts long-laminate. Mexico; Ecuador and Peru.
T. gymnotrya, T. oroyensis
- 14a. Upper scape-bracts bladeless. Jamaica.....*T. adamsii
- 19(2). Floral bracts prominently nerved.
- 19a. Spikes more than 3-flowered. Paraguay, Bolivia, Brazil and Argentina; and Florida, West Indies and Mexico to Venezuela and Bolivia.....T. lorentziana, T. valenzuelana
- 19a. Spikes 3-flowered including a reduced sterile apical flower. Brazil.....*T. sucrei
- 22(2). Inflorescence simple or rarely of 2 spikes.
- 22a. Scape very short and mostly concealed by the leaves; upper scape-bracts polystichous. Salvador, Honduras.
T. cryptopoda
- 22a. Scape elongate; upper scape-bracts distichous. Ecuador.
 *T. rhodosticta
- 46(2). Floral bracts obtuse (add: "to acuminate"), nerved or rugose (add: "when dry"); rhachis prominently winged (excavated). Peru. to cover T. extensa Mez emend. Rauh.
- 48(1). Spikes 15 mm wide; floral bracts 20 mm long.
- 48a. Floral bracts glabrous; inflorescence amply tripinnate. Peru.....T. extensa
- 48a. Floral bracts cinereous-lepidote at apex; inflorescence bipinnate. Ecuador.....*T. lehmannii

Subkey IV

- 9(1). Branches nearly or quite straight, slender, sterile for about half their length from base.
- 9a. Leaf-blades 9-11 cm wide, green; sepals 25-27 mm long, slightly exerted above the floral bracts. Hispaniola.
T. paniculata
- 9a. Leaf-blades 1.5-2.5 cm wide, cinereous; sepals 18-20 mm long, wholly covered by the floral bracts. Peru.
 *T. propagulifera

Subkey V

- 11(1). Internodes of the rhachis 20-30 mm long.
- 11a. Floral bracts about equaling the internodes, equaling or shorter than the sepals; leaf-sheaths concolorous and merging gradually with the blades; (petal-blades narrow; stamens exerted). Florida, West Indies, Panama, northern South America.....T. flexuosa
- 11a. Floral bracts distinctly longer than the internodes, longer than the sepals; leaf-sheaths dark brown, contrasting with the blade; (petal-blades suborbicular; stamens deeply included). Ecuador.....
 *T. dodsonii

- 16(1). Floral bracts lepidote.
 16a. Leaf-sheaths large, distinct, very dark castaneous; floral bracts equaling or exceeding the sepals. Honduras.
T. steiropoda
 16a. Leaf-sheaths narrow, concolorous with and indistinguishable from the blades; floral bracts slightly exceeded by the sepals. Mexico.....*T. gracillima
- 17(1). Floral bracts 3 times as long as the internodes. Mexico.
 17a. Floral bracts convex, but not inflated nor cretaceous.
T. parryi
 17a. Floral bracts inflated, cretaceous.....*T. cretacea

Subkey VI

- 14(1). Pseudo-bulb elongate, one-third to more than one-half the total length of the plant.
 14a. Leaves even. Florida, West Indies and Mexico to Colombia.
T. circinnata
 14a. Leaves strongly sulcate even when living. Mexico.
*T. circinnatoides

Subkey VII

- 36(1). Floral bracts with convex sides, wrinkled when dry; spikes slightly compressed.
 36a. Spikes ovate or lanceolate, acute; floral bracts narrow and partially exposing the rhachis at anthesis. Mexico.
T. violacea
 36a. Spikes elliptic, very broadly acute or rounded; floral bracts ample, wholly covering the rhachis at all times.
 Mexico, Guatemala.....*T. eizii
- 35(2). Spikes 2-3 cm wide, lance-oblong to elliptic.
 35a. Leaf-blades 45-60 mm wide; (stamens included). Colombia and Venezuela; Peru.....T. cuatrecasasii, T. wurdackii
 35a. Leaf-blades 20 mm wide; (stamens exerted). Mexico.
*T. carlos-hankii

Subkey VIII

- 8(1). Bracts acute.
 8a. Scape distinct; scape-bracts longer than the floral bracts; flowers all polystichous. Mexico.....T. benthamiana
 8a. Scape very short; scape-bracts shorter than the floral bracts; upper leaves distichous. Guatemala.
*T. velickiana
- 10(1). Scape short or none; (add: "scales spreading especially along the leaf-margins. Bolivia.") (replacing T. nana but differing in its leaf-scales).....
*T. edithae

Subkey IX

- 1(1). Posterior and anterior sepals all ecarinate and alike.
 1a. Floral bracts fleshy, strongly rugose-sulcate in drying, 4-6 times as long as the internodes. Peru.....*T. carnosa
 1a. Floral bracts coriaceous or subcoriaceous, even to nerved, but not rugose in drying.....Remaining species under 1(1)
- 12(2). Spikes nutant.
 12a. Floral bracts 15-20 mm long. Venezuela to Peru.
T. denudata
 12a. Floral bracts 50 mm long. Mexico.....*T. superinsignis
- 34(2). Sepals 20 mm long. Ecuador.
 34a. Capsules about equaling the sepals; floral bracts narrow and partially exposing the rhachis at anthesis.
T. brevicapsula
 34a. Capsules more than twice as long as the sepals; floral bracts ample, wholly covering the rhachis at anthesis.
 *T. nervisepala
- 36(1). floral bracts 27-35 mm long.
 36a. Spikes more or less caudate-acuminate from a base 3-5 cm wide, sessile or subsessile. Ecuador, Peru...T. stenoura
 36a. Spikes elliptic and equally narrowed at base and apex, distinctly stipitate with a sterile base nearly equaling to exceeding the primary bracts. Peru.....*T. reuteri
- 45(1). Floral bracts oblong, (20-) 25 (-27) mm long. Peru.
 45a. Primary bracts barely exceeding the sterile bases of the branches; inflorescence tripinnate; sheaths concolorous with the blades.....T. glauca
 45a. Primary bracts 1/2 to 3/4 as long as the basal branches (spikes).
 45b. Sheaths dark violet; posterior sepals connate.
 *T. pomacochae
 45b. Sheaths concolorous with the blades; posterior sepals free
 *T. bongarana
- 54(1). Floral bracts drying pale.
 54a. Primary bracts scarcely longer than the floral bracts, apiculate; spikes linear-lanceolate. Colombia....T. reversa
 54a. Primary bracts large, the lower laminate and covering about half the axillary spike; spikes lanceolate. Peru.
 *T. dudleyi

Subkey X

- 1(1). Lower floral bracts less than twice the internodes; rhachis slender.
 1a. Flowers downwardly secund. Ecuador..*T. marnier-lapostollei
 1a. Flowers not secund as a whole but the petals sometimes

drooping. Colombia; Peru....T. rariflora, T. hutchisonii

2(2). Rhachis geniculate; inflorescence tripinnate. Peru.

2a. Leaves concolorous; blades ligulate, broadly subacute and apiculate; flowers subspreading.....T. hutchisonii

2a. Leaves strongly cross-banded; blades attenuate-ligulate to a stout cusp; flowers erect.....*T. hildae

9(2). Floral bracts broadly convex, ecarinate.

9a. Flowers suberect; margins of the floral bracts narrow, nearly or quite even. Bolivia and Argentina; Peru.

T. maxima, T. platyphylla

9a. Flowers subspreading; margins of the floral bracts broad, strongly bullate-cripsed. Peru.*T. undulato-bracteata

21. Inflorescence much branched; plant to 3.3 m high; (add: "floral bracts 4-5 times as long as the internodes, ample, covering nearly or all of each sepal; leaves thick.").

T. grandis

21. Inflorescence simple or few-branched; (add: "plant less than 2 m high; floral bracts 2-3 times as long as the internodes, narrow, exposing much of each sepal; leaves thin.").

T. viridiflora

Subkey XII

3(2). Floral bracts imbricate and concealing the rhachis; inflorescence erect or nearly so.

3a. Leaves 8-20 cm long, shorter than to equaling the inflorescence; blades narrowly triangular, 5-12 mm wide; floral bracts suborbicular. Colombia to Bolivia.....T. seemanii

3a. Leaves to 45 cm long, much exceeding the inflorescence; blades subfiliform, to 4 mm wide at base; floral bracts ovate. Venezuela.....*T. steyermarkii

29(2). Sepals rounded to truncate; leaf-blades (20-) 30-50 mm wide.

29a. Leaf-sheaths strongly inflated. Ecuador.....*T. blassii

29a. Leaf-sheaths nearly flat.....Remaining species under 29(2)

42(2). Branches divergent or curved-ascending.

42a. Leaf-blades linear, about 5 mm wide. Peru, Bolivia.

*T. parviflora

42a. Leaf-blades narrowly triangular or ligulate, 8-30 mm wide. Remaining species under 42(2)

TILLANDSIA

Relative to Mez in Engler, Pflanzenreich IV. Fam. 32. 1935.

ADAMSII R. W. Read, Phytologia, cf. preceding article in this issue. TIL.

ANDREANA E. Morr. ex André; Pflr. 496, TIL; L. B. Smith,

Contr. U. S. Nat. Herb. 29: 476, fig. 54. 1951; Rauh, Bromeliol. 1: 197. 1970. T. funkiana Baker, Pflr. 496; Padilla, Bromel. Soc. Bull. 17: 49 (fig.), 52. 1967. TTL.

M. B. Foster, Padilla, and others consider T. funkiana specifically distinct, while Rauh considers it a variety of T. andreana, although he has not gone so far as to give it a valid name. Foster's own collections show a great variation in stem length of flowering plants and are the original and continuing reason for my reducing T. funkiana. In reality we can not be sure until flowering T. andreana is collected from the topotype locality.

What is a much more interesting question is the position of the species within the genus. Technically it can be said to belong in subgenus Tillandsia but the corolla is asymmetric like those of most species of Pitcairnia and the recurving petal-tips expose the shorter of the unequal stamens.

BAKERI, Pflr. 502. PS-C. Omitted by mistake; insert after BAILEYI.

BEUTELSPACHERI Matuda, nom. nov. ALL. T. insignis Matuda, Cact. y Sucul. Mex. 16: 91, fig. 48. 1971, non L. B. Smith & Pittendrigh, 1953.

BLASSII L. B. Smith, Phytologia 22: 85, pl. 1, fig. 5, 6. 1971. PS-C.

BONGARANA L. B. Smith, sp. nov. A T. pomacochae Rauh, cui affinis, foliis concoloribus, sepalis liberis differt. ALL.

PLANT stemless, flowering 1 m high. LEAVES many in a funnelform rosette, to 45 cm long, green; sheaths broadly ovate, ca. 15 cm long, minutely appressed-lepidote; blades ligulate, attenuate at apex, flat, 4 cm wide, densely and minutely lepidote beneath, soon glabrous above. SCAPE erect, much exceeding the leaves; scape-bracts imbricate, the lowest sub-foliaceous, the others elliptic, acute. INFLORESCENCE fusiform, laxly bipinnate, glabrous; primary bracts like the upper scape-bracts, about half as long as the axillary spikes; spikes divergent, 7 cm long, lanceolate with a sterile bracteate base, densely 4-flowered, complanate. FLORAL BRACTS imbricate, oblong, acute, 3 cm long, exceeding the sepals, carinate, coriaceous, even, red; flowers subsessile. SEPALS free, linear, acute, 25 mm long, the posterior carinate; petals 35 mm long, the blades purple with white apices; stamens included. Pl. III, fig. E: Inflorescence; fig. F: Sepal.

PERU: AMAZONAS: Prov. Bongará: Epiphyte in moist high forest, hills 1-5 km southeast (150°) of Yambrasbamba, 2100-2400 m alt, 25 June 1962, Wurdack 1037 (US, type).

CALIFANII Rauh, Journ. Bromel. Soc. 21: 65, fig. 1971. TTL.

At first glance T. califanii so closely resembles T. achyrostachys that it is easily mistaken for that species. However, its densely lepidote floral bracts quickly distinguish it and even bring it out to a different position in the key from T. achyrostachys.

The leaf-sheaths are slightly different from the original description in that their scales are brown-centered like those

on the blade. The sheath-color is derived from the dark tissue below showing through the large pale scale-margins and covers only the base of the sheath.

CARLOS-HANKII Matuda, Cact. & Succul. Journ. (U. S.) 45: 186, fig. 1, 2. 1973. TIL.

CARNOSA L. B. Smith. TIL. IX-4 (2).

Var. CARNOSA. INFLORESCENCE bipinnate; branches spreading, the sterile base about twice as long as the 18 cm spike. FLORAL BRACTS to 5 cm long; flowers short-pedicellate. SEPALS free, to 42 mm long; stamens slightly exerted at anthesis.

Var. LONGISPICATA Rauh, ined. INFLORESCENCE bipinnate; branches ascending relative to the axis, 40 cm long, the sterile base only 6-15 cm long. FLORAL BRACTS 35-40 mm long; flowers sessile. SEPALS connate for 2 mm, to 30 mm long; stamens much exerted at anthesis.

Var. BREVISTIPITA Rauh, ined. INFLORESCENCE tripinnate at base; branches ascending relative to the axis, the basal sterile bases to 20 cm long; spikes 12-15 cm long with sterile bases 3 cm long. FLORAL BRACTS 30 mm long; flowers sessile. SEPALS connate for 3 mm, ca. 25 mm long; stamens much exerted at anthesis.

Owing to the relatively short floral bracts of the above variety, my key has had to be realigned to bring forward the fleshy character of the floral bracts. All three varieties have dense spikes with floral bracts 4-6 times the internodes where they are barely more than 2 in nearly related T. ecarinata.

CIRCINNATOIDES Matuda, Cact. & Succul. Journ. (U. S.) 45: 187, fig. 4, 4a, 5, 1973, as "circinnatioides." TIL. Matuda gives other distinctions than the sulcate leaves cited above but they are all covered in the very variable characters of T. circinnata. Horticulturists will thank him for giving a name to a taxon that was becoming a problem.

CRETACEA L. B. Smith, sp. nov. A T. inflata Mez, cui valde affinis, spicis laxis, internodiis longioribus, bracteis florigeris angustioribus differt. TIL.

PLANT known only from fragments but probably stemless and flowering over 1 m high. LEAVES ca. 50 cm long, bearing minute, appressed, brown-centered scales throughout; sheaths ample, densely lepidote, brownish; blades narrowly triangular, attenuate, 5 cm wide at base, laxly lepidote, green. SCAPE unknown. INFLORESCENCE laxly bipinnate, over 32 cm long, white-cretaceous except the petals; primary bracts broadly ovate, apiculate, about equaling the 1-bracteate sterile base of the spike; spikes oblong, acute, 20 cm long, laxly many-flowered; rhachis straight or nearly so, narrowly winged. FLORAL BRACTS strongly divergent at anthesis, 32 mm long, 3 times the internodes and about equaling the sepals, broadly elliptic, apiculate, ecarinate, inflated, probably fleshy because wrinkled and nerveless when dry, inconspicuously lepidote; pedicels short. SEPALS all alike, elliptic, 28 mm long, ecarinate; petals ca. 45 mm long, drying violet; stamens and style exerted. Pl. III, fig. A: Primary bract and spike;

fig. B: Sepal.

MEXICO: CHIHUAHUA: On igneous rocks, La Bufa, southeast of Creel, 22 September 1957, I. Knobloch 564 (US, type).

DODSONII L. B. Smith, sp. nov. A *T. narthecioides* Presl, cui affinis, bracteis florigeris quam internodiis haud subduplo longioribus, omnibus partibus multo majoribus differt. PHY.

PLANT flowering to 84 cm high. LEAVES many in a funnelform rosette, to 22 cm long, covered throughout with minute, flat, brown-centered scales; sheaths elliptic, ca. 4 cm long, dark brown; blades narrowly triangular, ca. 12 mm wide at base, the outer much reduced. SCAPE erect, slender, much exceeding the leaves; scape-bracts erect, imbricate, elliptic, apiculate. INFLORESCENCE erect, simple, lax, many-flowered; sparsely pale-lepidote; rhachis very slender, flexuous. FLORAL BRACTS spreading, to 30 mm long, exceeding the internodes and the sepals, ovate, convex and rolled around the sepals, thin-coriaceous, nerved; flowers short-pedicellate. SEPALS free, 20 mm long, elliptic, broadly acute; petal-blades suborbicular, spreading, 20 mm long, white with yellow eye; stamens and pistil deeply included. Pl. II, fig. F: Inflorescence; fig. G: Sepal.

ECUADOR: PICHINCHA: epiphytic in old orange trees along road, km 30 on Santo Domingo to Quito road, 1100 m, 27 December 1972, C. H. Dodson 5225 (US, type).

DUDLEYI L. B. Smith, sp. nov. A *T. reversa* L. B. Smith, cui verisimiliter affinis, bracteis primariis amplis, inferioribus laminatis, spicas axillares semiocculantibus, spicis lanceolatis differt. ALL.

PLANT stemless, flowering 30 to probably 50 cm high. LEAVES in a spreading rosette, 35-40 cm long, covered with fine, appressed, brown-centered scales; sheaths ample, 10-15 cm long, maculate with red-purple merging into solid purple at base; blades ligulate, attenuate, 2-3 cm wide, maculate, more or less cinereous beneath. SCAPE erect; scape-bracts erect, densely imbricate, subfoliaceous. INFLORESCENCE densely bipinnate, ellipsoid, 13-18 cm long; primary bracts broadly ovate, even, sublustrous, red, sparsely and obscurely lepidote, the lower laminate and covering about half the axillary spike; spikes lanceolate, acute, strongly complanate, 5-7 cm long, 15-20 mm wide, densely 8-12-flowered. FLORAL BRACTS broadly ovate, apiculate, 20-25 mm long, covering the sepals, strongly carinate, thin-coriaceous, even, glabrous, lustrous, bright blood-red (! Dudley), drying to stramineous; pedicels short. SEPALS lanceolate, acute, 18 mm long, the posterior carinate, connate for 5 mm; petal-blades elliptic, obtuse, 10 mm long, lavender (! Dudley); stamens and pistil included. Pl. III, fig. G: Inflorescence; fig. H: Posterior sepals.

PERU: CUZCO: Prov. La Convencion: Cordillera Vilcabamba: epiphyte 6-18 m (20-60 ft) in tree branches, very dense and damp cloud forest, about half way between Camp 2 $\frac{1}{2}$, 1730 m, and Camp 3, 2100 m, 12° 38' S, 73° 37' W, 24 July 1968, T. R. Dudley 11332 (NA, type); cloud forest, 90 m (300 ft) northwest of Camp 2 $\frac{1}{2}$, by cascade, 1750 m, 12° 38' S, 73° 38' W, 26 June 1968,

Dudley 10528 (NA); steep and dry ridge (ceja) of reduced elfin forest, just above Camp 4, 2660 m, 12° 37' S, 73° 33' W, 30 June 1968, Dudley 10637 (NA); epiphyte, Chusquea thicket at edge of steep dry ridge, half way between Camps 2½ and 3 in reduced elfin forest, 12° 38' S, 73° 36' W, 30 June 1968, Dudley 10657 (NA).

EDITHAE Rauh, ined. ALL. This takes the place of T. nana Baker, which was placed here because of its supposed simple inflorescence. T. nana takes the place of the later T. calocephala and Rauh has pointed out the close relationship with his T. edithae. Besides its simple inflorescence, T. edithae also differs in its shorter broader leaf-blades with spreading scales and in its larger petals.

EIZII L. B. Smith, sp. nov. A T. violacea Baker, cui valde affinis, spicis ellipticis, latissime acutis vel rotundatis, bracteis florigeris latioribus et rhachin omnino occultantibus differt. TIL.

PLANT stemless, flowering to 2 m high (extended). LEAVES densely rosulate, 50-70 cm long, covered with minute, appressed, brown-centered scales; sheaths elliptic, ample, 18 cm long, brown to dark purple; blades narrowly triangular, 5 cm wide, green. SCAPE stout, decurved; scape-bracts foliaceous, densely imbricate. INFLORESCENCE bipinnate, subax except at apex, over 1 m long; primary bracts spreading, their ample bases exceeding the lower branches, their blades foliaceous; spikes short-stipitate, elliptic, very broadly acute or rounded, 10 cm long, convex and slightly complanate. FLORAL BRACTS ample and densely imbricate, wholly concealing the rhachis, 30-35 mm long, broadly convex, probably fleshy because nerveless and strongly wrinkled when dry, glabrous, glaucous; flowers subsessile. SEPALS oblong, 25 mm long, subfree, the posterior incurved, alate-carinate; petal-blades erect, 30 mm long, violet; stamens exserted. CAPSULES slenderly cylindrical, 4 cm long. Pl. III, fig. C: Primary bract and spike; fig. D: Posterior sepals.

MEXICO: CHIAPAS: In wet forest, on tree, Cascada, Siltepec, 1200 m, 1 March 1951, E. Matuda 21012 (US, type; MEXU, isotype); San Cristobal las Casas, Mar 1949, Carlson 1652 e p (US); 29 Mar 1956, MacDougall s n (US); 22 Jan 1965, Breedlove & Raven 8299 (DS, US); Zinacantan, 31 March 1966, Laughlin 522 (US); 13 Apr 1966, 669 (US).

GUATEMALA: HUEHUETENANGO: San Mateo to Soloma, Feb 1969, Krukoff s n (US).

EXTENSA Mez, emend Rauh, Akad. Wiss. & Lit. Mainz "1973," no. 3: 29, fig. 16a-c, 17. 1973. TIL. III-48 (1).

PLANT stemless, flowering to 1.6 m high, producing many adventitious plants at base. LEAVES numerous, erect to spreading; sheaths 18-20 cm long, merging with the blades, brown-lepidote; blades cinereous-lepidote. SCAPE glabrous or sparsely lepidote. INFLORESCENCE broadly pyramidal, 50 cm long; axis straight, faintly angled, puniceous; spikes to 25 cm long. CAPSULE slenderly cylindrical, ca. 5 cm long.

PERU: LAMBAYEQUE: on rock, Rio Sana Valley, 7° 05' S, 79° 44' W, 600-700 m, August 1970, Rauh 24168 (HEID, US).

GRACILLIMA L. B. Smith, sp. nov. A T. setacea Sw., cui verisimiliter affinis, spicis laxis, sepalis paulo exsertis differt. TIL.

PLANT flowering 45-60 cm high (! Foster). LEAVES (unattached) fasciculate (?), 40 cm long, covered with pale subappressed scales; sheaths narrow, concolorous and merging with the blades, blackish and auricled at extreme base; blades very narrowly triangular, filiform-attenuate, ca. 5 mm wide at base, more or less involute at least when dry. SCAPE erect, very long and slender; scape-bracts erect, imbricate, the lower subfoliaceous, the upper lanceolate, apiculate. INFLORESCENCE typically 2-branched; primary bract like the upper scape-bracts, much shorter than the axillary spike; spikes elliptic with a narrow, sterile, bracteate base, lax; rhachis slender, nearly straight. FLORAL BRACTS strongly divergent at anthesis and exposing the rhachis, ovate, acute, to 19 mm long, convex, white-lepidote, thin-coriaceous, nerved at apex; pedicels short, obscure. SEPALs oblong, acute, 22 mm long, slightly exserted, glabrous, the posterior carinate, connate for 10 mm; petals tubular-involute, ca. 4 cm long, violet; stamens exserted. Pl. II, fig. H: Scape and inflorescence; fig I: Posterior sepals.

MEXICO: PUEBLA: near Cholula, February 11, 1958, M. B. Foster 3033 (US, type).

21. Inflorescence much branched; plant to 3.3 m high; (add: "floral bracts 4-5 times as long as the internodes, ample, covering nearly or all of sepal; leaves thick.").

T. grandis

21. Inflorescence simple or few-branched; (add: "floral bracts 2-3 times as long as the internodes, narrow, exposing much of each sepal; leaves thin.").

T. viridiflora

GRANDIS Schlecht.; Pflr. 455. PSA. Further study has revealed more distinctions between this species and T. viridiflora. Cf. key, X - 21 above.

HILLDAE Rauh, Journ. Bromel. Soc. 21: 139, photo 1-4. 1971, nomen, without Latin diagnosis; valid publication: Akad. Wiss. & Lit. Mainz, no. 3: 19, fig. 9-13. 1973. T. platyphylla sensu L. B. Smith, Phytologia 13: 146. 1966, quoad Hutchison & Wright 3516, non Mez, 1906. TIL.

HINTONIANA L. B. Smith, sp. nov. A T. lineatispica Mez et T. maritima Matuda, quibus affinis, bracteis primariis magnis a T. bourgaei Baker, quam simulans, foliis concoloribus viridibus, bracteis primariis angustioribus, laminis suis vix distinctis differt. TIL.

PLANT stemless, flowering 40-70 cm high. LEAVES over 10 in a funnelform rosette, 30-50 cm long, concolorous and green or slightly darkened at extreme base, covered with minute, appressed, brown-centered scales; sheaths ovate, ca. 10 cm long; blades narrowly triangular, 15-25 mm wide, flat. SCAPE erect; scape-bracts erect, densely imbricate, subfoliaceous. INFLORESCENCE densely bipinnate, subcylindric or fusiform, 13-26 cm

long; primary bracts large but typically somewhat shorter than their axillary spikes; spikes sessile, suberect, lanceolate, acute, 5 (-8) cm long, 2 cm wide, complanate. FLORAL BRACTS densely imbricate and concealing the rhachis at anthesis, 3 cm long, exceeding the sepals, ovate, attenuate, thin, nerved, sharply carinate, glabrous or subglabrous; flowers subsessile. SEPALs lanceolate, acute, 25 mm long, thin, nerved, glabrous, the posterior carinate, short-connate; petals erect, ca. 4 cm long; stamens exerted. CAPSULE slenderly cylindrical, 3-4 cm long. Pl. I, fig. I: Primary bract and spike; fig. J: flower.

MEXICO: MEXICO: Dist. Temascaltepec: On oak, Tejupilco, 18 April 1935, G. B. Hinton 7636 (US, type; GH, isotype); dry rocky slope, Cerro de la Muñeca, 1500 m, 27-28 February 1954, Matuda 30516 (MEXU, US); dry slope, high matorral, Ixtapantongo to La Junta, 600-800 m, 24-25 April 1954, Matuda 30662 (MEXU, US); moist slope, mixed oak and pine forest, Canada de Nanchititla, 1600 m, 25-26 May 1954, Matuda 30791 (MEXU, US); moist ravine, Malinalco to Charma, 1300 m, 22 April 1954, Matuda 32175 (MEXU, US).

The concentration of Matuda's collections in 1954 suggests that this species has flowering years like many bamboos and like my own experience with Nidularium micrope in Rio de Janeiro.

INTUMESCENS L. B. Smith var. BREVILAMINA L. B. Smith, var. nov. A var. intumescenti bractearum primariorum laminis quam spicis multo brevioribus, spicis subduplo majoribus differt. TIL. Pl. I, fig. G: Lower primary bract and spike; fig. H: Posterior sepals.

MEXICO: MICHOACAN: cult. Sue Gardner (US, type).

LANGLASSEANA Mez, Bull. Herb. Boiss. II. 3: 142. 1903. TIL.

Owing to a confusion of the type with another collection, I formerly placed this species in the synonymy of T. bourgaei Baker (North American Flora 19: 140. 1938). In reality it is a distinct species and is more nearly related to T. intumescens L. B. Smith as indicated in the key above.

LEHMANNII Rauh, ined. TIL. Ecuador.

MARITIMA Matuda, Cact. y Sucul. Mex. 16: 90, fig. 47. 1971. TIL.

MARNIER-LAPOSTOLLEI Rauh, Journ. Bromel. Soc. 22: 41, figs. (p. 40, 42). 1972, nomen, without Latin diagnosis; valid publication: Akad. Wiss. & Lit. Mainz "1973", no. 3: 6, fig. 1-3. 1973. ALL.

MOSCOSOI L. B. Smith & Jiménez, Phytologia 5: 281. 1955; Revist. Soc. Cub. Bot. 12: 65. 1955. TIL. VII-30 (1).

NANA Baker; Pflr. 549. ALL.

PERU: without exact locality, Gay s n (P, type).

BOLIVIA: COCHABAMBA: Río Montehuaiko, June 1911, Herzog 2300 (L, type of T. calocephala Wittm.; F photo 11484).

Examination of the type of T. nana shows that it has a depauperately compound inflorescence not a simple one and that consequently it equals and replaces the later T. calocephala Wittm.

NERVATA L. B. Smith, sp. nov. Sepalis posterioribus alato-carinatis T. punctulata Schlecht. & Cham. (Subgen. Tillandsia) affinis sed foliorum vaginis pallidis et scapi bracteis inflorescentiam haud involucrentibus differt. TIL.

PLANT flowering to 66 cm high. LEAVES many in a more or less funnellform rosette, to 55 cm long, green, minutely appressed-lepidote throughout; sheaths merging with the blades, large; blades narrowly triangular, ca. 35 mm wide. SCAPE erect, stout, about equaling the leaves; scape-bracts all polystichous, erect, densely imbricate, the lower foliaceous with long blades, the upper ovate, acute and apiculate, subinflated, sublustrous. INFLORESCENCE simple, 12 cm long, 4 cm wide, lanceolate, acute, complanate, ca. 10-flowered. FLORAL BRACTS erect and densely imbricate, 45 mm long, ovate, acuminate, subcoriaceous, nerved, carinate, bright red (! L. O. Williams), lepidote at apex, elsewhere glabrous; flowers subsessile. SEPALS 30 mm long, elliptic, acute, glabrous, the posterior alate-carinate, nearly free. Pl. I, fig. K: Inflorescence; fig. L: Posterior sepals.

GUATEMALA: SAN MARCOS: Montane cloud forest area on outer slopes of Tajumulco Volcano, Sierra Madre Mountains, about 10 km west of San Marcos, 2400-2700 m, 3 January 1965, L. O. Williams et al. 27215 (F, type).

The petals and stamens of Tillandsia nervata are very immature but in all probability they are of the subgenus Tillandsia type, although in an artificial key they come close to species of subgenus Phytarrhiza. There is also the lesser possibility of its belonging to subgenus Allardtia.

NERVISEPALA (Gilmartin) L. B. Smith, comb. nov. T. fendleri Griseb. var. nervisepala Gilmartin, Phytologia 16: 157. 1968. ALL.

PARVIFLORA R. & P. PS-C. XII-47 (1).

Var. PARVIFLORA. Scape-bracts acute or attenuate. Inflorescence bipinnate.

Var. EXPANSA L. B. Smith, Phytologia 22: 87, pl. 1, fig. 7. 1971. Scape-bracts long-caudate. Inflorescence amply tripinnate.

POMACOCCHAE Rauh, Akad. Wiss. & Lit. Mainz "1973", no. 3: 25, fig. 14-15. 1973. ALL.

PROPAGULIFERA Rauh, Akad. Wiss. & Lit. Mainz "1973", no. 3: 10, fig. 4-6. 1973. TIL.

As indicated in the key above, T. propagulifera closely resembles T. paniculata (L.) L. in habit, the most distinctive difference in photographs being the much narrower leaf-blades of T. propagulifera.

PYRAMIDATA André. ALL. IX-43 (1).

Var. PYRAMIDATA. Flowers all normal.

Var. VIVIPARA Rauh, Akad. Wiss. & Lit. Mainz "1973", no. 3: 17, fig. 7, 8. 1973. Flowers largely viviparous.

REUTERI Rauh. ined. ALL. In his manuscript, Rauh compares this species with T. glauca L. B. Smith, but its strongly beaked floral bracts places it next to T. stenoura Harms in my key.

RHODOSTICTA L. B. Smith, sp. nov. A T. deppeana Steud., cui verisimiliter affinis, inflorescentia simplici, bracteis florigeris laevibus differt. A T. pretiosa Mez, Quam valde simulans, foliis rubropictis, inflorescentia laxiore differt. ALL.

PLANT presumably stemless, flowering ca. 50 cm high. LEAVES to 28 cm long, inconspicuously appressed-lepidote throughout, green with prominent red spots; sheaths elliptic, 6 cm long; blades narrowly triangular, 15-20 mm wide at base. SCAPE slender, curved; scape-bracts erect, imbricate, the lower polystichous, subfoliaceous but much reduced, the upper like the floral bracts but smaller and distichous. INFLORESCENCE simple, linear-lanceolate, acute, to 27 cm long, 4 cm wide, strongly complanate, glabrous; rhachis slender, nearly straight. FLORAL BRACTS distichous, divergent at anthesis and exposing the rhachis, elliptic, acute, to 44 mm long, exceeding the sepals, 11 mm wide on the side, carinate, coriaceous, even, sublustrous, rose with a violet apex. SEPALS free, linear, acute, 35 mm long, thin, nerved, the posterior carinate; petal-blades elliptic, obtuse, dark blue (! Blass); stamens included. Pl. II, fig. D: Scape and inflorescence; fig. E: Sepal.

ECUADOR: AZUAY: Cuenca, 1967, cultivated by Alfred Blass (US, type), in 1970.

SCHUNKEI L. B. Smith, sp. nov. A T. caerulea H.B.K., cui verisimiliter affinis, spica multiflora, floribus multo minoribus, sepalis dense lepidotis, petalis breviter unguiculatis differt. PHY.

PLANTS evidently in dense masses; roots present; stems at least 4 cm long, ca. 8 mm thick including the leaf-sheaths. LEAVES polystichous, to 17 cm long, densely cinereous-lepidote with retrorse-divergent scales; sheaths suborbicular, 8 mm long; blades filamentous, nearly straight, ca. 2 mm wide at base. Scape erect, 1 mm thick, glabrescent; scape-bracts involute, erect, ovate with a filiform apex, shorter than the internodes. Inflorescence simple and distichous-flowered or rarely a short branch at base, densely lepidote except the petals, lax, many-flowered; rhachis slender, straight. FLORAL BRACTS broadly ovate, acute, about half as long as the sepals; flowers strongly divergent, more than twice as long as the internodes. SEPALS free, lance-elliptic, acute and beaked, 5 mm long, carinate; yellowish when dry, the claw very short, the blade elliptic, acute, mostly included; stamens deeply included but exceeding the pistil; anthers apiculate. Style about equaling the ovary. CAPSULE slenderly cylindrical, 15 mm long. Pl. I, fig. A: Inflorescence; fig. B: Sepal; fig. C: Petal; fig. D: Stamens & pistil.

PERU: TUMBES: Zarumilla: Matapalo: Campoverde 68 km from Tumbes, dry woods, 600-800 m alt., 14 December 1967, J. Schunke V. 2404 (US, type; F, isotype).

STENOURA var. TRIPINNATA (L. B. Smith) L. B. Smith, Phytologia 21: 93. 1971. T. deppeana var. tripinnata L. B. Smith, Phytologia 5: 49. 1954. T. stenoura var. gonzalezii Gilmartin,

Phytologia 16: 155. 1968. T. fendleri var. fendleri sensu L. B. Smith, Phytologia 20: 175. 1970. ALL.

STEYERMARKII L. B. Smith, sp. nov. A T. seemanii (Baker) Mez, cui affinis, foliorum laminis subfiliformibus, inflorescentiam subduplo superantibus, bracteis florigeris ovatis differt. PS-C.

PLANT stemless, flowering to 15 cm high. LEAVES in a sub-bulbous, ovoid rosette, to 45 cm long, covered with appressed, brown-centered scales; sheaths ovate, to 7 cm long, dark castaneous; blades subfiliform, to 4 mm wide at base, involute, green. SCAPE erect, slender; scape-bracts erect, imbricate, the lower with foliaceous blades, the upper acute. INFLORESCENCE simple, oblong, 3 cm long, complanate, ca. 8-flowered. FLORAL BRACTS imbricate, ovate, 8 mm long, convex, thin, nerved, densely lepidote. SEPALS asymmetric, obovate, truncate, 3 mm long, thin, densely pale-lepidote. Pl. III, fig. I: Leaf; fig. J: Inflorescence; fig. K: Sepal.

VENEZUELA: YARACUY: virgin cloud forest at the crest of the range, El Amparo to Candelaria, 7-10 km north of Norte de Salom, 1200-1300 m, 27-30 December 1972, J. A. Steyermark, V. C. Espinoza & E. Diederichs 106763 (US, type; VEN, isotype).

SUBINFLATA L. B. Smith, sp. nov. Ab omnibus speciebus subgeneris Tillandsiae, foliorum laminis anguste triangularibus, cinereo-lepidotis, vaginis subinflatis, atro-castaneis, bracteis florigeris lepidotis, sepala superantibus, sepalis lepidotis, posterioribus carinatis differt. TIL.

PLANT (known only from fragments) flowering at least 25 cm high. LEAVES almost certainly rosulate, over 30 cm long, covered with fine, subspreading, cinereous scales; sheaths sub-orbicular, 6 cm long, subinflated, dark castaneous; blades very narrowly triangular, ca. 15 mm wide at base, involute, contorted. SCAPE erect; scape-bracts erect, imbricate, lanceolate, attenuate, cinereous-lepidote. INFLORESCENCE typically simple although separate spikes appear to have been lateral, to 11 cm long, lax, apically distichous-flowered, basally polystichous; rhachis slender, flexuous, lepidote. FLORAL BRACTS divergent, lepidote, ecarinate, equaling or exceeding the sepals, the lower like the scape-bracts, the upper ovate, acute, red; flowers subsessile. SEPALS oblong, subacute, 25 mm long, lepidote, the posterior carinate, more or less connate; petals tubular-convolute, 4 cm long, violet; stamens exserted. Pl. II, fig. A: Leaf; fig. B: Inflorescence; fig. C: Posterior sepals.

MEXICO: ZACATECAS: without exact locality, cult. & comm. A. Blass (US, type), June 1973.

SUCREI E. Pereira, Rodriguesia 26: 115, pl. 4. 1971; Leandra 2, no. 2: 70, pl. 7. 1972. ANO.

Although it is fairly clear that this is a new species it is not certain where it should be inserted in my key. Neither of the descriptions states whether the floral bracts are lepidote or glabrous or whether even or nerved.

SUPERINSIGNIS Matuda, Cact. & Succul. Journ. (U. S.) 45: 189,

fig. 6. 1973. TIL. Cf. also under Subkey IX because the form of the leaf-blade is uncertain in the description and may well be in fact also. There are tillandsias such as T. multiflora Benth. that vary from a perfectly triangular blade to a subligulate one. In either case T. superinsignis is abundantly distinct in my key.

TECTORUM E. Morr. ALL. I-37 (2).

Var. TECTORUM. Leaf-blades filiform-attenuate, to 20 cm long, 4 mm wide at base. Spikes to 45 mm long and 7-flowered.

Var. BRACHYPHYLLA Rauh, ined. Leaf-blades attenuate to a blunt apex, 5-7 cm long, 5 mm wide at base. Spikes 15 mm long and 2-3-flowered.

TERES L. B. Smith, emend. Rauh, Akad. Wiss. & Lit. Mainz 1973¹; no. 3: 33, fig. 18-20. 1973. TIL. IX-16 (1).

PLANT stemless, flowering 2 m long when extended. LEAVES to 80 cm long; blades 8 cm wide. SCAPE to 60 cm long, 3 cm thick at base; upper scape-bracts rufescent-violet. INFLORESCENCE laxly 2-3-pinnate, 1.4 m long; branches to 60 cm long; spikes to 20 cm long; rhachis internodes 5-7 mm long. FLORAL BRACTS to 27 mm long and wide. SEPALS 14-22 mm long; petals exceeding the floral bracts by about 1 cm.

Data from Rauh 2221⁴ (HEID, US, topotype).

UNDULATOBRACTEATA Rauh, ined. ALL. In his manuscript, Rauh relates this species to T. hutchisonii L. B. Smith, but by emphasizing the relative length of the floral bracts my artificial key places it with T. maxima and T. platyphylla Mez. In reality, T. undulatobracteata is immediately distinguishable from all species of subgenus Allardtia by the broad, bullate-crested margins of its floral bracts.

VELICKIANA L. B. Smith, sp. nov. T. lepidosepala L. B. Smith et T. benthamiana Kl. ex Baker affinis, sed scapo brevissimo, scapi bracteis quam bracteis florigeris brevioribus differt.

PLANT flowering to 12 cm high. LEAVES very many in a dense spreading rosette, to 11 cm long, covered with subspreading cinereous scales; sheaths elliptic-oblong, merging with the blades; blades very narrowly triangular, filiform-attenuate, soon involute, ca. 1 cm wide at base. SCAPE very short and hidden by the leaves; scape-bracts elliptic, caudate to apiculate, green, subcoriaceous, lepidote, shorter than the floral bracts, subinvolucrate beneath the inflorescence. INFLORESCENCE erect, simple, 6 cm long, 2 cm wide and nearly as thick, subfusiform, narrowly acute, densely few-flowered. FLORAL BRACTS slightly more than distichous at base, exactly so above, ovate, acute, 4 cm long, much exceeding the sepals, ecarinate, thin, roseate, subdensely white-lepidote; flowers subsessile. SEPALS elliptic, obtuse, 28 mm long, free, thin, sparsely lepidote, the posterior carinate; petals erect in a tube, 4 cm long, white; stamens exerted. Pl. I, fig. E: Inner leaves and inflorescence; fig. F: Flower.

GUATEMALA: without exact locality, cultivated in Los Angeles, California, September 1973, G. J. Velick s. n. (US, type).

Plate I

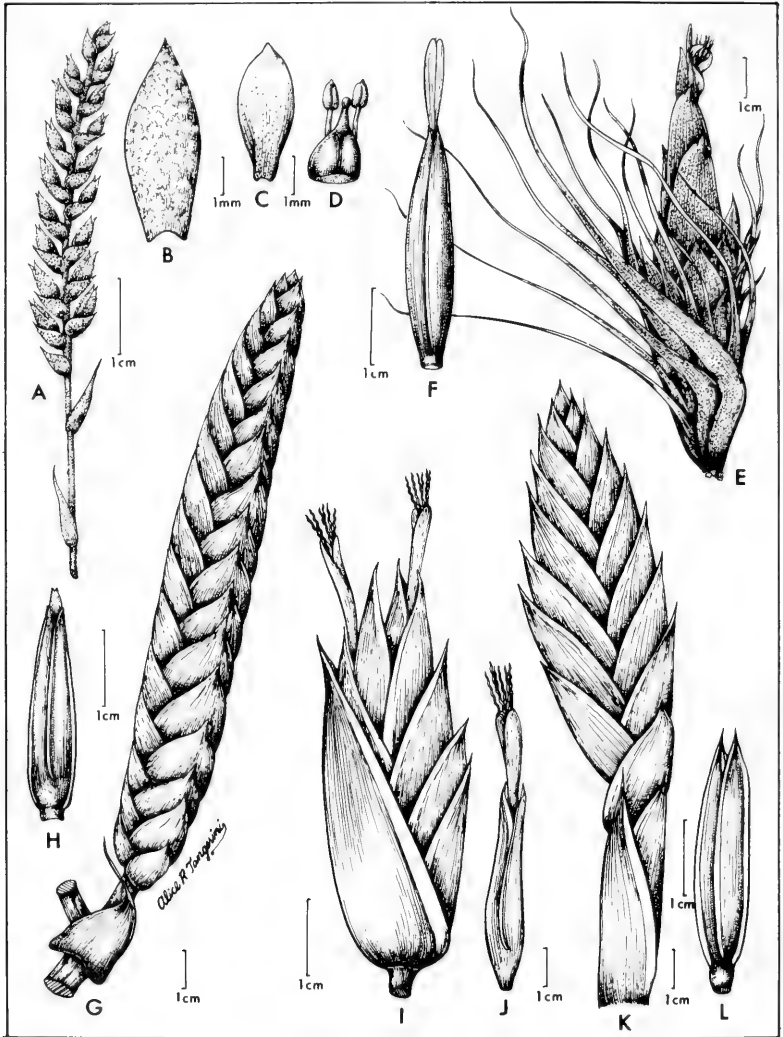


Fig. A-D: *Tillandsia schunkei*. E, F: *T. velickiana*.
 G, H: *T. intumescens* var. *brevilamina*.
 I, J: *T. hintoniana*. K, L: *T. nervata*.

Plate II

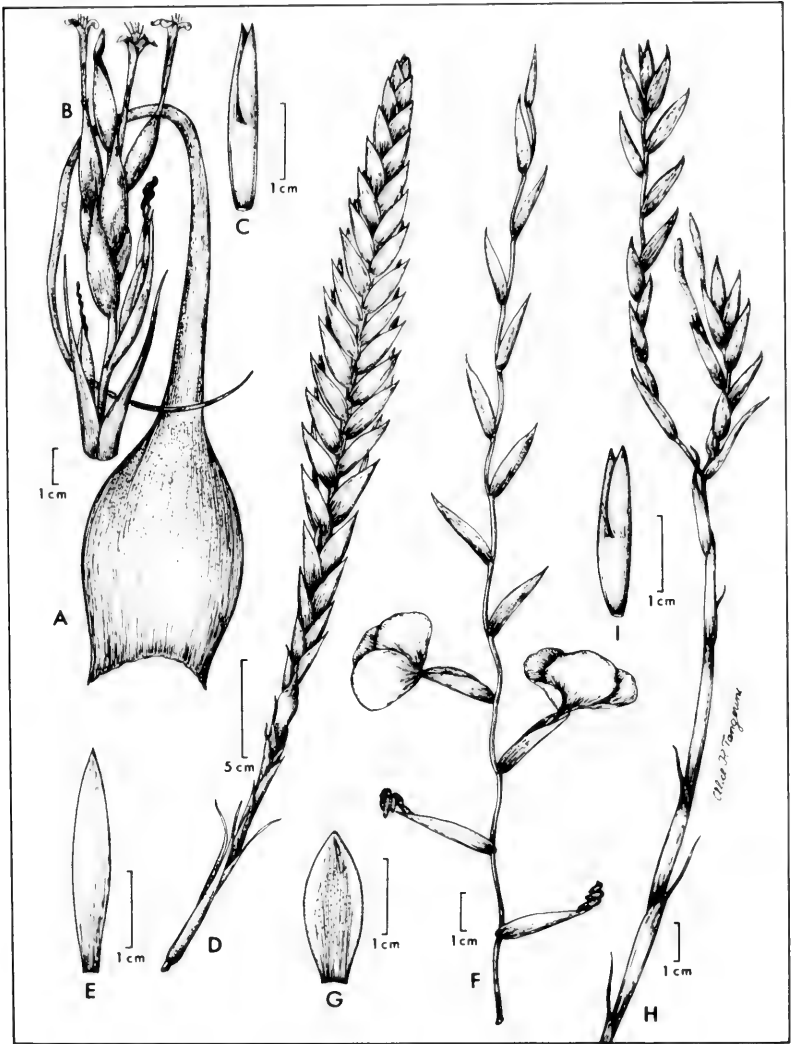


Fig. A-C: *Tillandsia subinflata*. D, E: *T. rhodosticta*.
 F, G: *T. dodsonii*. H, I: *T. gracillima*.

Plate III

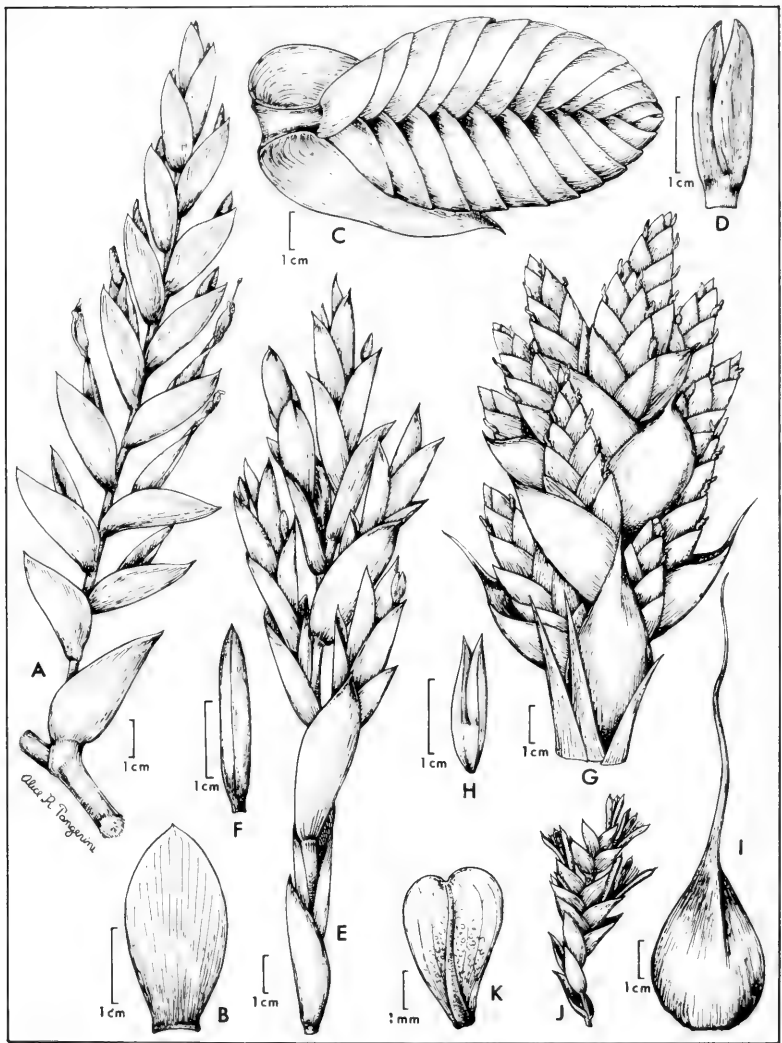


Fig. A, B: *Tillandsia cretacea*. C, D: *T. eizii*.
 E, F: *T. bongarana*. G, H: *T. dudleyi*.
 I-K: *T. steyermarkii*.

STUDIES IN THE LIABEAE (ASTERACEAE). II.

PRELIMINARY SURVEY OF THE GENERA

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Two related papers have been concerned with the tribal status of the Liabeae and with the four genera of the Liabeae that have been classified in four separate tribes (Robinson & Brettell 1973; Robinson & Cuatrecasas 1973). The major remaining problems that are treated in this paper involve the detailed analysis of the primary genus, Liabum, and the summary of the revised generic concepts of the tribe.

The present treatment recognizes fourteen genera in the tribe Liabeae with the increase derived entirely from the dissection of the overly expanded concept of Liabum. As conceived by Bentham (1873) and Hoffmann (1894), Liabum included a variety of habits equal to that in the vast genus Senecio. All illusions of an intergrading series disappear on examination of microscopic structures. Supporting evidence is obtained from pollen, style branches, corolla shapes, stipules, raphids, minute details of pappus, stomates on corollas, exothecial cells, nectaries, ray flower length, ornamentation of receptacles, corolla and achene pubescence, carpopodia, filaments and phyllaries. The characters have all proven to correlate rather well with macroscopic features and all the resulting genera can be recognized by a combination of habit, leaf venation, inflorescence form and pappus.

The relationships among the Liabeae prove to be much more complex than previous treatments would indicate. Some general groupings are obvious, however. The Munnozia group is particularly distinct with the black anthers, distinct disk corolla tubes, very prominent rays, short raphids in the achenes and short style branches. The Paranephelius group has pale anthers large pollen with simple spines, long raphids in the achenes and long style branches. The Liabum group has comparatively small spores and rather short rays and includes many variations having sometimes shrubby habits or filiform style branches, short raphids in the achenes, very narrow tubes of the disk corollas or corolla lobes without evident stomata. The remaining groups including Sinclairia and Austroliabum have long raphids in the achenes, large pollen with more complex spines and intermediate length style branches. The analysis of the tribe indicates that the reduced habit of a few more basal leaves and a small scapose inflorescence has evolved in four

separate groups, Liabum, Liabellum, Chrysactinium and Pseudonosseris. The eppapose condition has evolved in two genera, Cacosmia and Philoglossa.

Most of the microscopic characters used in the tribe are easily seen in dissections but two characters require special notice. The raphids in the achene wall are inside the cells of the various layers and usually cannot be seen without a clearing agent. A clearing agent such as Hoyer's solution is definitely required to observe the differentiated cell tips in the pappus of Liabum, Oligactis and Chionopappus. In water only the slightest differentiation of the cell tips can be seen but the combination of clearing and the altered index of refraction in Hoyer's solution reveals a very small thin-walled acumination or apiculus on the tip of each tooth. The pappus character is often difficult to see but in only one species in the group of three genera, Liabum domingense, has it proven to be lacking.

This study has benefited from reference to extensive notes maintained by Dr. Jose Cuatrecasas and from Liabum material on loan to Dr. Cuatrecasas from the Field Museum in Chicago.

The genera can be distinguished by the following keys. The first key uses the more obvious characters while the second key attempts to reflect more of the relationships.

Key to Genera

1. Corolla tube abruptly expanding into rather tubular base of limb; anther thecae partly or totally black; style branches rather short, not more than ten times as long as wide; heads usually on very long slender unbranched peduncles, never congested 2
1. Corolla tube gradually expanding into limb; anther thecae pale or brownish; style branches short to very elongate, sometimes filiform; heads never on very long slender unbranched peduncles, often congested 4
2. Pappus very vestigial or lacking; at least the stipules of the leaves bearing hairs with much enlarged basal cells; tube of disk corolla 2-3 times as long as wide
Philoglossa
2. Pappus with prominent setae or squamae or both; leaves not bearing hairs with much enlarged basal cells; tube of disk corolla much longer 3
3. Plants with leaves in basal rosettes; inflorescence of single heads on very long unbranched peduncles; corolla lobes with short-stalked capitate glands scattered over outer

- surface, without longer glands or hairs; anther collars with prominent transverse annular thickenings obscuring cell pattern Chrysactinium
3. Plants small to robust herbs with distinct leafy stems, usually with branching inflorescence; corolla lobes usually with elongate hairs or glands near tips; anther collars with annular thickenings not obscuring cell limits Munnozia
 4. Plant a basal rosette with heads sessile and immersed Paranephelius
 4. Plant with heads raised on short to elongate pedicels 5
 5. Pappus completely absent, achene completely glabrous Cacosmia
 5. Pappus present, achene with at least a few glands or setae 6
 6. Pappus setae plumose, in one series; corollas of disk flowers red or purple Chionopappus
 6. Pappus not plumose, usually in more than one series; all flowers yellow 7
 7. Inflorescence with all or all but most basal bracts and branches subopposite and alternate; receptacle minimally alveolate, without any hairs, chaff or projections 8
 7. Inflorescence with all or with primary bracts and branching opposite; receptacle with minute hairs or chaff or projections 10
 8. Pappus with inner setae broadened and flattened like outer squamae; small high elevation plants Angelianthus
 8. Pappus with setae narrow and mostly terete 9
 9. Plants with leaves in basal rosette, leaf venation essentially pinnate; pollen spines simple without evident multiple chambering at base Pseudonosoris
 9. Plants with prominent erect leafy stems, primary leaves prominently trinervate; spines of pollen with distinct complex chambering in base Austroliabum
 10. Plants shrubs, vines or trees; leaves with pinnate venation

- achenes bearing both glands and setae 11
10. Plants small to large herbs; leaves rather prominently trinervate; achenes with or without glands 12
11. Scandent shrubs; leaf bases not stipulate or with only adjacent lobe on node; raphids in walls of achene quadrate; tips of cells of pappus teeth with specialized thin walled mucro Oligactis
11. Shrubs and small trees; leaf bases with stipules fused into small sheath; raphids in walls of achene elongate; tips of cells of pappus teeth not specialized Ferreyranthus
12. Leaves deeply palmately lobed; small few headed plants with underground tuber Liabellum
12. Leaves dentate to entire, not palmately lobed; small to larger herbs without underground tuber 13
13. Petiole bases and nodes without wings or lobes, leaves sometimes in whorls of three or more; stems usually not white tomentose, mostly terete; inflorescence in thyrsoid or corymbose panicle; ray flowers often lacking; pollen grains 35-50 μ in diam.; achenes with elongate raphids in walls; tips of teeth of pappus setae not specialized Sinclairia
13. Petiole bases or nodes with wings or lobes, leaves always opposite; stems always white tomentose or flocculose pubescent; inflorescence a cymose panicle; ray flowers always present; pollen grains 25-35 μ in diam; achenes with quadrate raphids in walls; tips of cells in pappus teeth with thin-walled mucro Liabum

Alternative Key

1. Anther thecae black; peduncles usually elongate; corollas abruptly expanded above tube; style branches rather short Munnozia, Chrysactinium, Philoglossa
1. Anther thecae pale; peduncles usually short; style branches often very long 2
2. Pappus in one row or lacking; achene without distinct carpopodium 3
2. Pappus in 2-3 rows; achene with distinct carpopodium 4

3. Pappus lacking; corolla lobes without stomata; heads with few broad rays Cacosmia
3. Pappus with plumose setae; corolla lobes with stomata near margin; heads with many narrow rays Chionopappus
4. Pappus with tips of projecting cells bearing a minute thin-walled mucro; walls of achenes with cells containing quadrate raphids; pollen grains 25-35 μ in diam. corolla lobes without evident stomata 5
4. Pappus with tips of projecting cells not specialized; walls of achenes with cells containing elongate raphids; pollen grains mostly 35-50 μ in diam; corolla lobes usually with evident stomata 6
5. Plant small to large herbs; leaves slightly to strongly trinervate; inflorescence cymose or subcymose; achenes with only setae and no glands Liabum
5. Plants scandent shrubs; leaves pinnately veined; inflorescence a corymbose or thyrsoid panicle; achene with glands and setae Oligactis
6. Plants with leaves mostly in basal rosettes; pollen grains with spines simple internally 7
6. Plants with prominent erect leafy stems; pollen grains with spine bases intricately chambered internally 9
7. All pappus elements flattened Angelianthus
7. All least inner pappus elements capillary 8
8. Heads sessile in basal rosette; receptacle with high ridges enclosing bases of achenes; phyllaries rather broad and blunt Paranephelius
8. Heads on laxly branched scape; receptacle nearly smooth; phyllaries rather narrow with long slender tips Pseudonosaris
9. Shrubs or small trees; upper surfaces of leaves usually rugose, leaf venation pinnate Ferreyranthus
9. Herbs or straggling shrubs; upper surfaces of leaves rather smooth, leaf venation prominently trinervate 10
10. Most or all bracts and branches of inflorescence subopposite

or alternate; achene narrowed at base with small carpopodium, ribs very prominent; leaves never in whorls; ray flowers always present Austroliabum

10. Most bracts and branches of inflorescence opposite; achene cylindrical with very large carpopodium, ribs rather weak; leaves often in whorls; ray flowers often lacking 11
11. Leaves sessile or winged to base, palmately lobed; small plants with basal tuber Liabellum
11. Leaves petiolate without wings or stipules, not lobes; plants without basal tuber Sinclairia

ANGELIANTHUS H. Robinson & R.D. Brettell nom. nov. Liabellum Cabrera, Not. Mus. La Plata 17, Bot. no. 84:76. 1954. (not Liabellum Rydberg) T. Liabellum humile Cabrera, originally monotypic.

The genus is named for Dr. Angel L. Cabrera, the author of the species.

Angelianthus humilis (Cabrera) H. Robinson & R.D. Brettell, comb. nov. Liabellum humile Cabrera, Not. Mus. La Plata 17, Bot. No. 84:78. 1954.

AUSTROLIABUM H. Robinson & R.D. Brettell, genus novum Asteracearum (Liabeae). Plantae herbaceae vel suffruticentes. Folia opposita vel subopposita distincte petiolata, petiolis alatis vel base stipulatis, laminis triangularibus vel lanceolatis subtus vel utrinque albo-tomentosis, nervis basilaribus trifidis. Inflorescentiae plerumque cymosae superne alternate ramosae, pedicellis saepe elongatis. Capitula late campanulata; squamae involucri ca. 3-4 seriatae inaequales vel subaequales anguste attenuatae extus plerumque glandulis longiuscule stipitatis dense obsitae; receptacula admodum glabra. Flores ca. 50-200; radii 1-2-seriati longi, corollis base perangustis hirsutis; corollae disci inferne sensim perangustae parce hirsutae, lobis elongatis plerumque glabris ad apicem hirsutis marginaliter stomatiferis; filamenta antherarum laevia vel papillosa; thecae pallidae base subfimbriatae, cellulis exothecialibus ovalis irregulariter ornatis in extremis nodiferis, appendices longe ovatae 1-1/2 - 2 longiores quam latiores laeves; rami stylorum ca. 15 longiores quam latiores. Achaenia oborata inferne distincte angustiora valde 10-costata dense setifera, raphidibus elongatis; carpopodia angusta, cellulis plerumque 3-5-seriatis aliquantum parvis, parietibus subcrassis; series pappi exteriores mediocriter vel manifeste squamiformes interiores setiformes plerumque facile deciduae, apicibus cellularum simplicibus. Grana pollinis 35-45 μ diam., spinis

irregularibus interne intricatis. Species typica: Liabum candidum Griseb.

Austroliabum candidum (Griseb.) H.Robinson & R.D.Brettell, comb. nov. Liabum candidum Griseb., Symbolae 203. 1979.

Austroliabum eremophilum (Cabrera) H.Robinson & R.D.Brettell, comb. nov. Liabum eremophilum Cabrera, Bol. Soc. Arg. Bot. 2:96. 1947.

Austroliabum mulgediifolium (Muschler) H.Robinson & R.D.Brettell, comb. nov. Liabum mulgediifolium Muschler, Engl. Bot. Jahrb. 50, Beibl. III:85. 1913.

Austroliabum polymnioides (R.E.Fries) H.Robinson & R.D.Brettell, comb. nov. Liabum polymnioides R.E.Fries, Arkiv Bot. 5(13):24. pl. 1, fig. 10-11. 1906.

CACOSMIA H.B.K., Nov. Gen. et Sp. 4:227. ed. fol. 1818.
T. Cacosmia rugosa H.B.K., originally monotypic.

Cacosmia rugosa H.B.K., Nov. Gen. et Sp. 4:228, ed. fol. 1818.

CHIONOPAPPUS Benth. in Benth. & Hook f. Gen. 3:485. 1873.
T. Chionopappus benthamii Blake, Journ. Wash. Acad. Sci. 25:492. 1935. monotypic, originally described without named species.

Chionopappus benthamii Blake, Journ. Wash. Acad. Sci. 25:492. 1935.

CHRYSACTINIUM (H.B.K.) Wedd., Chlor. And. 1:212. 1856.
Andromachia sect. Chrysactinium H.B.K., Nov. Gen. & Sp. 4:77 ed. fol. 1818. LT.: Andromachia acaulis H.B.K., present designation.

Chrysactinium acaule (H.B.K.) Wedd., Chlor. And. 1:212. 1857.
Ancromachia acaulis H.B.K., Nov. Gen. et Sp. 4:77 ed. fol. 1818.

Chrysactinium amphothrix (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum amphothrix Blake, Journ. Wash. Acad. Sci. 17:290. 1927.

Chrysactinium arthrothrix (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum arthrothrix Blake, Journ. Wash. Acad. Sci. 17:288. 1927.

Chrysactinium bicolor (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum bicolor Blake, Jour. Wash. Acad. Sci. 17:290. 1927.

Chrysactinium caulescens (Hieron.) H. Robinson & R.D. Brettell,
comb. nov. Liabum caulescens Hieron., Engl. Bot. Jahrb.
36:500. 1905.

Chrysactinium erigeroides (Benth.) H. Robinson & R.D. Brettell,
comb. nov. Liabum erigeroides Benth., Pl. Hartw. 206. 1845.

Chrysactinium hieracioides (H.B.K.) H. Robinson & R.D. Brettell
comb. nov. Andromachia hieracioides H.B.K., Nov. Gen. et
Sp. 4:77 ed. fol. 1818.

Chrysactinium longiradiatum (Hieron.) H. Robinson & R.D. Brettell,
comb. nov. Liabum longiradiatum Hieron., Engl. Bot. Jahrb.
21:352. 1895.

Chrysactinium rosulatum (Hieron.) H. Robinson & R.D. Brettell,
comb. nov. Liabum rosulatum Hieron., Engl. Bot. Jahrb.
36:501. 1905.

Chrysactinium tenuius (Blake) H. Robinson & R.D. Brettell,
comb. nov. Liabum tenuius Blake, Jour. Wash. Acad. Sci.
17:289. 1927. ("tenuior").

FERREYANTHUS H. Robinson & R.D. Brettell, genus novum Aster-
acearum (Liabeae). Plantae fruticentes vel subarborescentes.
Folia opposita, petiolis brevibus saepe alatis base breviter
vaginatis connatis, laminis ovatis vel ellipticis supra
plerumque rugosis subtus albo-tomentosis, nervis pinnatis.
Inflorescentiae corymboso-paniculatae, pedicellis aliquantum
brevibus angustis. Capitula late campanulata; squamae
involucri ca. 5-seriatae valde inaequales acutae; receptacula
breviter distincte paleacea. Flores ca. 20-25; radii uniseriati
breves, corollis base perangustis; corollae disci anguste infundi-
bulares, tubis aliquantum latae indistinctae glabrae, lobis
elongatis superne pauca setiferis vel breviter glanduliferis
marginaliter stomatiferis; filamenta antherarum glabra vel
hirsuta; thecae plerumque pallidae base valde fimbriatae,
cellulis exothecialibus ovalis in extremis nodiferis, appen-
dices oblongo-ovatae 1-1/2 - 2 longiores quam latiores laeves;
rami stylorum ca 10-12 longiores quam latiores. Achaenia
prismatica inferne parum angustiora leniter 10-costata varie
setifera et glandulifera, raphidibus elongatis; carpopodia
obturaculiformia, cellulis aliquantum parvis, parietibus
crassis; series pappi exteriores anguste squamiformes
interiores setiformes persistentes, apicibus cellularum
simplicibus. Grana pollinis 25-40 μ diam, spinis irregularibus
interne intricatis. Species typica: Andromachia verbascifolia
H.B.K.

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Ferreyranthus vernonioides (Muschler) H. Robinson & R.D. Brettell, comb. nov. Liabum vernonioides Muschler, Engl. Bot. Jahrb. 50, Beibl. III:80. 1913.

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Liabellum angustissimum (Gray) Rydb., North Am. Flora 34:295. 1927. Liabum angustissimum Gray, Proc. Amer. Acad. 22:432. 1887.

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- Liabum acuminatum Rusby, Descr. S. Amer. Pl. 161.1920.
- Liabum acutifolium Cuatr., Collect. Bot., Barcinone 3:299.1953.
- Liabum amplexans Blake, Journ. Wash. Acad. Sci. 17:292.1927.
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- Liabum asclepiadeum Sch. Bip., Linnaea, 20:521.1847.
- Liabum barahonense Urb., Arkiv. Bot. 23A:85. 1931.
- Liabum bourgeauii Hieron.; Ule, Verh. Bot. Ver. Prov. Brand.
48:208.1907.
- Liabum caliense Hieron., Engl. Bot. Jahrb. 28:623. 1901.
- Liabum cubense Sch.Bip., Journ. Bot. 1:236. 1863.
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- Liabum eggertii Hieron., Engl. Bot. Jahrb. 28:624.1901.
- Liabum eriocaulon Poepp. & Endl. Nov. Gen. & Sp. 3:43. t.
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- Liabum grandiflorum (H.B.K.) Less., Linnaea 6:698.1831.
Andromachia grandiflora H.B.K., Nov. Gen. et Sp.
4:77. ed. fol. 1818.
- Liabum igniarium (H.B.K.) Less. Linnaea 6:701.1831.
Andromachia igniaria H.B.K. Pl. Aequin. 2:104.1812.
- Liabum lehmannii Hieron., Engl. Bot. Jahrb. 19:61. 1894.
- Liabum longipes Urb., Fedde, Rep. Sp. Nov. 26:115.1929.
- Liabum melastomoides (H.B.K.) Less., Linnaea 6:699.1831.
Andromachia melastomoides H.B.K., Nov. Gen. et Sp.
4:79 ed. fol. 1818.
- Liabum nigro-pilosum Hieron., Engl. Bot. Jahrb. 29:59. 1900.
- Liabum oblanceolatum Urb. & Ekm., Arkiv. Bot. 23A:89.1931.

Liabum ovatifolium Urb., Arkiv. Bot. 23A:86.1931.

Liabum polycephalum Urb., Arkiv. Bot. 23A:88.1931.

Liabum selleanum Urb., Arkiv. Bot. 23A:26.1931.

Liabum solidagineum (H.B.K.) Less., Linnaea 6:700.1831.

Andromachia solidaginea H.B.K., Nov. Gen. et Sp. 4:78 ed. fol. 1818.

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Liabum wurdackii Ferreyra, Publ. Mus. Hist. Nat. "Javier Prado" Bot. Ser. B. 20:2.1965.

MUNNOZIA Ruiz & Pavon, Prod. Fl. Per. 108. 1794. LT.:

Munnozia lanceolata Ruiz & Pavon, present designation. The genus was originally described with mention of two unnamed species (Ruiz & Pavon 1794). Four species were later described (R & P. 1798). Cabrera (1960) in his notes of the types of the four species indicated that only two had been annotated as new genus. Of these two, M. lanceolata seems the most completely known and it is here selected as the lectotype.

Key to Subgenera

1. Exothecial cells quadrate with thickenings on both transverse and vertical walls; pappus with lacerate or triangular outer squamae and very few inner setae. Kastnera
1. Exothecial cells without evident thickenings on vertical walls; pappus with numerous setae and with few or no outer squamae

2. Leaves densely tomentose below, trinervate near base; nectaries not very long; achenes mostly 8-10 ribbed

Munnozia

2. Leaves nearly glabrous on both sides, with 5-7 veins radiately from base nectaries elongate; achenes mostly 5-ribbed.

Erato

Munnozia subgenus Munnozia. Alibum Less., Syn. Comp. 152. 1832. T. Alibum liaboides Less. = Munnozia lyrata, originally monotypic. Prionolepis Poepp. & Endl., Nov. Gen. et Sp. 3:55, t.261. 1845. T. Prionolepis silphioides Poepp. & Engl., originally monotypic. Liabum subgenus Chrysastrum Willd. ex Sch. Bip., Flora 36:37. 1853. T. Liabum sagittatum Sch. Bip., present designation. Chrysastrum (Sch.Bip.) Willd. ex Wedd., Chlor. And. 1:211, in nota. 1857. T. Liabum sagittatum Sch. Bip.

Munnozia acostae (Chung) H. Robinson & R.D. Brettell, comb. nov.
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Munnozia angusta (Blake) H. Robinson & R.D. Brettell, comb. nov.
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Liabum canarense Cuatr., Brittonia 8:46.1954.

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Munnozia convencionensis (Cuatr.) H. Robinson & R.D. Brettell, comb. nov.
Liabum convencionense Cuatr., Collect. Bot., Barcinone 3:300.1953.

Munnozia corymbosa Ruiz & Pavon, Syst. Veg. Peruv. Chil. 195. 1798.

Munnozia eriocalyx (Blake) H. Robinson & R.D. Brettell, comb. nov.
Liabum eriocalyx Blake, Journ. Wash. Acad. Sci. 17:297.1927.

Munnozia foliosa Rusby, Bull. Torrey Bot. Cl. 54:312.1927.

- Munnozia gigantea (Rusby) Rusby, Bull. Torrey Bot. Cl. 54:312.1927.
Liabum giganteum Rusby, Bull. N.Y.Bot. Gard. 4:391.1907.
- Munnozia glandulosa (O.Ktze.) Rusby, Bull. Torrey Bot. Cl. 54:314.
1927. Liabum glandulosum O.Ktze., Rev. Gen. 3(2):163. 1898.
- Munnozia hastifolia (Poepp. & Endl.) H.Robinson & R.D.Brettell,
comb. nov. Liabum hastifolium Poepp. & Endl., Nov. Gen. & Sp.
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- Munnozia herrerae (Cabrera) H.Robinson & R.D.Brettell, comb. nov.
Liabum herrerae Cabrera, Rev. Univ. Cuzco, 33(87):119.1945.
- Munnozia hirta (O.Ktze.) Rusby, Bull. Torrey Bot. Cl. 54:314.1927.
Liabum hirtum O. Ktze., Rev. Gen. 3(2): 163. 1898.
- Munnozia isodonta (Blake) H.Robinson & R.D.Brettell, comb. nov.
Liabum isodontum Blake, Journ. Wash. Acad. Sci. 17:298.1927.
- Munnozia jussieui (Cass.) H.Robinson & R.D.Brettell, comb. nov.
Andromachia jussieui Cass., Bull. Soc. Philom. 184.1817.
- Munnozia klattii H.Robinson & R.D.Brettell, nom.nov. Liabum
corymbosum Sch. Bip. ex Klatt, Annal. Naturh. Hofmus Wien.
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- Munnozia lanceolata Ruiz et Pavon, Syst. Veg. 196. 1798.
- Munnozia longifolia Rusby, Bull. Torrey Bot. Cl. 54:313.1927.
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- Munnozia megacephala (Sch.Bip.) H.Robinson & R.D.Brettell,
comb. nov. Liabum megacephalum Sch. Bip., Flora 36:38.1853.
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nov. Liabum nonoense Hieron., Engl. Jahrb. 29:59.1900.
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comb. nov. Liabum olearioides Muschler, Engl. Bot. Jahrb.
50, Beibl. III:82.1913.
- Munnozia oxyphylla (Cuatr.) H.Robinson & R.D.Brettell, comb.
nov. Liabum oxyphyllum Cuatr., Collect. Bot., Barcinone,
3:303.1953.
- Munnozia perfoliata (Blake) H.Robinson & R.D.Brettell, comb.
nov. Liabum perfoliatum Blake, Journ. Wash. Acad. Sci.
17:291.1927.

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- Munnozia pinnulosa (O. Ktze) H.Robinson & R.D.Brettell, comb. nov. Liabum pinnulosum O. Ktze. Rev. Gen. 3 (2):163.1898.
- Munnozia pulchra (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum pulchrum Blake, Journ. Wash. Acad. Sci. 17:299.1927.
- Munnozia rusbyi (Britton) Rusby, Bull. Torrey Club 54:312.1927. Liabum rusbyi Britton, Bull. Torrey Bot. Cl. 19:263.1892.
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- Munnozia senecionidis Benth., Pl. Hartw. 134. 1844.
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- Munnozia taeniotricha (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum taeniotrichum Blake, Journ. Wash. Acad. Sci. 17:298.1927.
- Munnozia trinervis Ruiz & Pavon, Syst. Veg. 195.1798.
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- Munnozia subgenus Erato (DC.) H.Robinson & R.D.Brettell, Stat. nov. Erato DC., 5:318.1836. T.Erato polymnioides DC., originally monotypic.
- Munnozia (Erato) anatina (Benoist) H.Robinson & R.D.Brettell, comb. nov. Liabum anatinum Benoist, Bull. Soc. Bot. France. 84:633.1938.
- Munnozia (Erato) polymnioides (DC.) H.Robinson & R.D.Brettell, comb. nov. Erato polymnioides DC., Prod. 5:318.1836. Syn. Liabum pallatangense Hieron., Engl. Bot. Jahrb. 29:60.1900.

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Munnozia subgenus Kastnera (Sch.Bip.) H.Robinson & R.D.Brettell, stat. nov. Kastnera Sch.Bip., Flora 36:37.1853. T.Kastnera tenera Sch.Bip., originally monotypic.

Munnozia (Kastnera) annua (Muschler) H.Robinson & R.D.Brettell, comb. nov. Liabum annuum Muschler, Engl. Bot. Jahrb. 50, Beibl. III:84.1913.

Munnozia (Kastnera) nivea (Hieron.) H.Robinson & R.D.Brettell, comb. nov. Liabum niveum Hieron., Engl. Bot. Jahrb. 19:62.1894.

Munnozia (Kastnera) pinnatipartitum (Hieron.) H.Robinson & R.D. Brettell, comb. nov. Liabum pinnatipartitum Hieron., Engl. Bot. Jahrb. 29:62.1900.

Munnozia (Kastnera) tenera (Sch.Bip.) H.Robinson & R.D.Brettell, comb. nov. Kastnera tenera Sch.Bip., Flora 36:38.1853.

OLIGACTIS (H.B.K.) Cass., Dict.Sci.Nat. 36:16. 1825.
Andromachia sect. Oligactis H.B.K., Nov. Gen. et Sp. 4:79.ed. fol. 1818. LT.: Andromachia volubilis H.B.K., present designation.

Oligactis subgenus Oligactis Heads clustered in short subumbellate, spiciform or racemiform axillary or terminal branches, anther appendages papillose.

Oligactis biattenuata (Rusby) H.Robinson & R.D.Brettell, comb. nov. Liabum biattenuatum Rusby, Descr. S. Amer. Pl. 159.1920.

Oligactis boyacensis (Cuatr.) H.Robinson & R.D.Brettell, comb. nov. Liabum boyacensis Cuatr., Not. Fl. Colomb. 6:36.1944; Rev. Acad. Colomb. 6:61.1944.

Oligactis latifolia (Hieron.) H.Robinson & R.D.Brettell, comb. nov. Liabum volubile (H.B.K.) Less.v. latifolium Hieron., Engl. Bot. Jahrb. 28:622.1901.

Oligactis mikanoides (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum mikanoides Blake, Journ. Wash. Acad. Sci. 17:294.1927.

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Andromachia nubigena H.B.K., Nov. Gen. et Sp. 4:79 ed. fol. 1818.
- Oligactis sessiliflora (H.B.K.) H.Robinson & R.D.Brettell, comb. nov. Andromachia sessiliflora H.B.K., Nov. Gen. et Sp. 4:80 ed. fol. 1818.
- Oligactis valeri (Standl.) H.Robinson & R.D.Brettell, comb. nov. Liabum valeri Standl., Publ. Field. Mus. Nat. Hist. Chicago, Bot. Ser., 18:1490.1938.
- Oligactis volubilis (H.B.K.) Cass., Dict. Sc. Nat. 36:17.1825.
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- Oligactis subgenus Andromachiopsis H.Robinson & R.D.Brettell, subgenus novum. Plantae frutescentes subscandentes; inflorescentiae corymboso-paniculatae; appendices antherarum laeves. T. Liabum pichinchense Hieron.
- Oligactis (Andromachiopsis) coriacea (Hieron.) H.Robinson & R.D. Brettell, comb. nov. Liabum coriaceum Hieron. Engl. Bot. Jahrb. 29:58.1900.
- Oligactis (Andromachiopsis) cusalaguensis (Hieron.) H.Robinson & R.D.Brettell, comb. nov. Liabum cusalaguense Hieron., Engl. Bot. Jahrb. 29:55.1900.
- Oligactis (Andromachiopsis) ecuadoriensis (Hieron.) H.Robinson & R.D.Brettell, comb. nov. Liabum ecuadoriense Hieron., Engl. Bot. Jahrb. 19:60.1894.
- Oligactis (Andromachiopsis) fruticosa (Muschler) H.Robinson & R.D.Brettell, comb. nov. Liabum fruticosum Muschler, Engl. Bot. Jahrb. 50, Beibl. III:81.1913.
- Oligactis (Andromachiopsis) granatensis (Cuatr.) H.Robinson & R.D. Brettell, comb. nov. Liabum granatensis Cuatr., Fedde, Rep. Sp. Nov. 55:128.1953.
- Oligactis (Andromachiopsis) hallii (Hieron.) H.Robinson & R.D.Brettell, comb. nov. Liabum hallii Hieron., Engl. Bot. Jahrb. 29:57.1900.
- Oligactis (Andromachiopsis) ochracea (Cuatr.) H.Robinson & R.D.Brettell, comb. nov. Liabum ochraceum Cuatr., Collect. Bot., Barcinone 3:302.1953.
- Oligactis (Andromachiopsis) pastoensis (Cuatr.) H.Robinson & R.D.Brettell, comb. nov. Liabum pastoense Cuatr., Not.

Fl. Colomb. 6:36.1944; Rev. Acad. Colomb. 6:62.1944.

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Oligactis (Andromachiopsis) scandens (Domke) H. Robinson & R.D. Brettell, comb. nov. Liabum scandens Domke in Diels, Bibl. Bot. no. 116.167. 1937

PARANEPHELIUS Poepp. & Endl., Nov. Gen. et Sp. 3:42. t. 248. 1843. T.: Paranephelius uniflorus Poepp. & Endl., originally monotypic.

Paranephelius asperifolius (Muschler) H. Robinson & R.D. Brettell, comb. nov. Liabum asperifolium Muschler, Engl. Bot. Jahrb. 50, Beibl. III:78.1913.

Paranephelius bullatus Gray ex Wedd. Chlor. And. 1:214.1855.

Paranephelius jelskii (Hieron.) H. Robinson & R.D. Brettell, comb. nov. Liabum jelskii Hieron., Engl. Bot. Jahrb. 36:499.1905.

Paranephelius ovatus Wedd., Chlor. And. 1:214, t.37B.1855.

Paranephelius uniflorus Poepp. & Endl., Nov. Gen. & Sp. 3:42. t.248.1843.

PHILOGLOSSA DC., Prod. 5:567.1836. T. Philoglossa peruviana DC., originally monotypic.

Philoglossa blakei H. Robinson & J. Cuatrecasas, Phytologia 26(5): 383.1973.

Philoglossa mimuloides (Hieron.) H. Robinson & J. Cuatrecasas Phytologia 26(5):384.1973. Juamea mimuloides Hieron., Engl. Bot. Jahrb. 29:52.1900.

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Philoglossa pterocarpha Sandwith, Kew Bull. 1956:292.1956.

PSEUDONOSERIS H. Robinson & R.D. Brettell, genus novum Asteracearum (Liabeae). Plantae herbaceae quasi acaulescentes. Folia opposita oblanceolata crenata vel lobata sessilia base parum auriculata supra rugosa vel sublaevia subtus albo-tomentosa, nervis pinnatis. Inflorescentiae scaposae superne laxae alternate ramosae, pedicellis et involucris glandulis longiuscule stipitatis dense obsitis. Capitula late campanulata; squamae involucris ca. 4-seriatae inaequales interiores longe attenuatae; receptacula subglabra. Flores ca. 40-75; radii 1-2-seriati

longi, corollis base perangustis; corollae disci anguste infundibulares, tubis minus angustis indistinctis hirsutis, lobis elongatis extus glabris vel uniglanduliferis marginaliter stomatiferis; filamenta antherarum laevia; thecae pallidae base non fimbriatae, cellulis exothecialibus ovalis in extremis nodiferis, appendices breviter ovatae 1-1 1/2 longiores quam latiores laeves; rami stylorum angusti elongati ca. 20-30 longiores quam latiores. Achaenia obovata inferne parum angustiora valde 10-costata sparse setifera, raphidibus elongatis; carpodia breviter cylindrica, cellulis aliquantum magnis, parietibus nodiferis; series pappi exteriores anguste squamiformes interiores setiformes persistentes, apicibus cellularum simplicibus. Grana pollinis 35-45 μ diam, spinis regularibus interne simplicibus. Species typica: Liabum striatum Cuatr.

Pseudonosseris discolor (Muschler) H.Robinson & R.D.Brettell, comb. nov. Onoseris discolor Muschler, Engl. Bot. Jahrb. 50, Beibl.III:94.1913. syn. Liabum lanatum Ferreyra, Bol. Soc. Peru. Bot. 1:17.1948.

Pseudonosseris striatum (Cuatr.) H.Robinson & R.D.Brettell, comb. nov. Liabum striatum Cuatr., Collect. Bot., Barcinone 3:306.1953.

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Sinclairia adenotricha (Greenm.) Rydb., North Am. Flora 34:300. 1927. Liabum adenotrichum Greenm., Field Mus. Publ. Bot. 2:349.1912.

Sinclairia andrieuxii (DC.) H.Robinson & R.D.Brettell, comb. nov. Vernonia andrieuxii DC., Prod. 5:16.1836.

Sinclairia andromachioides (Less.) Rydb., N. Amer. Flora 34: 298.1927. Vernonia andromachioides Less. Linnaea 6:397. 1831.

Sinclairia blakei H.Robinson & R.D.Brettell, nom. nov. Vernonia hypoleuca DC., Prod. 5:27. 1836.

Sinclairia brachypus Rhdb., North Am. Flora 34:299.1927.

- Sinclairia caducifolia (B.L.Robinson & Bartlett) Rydb., North Am. Flora 34:299.1927. Liabum caducifolium B.L.Robinson & Bartlett, Proc. Amer. Acad. 43:59.1907.
- Sinclairia deamii (B.L.Robinson & Bartlett) Rydb., North Am. Flora 34:299.1927. Liabum deamii B.L.Robinson & Bartlett, Proc. Amer. Acad. 43:60.1907.
- Sinclairia deppeana (Less.) Rydb., North. Am. Flora 34:300.1927. Andromachia deppeana Less., Linnaea 6:401.1831.
- Sinclairia dimidia (Blake) H.Robinson & R.D.Brettell, comb. nov. Liabum dimidium Blake, Journ. Wash. Acad. Sci. 22:385.1932.
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Sinclairia sericolepis (Hemsl.) Rydb., North Am. Flora 34:301.1927.
Liabum sericolepis Hemsl., Biol. Centr. Am. Bot. 2:232.1881.

Sinclairia similis (McVaugh) H. Robinson & R.D. Brettell, comb. nov.
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Gynoxys columbiana (Klatt) Hieron., Engl. Bot. Jahrb.
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Liabum eupatorioides Muschler, Engl. Bot. Jahrb. 50, Beibl.
III:83.1913. = Schistocarpha sinforosii Cuatr., Trab.
Mus. Cienc. Nat., Madrid, Ser. Bot., no. 29:43.1935. not
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Neomirandea homogama (Hieron.) H. Robinson & R.D. Brettell,
n. comb. Syn. Neomirandea standleyi (B.L. Robinson) R.M.
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Field Mus. Nat. Hist., Chicago, Bot. Ser., 18:1461.1938.

Liabum lechleri Sch. Bip., Bonplandia 3:236. 1855. =
Diplostephium lechleri (Sch. Bip.) Wedd., Chlor. And.
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ADDITIONS TO THE GENUS TAXIPHYLLUM

(HYPNACEAE, MUSCI)

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The genus Taxiphyllum has seemed rather lacking in characters and has been subject to many mistreatments during bryological history. There has been confusion with other rather flattened ecostate forms such as Plagiothecium and Isopterygium which are not really closely related. Attempts to fully distinguish the genus have usually involved the structure of the broad pseudo-paraphyllia around the lateral buds which are distinct from the types found in Isopterygium but which are not always present and are not distinct from the types in many other pleurocarpous mosses. The present concept of the genus is summarized well by Ireland (1969) for North America. The only more recent addition is Taxiphyllum andersonii (Bartr.) Crum.

The species of Taxiphyllum are flattened with usually spreading lateral leaves and a vestigial double costa. In addition, most of the species have somewhat shortened apical cells and the leaf cells project on the upper ends abaxially. The alar cells provide a significant lack of differentiation. The combination of characters provides the impression of a rather distinctive genus with broader limits than generally recognized. Recently, specimens and descriptions have been noted that indicate the genus Taxiphyllum should be expanded to include an additional pair of species presently placed in the genus Pterigynandrum.

Under Pterigynandrum filiforme Hedw. there is a variety mexicanum Thér. and in the Eastern United States there is Pterigynandrum sharpii Crum & Anderson. The latter species, a renaming of the enigmatic Hylocomium splendens var. tenue Sharp, was placed in Pterigynandrum by Crum and Anderson (1967) with admitted reservations and at the same time the non Pterigynandrum nature of var. mexicanum was fully recognized. Both entities lack the fully developed quadrate alar cells of Pterigynandrum and they have more irregular cells on the apical margins. True Pterigynandrum has much more prominent almost bulbous papillae on the ends of its leaf cells, often on the lower ends as well as the upper, a feature not seen in either P. sharpii or the variety mexicanum. The alar cell structure of Pterigynandrum filiforme is basically different and agrees with peristome characters in relating the genus to the Entodontaceae. The variety mexicanum and P. sharpii have no evident relationship to that family.

A recent collection by Dana Griffin from South America has shown the same combination of characters noted above in the

disparate element of Pterigynandrum. The slight differences of leaf shape, brevity of leaf tip and serrulation indicate only species, not generic differences. The Griffin specimen (718; VENEZUELA: MERIDA: Distrito Libertador: El Maciegal, cuenca de la quebrada "La Pedregosa," afluyente del río Chama. Bosque residual. Plantas sobre roca en lugar semi-soleado. 1980 m) is apparently a second collection of Taxiphyllum machrisianum Crum, originally described from Goiás in central Brazil (1957). At the time of description Crum noted the primary anomalous feature of the species as a Taxiphyllum, the erect-spreading rather than very widely spreading leaves.

The proper generic placement of the above species cannot be resolved without consideration of an additional genus, the one in which Taxiphyllum andersonii was originally described. The genus Glossadelphus has been broadly interpreted to include some small mosses of the general Taxiphyllum type.

The genus Glossadelphus as established by Fleischer (1915-1922) consisted of two distinct groups of species. The first section, Colophyllum Fleisch., had species with leaf tips rounded to slightly emarginate and leaf cells when papillose often bearing papillae in series over the cell lumens. The apical cells are very irregular with both adaxial and abaxial projections. The papillose species of this group have much the appearance of Hypnella in the Hookeriaceae and have the same inclination toward counterpart species or phases differing in no way but presence or absence of papillae. The common papillose American species of Glossadelphus as well as at least one African species have actually been redescribed or described as Hypnella on the basis of non-fruiting specimens (Robinson 1965, 1967). The species of this section form the most distinctive element of Glossadelphus and I propose that the common American species Hypnum truncatulum C.Müll. be recognized as the type of the genus.

Also included in Glossadelphus by Fleischer was a second section Anastigma (Card.) Fleisch., transferred from Taxithelium. All the forms resembling Taxiphyllum belong in this section. The species are rather like typical Glossadelphus in general aspect with similar size and similar erect-spreading rather blunt leaves. The details of the leaves, however, suggest a very different element. Iwatsuki (1967) has pointed out that two species often placed in this group have a single very enlarged cell at the basal corner and belong in the genus Ectropothecium, E. zollingeri (C.Müll.) Jaeg. and E. obtusulum (Card.) Iwats. Material seen in this study under the name of another species of the group, Glossadelphus prostratus (Doz. & Molke.) Fleisch., lacks the large basal cell and is more like the American species. Further examination of this and other Eastern Hemisphere species may confirm relationship to Taxiphyllum machrisianum. It is the present opinion that such material must be excluded from the

genus Glossadelphus and that Crum was correct in the generic placement of his South American species. The American species I would place in this group of the genus Taxiphyllum include:

Taxiphyllum machrisianum Crum, Contr. Sci. Los Angeles Mus. 18: 5. 1957.

Taxiphyllum mexicanum (Thér.) H. Robinson, comb. nov. Pterigynandrum filiforme var. mexicanum Thér., Rev. Bryol. n.ser. 1: 9. 1928.

Taxiphyllum sharpii (Crum & Anderson) H. Robinson, comb. nov. Pterigynandrum sharpii Crum & Anderson, Bryologist 70: 99. 1967. Hylocomium splendens var. tenuis Sharp, Bryologist 36: 21. 1933.

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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXX. ADDITIONS
TO THE GENUS KOANOPHYLLON IN PANAMA.

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The present paper provides some results of the study of the genus Koanophyllon for the Flora of Panama. The studies have shown that three of the four species in the country require taxonomic changes or description. One species is raised from varietal rank where it has been associated with K. hypomalacum (B.L. Robinson) R.M.King & H.Robinson of Guatemala. The Guatemalan species differs by its distinctly puberulous leaves and by its short partly carnosae bracts in the inflorescence. The two new species differ from their relatives by both having densely hirsute young stems and petioles. The two new species can be distinguished from each other by the shape of the involucrel bracts and by the number of flowers in the heads.

Koanophyllon wetmorei (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium hypomalacum B.L.Robinson var. wetmorei B.L.Robinson, Contr. Gray Herb. n.s. 104: 17. 1934. Panama.

Koanophyllon panamensis R.M.King & H.Robinson, sp. nov.
Plantae frutescentes vel subarborescentes usque ad 6 m altae paucè vel multo ramosae. Caulis superficialiter parum carnosus dense evanescentiter hirsutus. Folia opposita saepe aliquantum incrassata petiolata, petiolis 1-3 cm longis; laminæ late vel anguste ellipticae papyraceae vel subcoriaceae plerumque 12-22 cm longae 5-9 cm latae base anguste cuneatae margine serratae vel serrulatae ad apicem anguste breviter acuminatae supra et subtus sparse pilosae vel subglabrae subtus sparse glandulo-punctatae, nervis secundariis pinnatis, nervulis dense reticulatis prominentibus. Inflorescentiae pyramidales, ramis late paniculatis, pedicellis 2-5 mm longis laxè puberulis. Capitula 5-6 mm alta; bracteae involucri ca. 20 subimbricate irregulariter inaequales 2-3-seriatae late ovatae vel lanceolatae 3-5-striatae ad apicem argute argute acutae, exteriores ca. 1.5 mm longae margine vix fimbriatae, interiores usque ad 4.0 mm longae deciduae. Flores plerumque 12-20; corollae albae ca. 3 mm longae,

lobis extus pauce glanduliferis. Achaenia 2-3 mm longa plerumque in costis multo breviter setifera raro pauce glandulifera base distincte angustiora, carpodiis parvis; setae pappi ca. 25-30 dense contiguae incrassatae ad apicem parum angustiores. Grana pollinis perbrevis spinosa.

Type: PANAMA: Cocolé: Vicinity of El Valle de Anton, alt. ca. 600 meters, September 17, 1939, P.H.Allen 1997 (Holotype US! Isotype MO!). Paratypes PANAMA: Cocolé: El Valle de Anton, D'Arcy & D'Arcy 6733, 6741 (both MO); El Valle, Dwyer 1835 (MO); between Pilon and El Valle de Anton, 700-900 meters, Duke & Dwyer 13953 (MO); Club Compestre, ca. 700 meters, Duke 13257 (FSU,MO). Panama: La Campana, Cerro Campana, Ebinger 933 (MO); Cerro Campana, Croat 12073, 12159 (both MO); Gentry 1826, 5780 (both MO); Cerro Campana, ca. 3000 ft, Dwyer & Kirkbride 7858 (MO); Cerro Campana, 2900 ft, McDaniel 6868 (FSU); Cerro Campana, 2700-3000 ft, Duke 8643 (MO,US); SW facing slopes of Mountains near the town of Chica, R.M.King 5335 (US).

Koanophyllon dukei R.M.King & H.Robinson, sp. nov.

Plantae frutescentes usque ad 2 m ? altae pauce vel multo ramosae. Caules superficialiter parum carnosius dense evanescentiter hirsuti. Folia opposita aliquantum anguste petiolata, petiolis 1-2 cm longis; laminae ellipticae papyraceae 8-16 cm longae 3.3-6.3 cm latae base anguste cuneatae margine argute serratae vel serrulatae ad apicem anguste breviter acuminatae supra et subtus plerumque glabrae subtus sparse glandulo-punctatae, nervis subtus parum puberulis, nervis secundariis pinnatis, nervulis dense reticulatis prominentibus. Inflorescentiae pyramidales, ramis late paniculatis, pedicellis 1-2 mm longis puberulis. Capitula 4-5 mm alta; bractae involucri ca. 15 subimbricatae inaequales 2-3-seriatae late ovatae vel oblongae plerumque 3-striatae ad apicem rotundatae vel obtuse acutae, exteriores ca. 1.5 mm longae margine breviter fimbriatae, interiores 2.5-3.0 mm longae deciduae. Flores 8-10; corollae virid-albae 2.0-2.5 mm longae plerumque glabrae, lobis extus distincte glanduliferis. Achaenia 1.3-2.3 mm longa superne in costis pauce glandulifera vel setifera base angustiora, carpodiis parvis prominentibus; setae pappi ca. 30 dense contiguae incrassatae ad apicem parum angustiores. Grana pollinis perbrevis spinosa.

Type: PANAMA: Chiriqui: Denuded premontane rain forest between Pinola and Quebrad Seco on Chiriquicito-Caldera Trail, April 21, 1968, Kirkbride & Duke 1038 (Holotype MO!). Paratype PANAMA: Chiriqui: degraded premontane rainforest and Brysoninia savanna between Quebrada Seco nearer Caldera on Chiriquicito-Caldera trail, Kirkbride & Duke 1008 (MO!).

The holotype specimen has involucre bracts reaching only about the length of the mature achenes and has only a few glands on the ribs of the achenes. The paratype specimen has bracts reaching sometimes to the middle of the corolla and has setae on the ribs of the achene. Still, no taxonomic distinction seems justified at this time.

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PLANTS OF PANAMA

MISSOURI BOTANICAL GARDEN
 GEORGE ENGELMANN PAPERS
 REPRODUCED BY THE MISSOURI BOTANICAL GARDEN

Joseph H. Kirkbride, Jr. & James A. Duke
 No. _____ April, 1968

Reproduction from the University of Michigan Sigma Xi

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



Koanophyllon panamensis R.M.King & H.Robinson,
Holotype, United States National Herbarium.



Enlargements of heads of *Koanophyllon*. Top; *K. dukei*. Bottom; *K. panamensis*.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXI.

ADDITIONS TO THE GENUS FLEISCHMANNIA.

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The genus Fleischmannia has received some limited study in previous years but only in the last few months has the taxonomic complexity of the group become fully apparent. The following new species, new combinations and new synonymy are provided here to be available for cytological and floristic studies that are in progress.

Fleischmannia allenii R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae vel suffrutescentes usque ad 1.5 m altae perennes pauca ramosae. Caules virides vel fulvi teretes leniter exarti dense rubro-puberuli. Folia opposita anguste petiolata, petiolis 1-5 cm longis; lamina late elliptica papyracea usque ad 15 cm longa 9 cm lata base cuneata vel anguste acuminata margine duplicato-crenata ad apicem acuta vel vix acuminata supra sparse puberula subtus glandulo-punctata, nervis plerumque pinnatis. Inflorescentiae late corymboso-paniculatae, ramis dense corymbosis, pedicellis 2-4 mm longis dense puberulis. Capitula ca. 5 mm alta; flores 20-25; squamae involucri ca. 28-30 subimbricatae vel imbricatae 3-4-seriatae inaequilongae plerumque 4-costatae extus puberulae exteriores breviter acutae margine late scariosae interiores lineari-oblongae ad apicem plus scariosae obtuse vel minute apiculatae; corollae ca. 3 mm longae lavendulae extus multo setiferae; filamenta antherarum in parte superiore ca. 250 μ longa; thecae 700-800 μ longae, appendicibus ovatis ca. 1 $\frac{1}{2}$ longioribus quam latioribus; rami stylorum vix incrassati; achaenia nigra 1 mm longa superne et in costis sparse setifera; setae pappi ca. 30 contiquae dense scabrae. Grana pollinis 18-20 μ diam. breviter spinosa.

Type: PANAMA: Chiriqui: vicinity of "New Switzerland" central valley of Rio Chiriqui Viejo, alt. 1800-2000 meters, January 6-14, 1939, P.H.Allen 1347 (Holotype MO!). Paratypes PANAMA: Chiriqui: Bajo Mona, mouth of Quebrada Chiquero, along Rio Caldera, 1500-2000 meters, Woodson et al 1013 (MO); forested hill N of Audobon Cabin, Croat 13652 (MO); vicinity Methodist

Camp near Nueva Swissa, Croat 13516 (MO); ca. 2 mi W of Cerro Punta, ca. 1630 meters, McDaniel 10060 (FSU).

Fleischmannia capillipes (Benth. ex Oerst) R.M.King & H.Robinson, comb. nov. Eupatorium capillipes Benth. ex Oerst, Kjoeb Vidensk. Meddel. 79. 1852. Eupatorium jejunum Standley & Steyermark, Field Mus. Publ., Bot. 23: 183. 1944.
Fleischmannia microcephala T. Brandg. ined.

Known distribution: El Salvador: Morazan: ca. 15 km NE of San Miguel, ca. 200 meters, Tucker 439 (US); vicinity of San Salvador, 650-850 meters, Standley 19633 (US). Guatemala: Santa Rosa, Rinconcito, 4000 ft?, Heyde & Lux 4206 (US). Mexico: Chiapas: 11 mi SE of Tapanatepec, 2300 ft., Breedlove & Raven 13713 (NY); Sierra de Tonala, Purpus 6791 (US); Guerrero: Temisco, 320-600 meters, Mexia 8799 (US). Nicaragua: Realejo, Oerst 9569 (isotype US!).

Fleischmannia chiriquensis R.M.King & H.Robinson, sp. nov. Plantae herbaceae vel subscandentes usque ad 3 m altae perennes paucе ramosae. Caules virides vel leniter rubescentes teretes minute striati leniter pilosi vel glabrescentes. Folia opposita anguste petiolata, petiolis 1.0-2.5 cm longis; lamina late ovata papyracea usque ad 6 cm longa 5 cm lata base late cordata valde trinervata margine valde obtuse serrato-crenata ad apicem aliquantum abrupte breviter acuminata supra et subtus sparse pilosa subtus non glandulo-punctata. Inflorescentiae late corymboso-paniculatae, ramis dense corymbosis, pedicellis 2-4 mm longis dense puberulis. Capitula ca. 5 mm alta; flores 20-25; squamae involucri ca. 20 subimbricatae ca. 3-seriatae inaequilongae plerumque bicostatae extus pilosae vel sparse puberulae plerumque breviter acutae margine late scariosae interiores lineari-oblongae ad apicem plus scariosae rotundatae vel minute apiculatae; corollae ca. 3.0-3.5 mm longae lavendulae, lobis extus multo breviter setiferis; filamenta antherarum in parte superiore ca. 250 μ longa; thecae ca. 1200 μ longae, appendicibus ovatis ca. 1 1/3 longioribus quam latioribus; rami stylorum ad apicem leniter clavati; achaenia nigra 1.2-1.3 mm longa, costis sparse scabris vel paucе breviter setiferis; seti pappi 27-30 contiguae scabrae. Grana pollinis 18-20 μ diam. breviter spinosa.

Type: PANAMA: Chiriqui: along Boquete Trail, Cerro Respinga, alt. ca. 2000-2500 meters. East of town of Cerro Punta, September 11, 1972, Gentry 5928 (Holotype MO!). Paratypes PANAMA: Chiriqui: above Cerro Punta, 6300 ft, D'Arcy 5372 (MO); slope of Cerro Respinga above town of Cerro Punta, 8400 ft, D'Arcy & D'Arcy 6545 (MO).

The new species is presently known only from the Cerro Punta area of Chiriqui Province. The species is most closely related to F. tysonii of Vulcan Chiriqui but also resembles superficially F. plectranthifolia Benth. of Costa Rica. The later species is readily distinguished by the more elongate usually non-cordate leaves having 5-7 veins prominently concentrated at the base. The inner phyllaries of the latter species are also much more pointed and the achene ribs sometimes yellow.

Fleischmannia ciliolifera R.M.King & H.Robinson, sp. nov. Eupatorium cilioferum Standley & L.O.Williams, ined. Plantae erectae herbaceae usque ad 1 m altae perennes pauca ramosae. Caules fulvi teretes vix striati sparse minute puberuli. Folia opposita anguste petiolata, petiolis 0.5-3.5 cm longis; lamina ovata papyracea usque ad 6 cm longa 3 cm lata base rotundata trinervata margine argute multo serrata ad apicem anguste leniter acuminata, superficiis glabris vel subglabris. Inflorescentiae paniculatae, ramis dense corymbosis vel aliquantum subumbellatis, pedicellis 1-3 mm longis puberulis. Capitula ca. 6 mm alta; flores 20-25; squamae involucri ca. 20-25 subimbricatae 3-4-seriatae inaequilongae bicostatae margine aliquantum late scariosae ad apicem plus scariosae breviter acutae vel rotundatae saepe apiculatae extus sparse minute puberulae vel glabrae; corollae 3.5-4.0 mm longae lavendulae extus glabrae; filamenta antherarum in parte superiore ca. 350 μ longa; thecae ca. 1.1 mm longae, appendicibus oblongo-ovatis vix longioribus quam latioribus; rami stylorum angustati; achaenia nigra ca. 1.5 mm longa in costis setifera; carpodia prominentia, cellulis subquadratis vel brevioribus; setae pappi ca. 30 vix contiguae regulariter scabrae. Grana pollinis ca. 18 μ diam. breviter valde spinosa.

Type: HONDURAS: Sta. Barbara: Forested ridge south side of Montana Sta. Barbara, alt. 2350 meters, April 7, 1951, Allen, Armour, & Shable 6134 (Holotype GH!).

The new species is a member of the group with totally dark achenes and is very distinct in the nearly glabrous leaves and the large size of the heads.

Fleischmannia croatii R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae vel suffrutescentes usque ad 1.5 m altae perennes. Caules obscuro-virides teretes vix striati infirme hirsuti. Folia opposita anguste longe petiolata, petiolis usque ad 5 cm longis; lamina ovata papyracea usque ad 7 cm longa 4.5 cm lata base subtruncata trinervata margine multo crenato-serrata ad apicem breviter distincte acuminata supra sparse breviter pilosa subtus glandulo-punctata et plerumque in nervis longe pilosa. Inflorescentiae late subplanate corymboso-paniculatae, pedicellis 1-4 mm longis hirtellis. Capitula ca. 6 mm alta; flores ca. 20; squamae involucri 20-25 eximbricatae ca. 3-seriatae inaequilongae bicostatae margine anguste scariosae ad apicem breviter acutae extus manifeste puberulae; corollae 3.5-4.0 mm longae lavenderulae, lobis extus setiferis et pauce glanduliferis, setis subargutis; filamenta antherarum in parte superiore 350-400 μ longa; thecae 800-900 μ longae, appendicibus oblongo-ovatis ca. 250 μ longis 150 μ latis; rami stylo-rum non incrassati; achaenia nigra ca. 1 mm longa subglabra in costis perpauce scabrida; carpopodia prominentia, cellulis subquadratis; setae pappi 25-30 contiguae inferne dense scabrae. Grana pollinis ca. 18-20 μ diam. breviter spinosa.

Type: PANAMA: Chiriqui: primary forest and adjacent cut over areas; vicinity of Las Nubes; 2.7 mi NW of Río Chiriqui Viejo W of Cerro Punta; alt. 2200 meters, February 27, 1973, Croat 22400 (Holotype MO!).

The species is most distinct in the broadly corymbose-paniculate inflorescence and in the abrupt compact base of the involucre.

Fleischmannia granatensis R.M.King & H.Robinson, sp.

nov. Plantae erectae herbaceae usque ad 1 m altae perennes pauce ramosae. Caules plerumque pubescentes teretes minute striati dense puberuli vel pilosi. Folia opposita anguste petiolata, petiolis 0.5-2.0 cm longis; lamina ovata papyracea usque ad 4 cm longa ca. 3 cm lata base plerumque breviter cuneata vel truncata valde trinervata margine crenata ad apicem anguste breviter acuminata supra sparse

setifera subtus sparse hirsuta obscure vel prominente glandulo-punctata in nervis subtomentosa. Inflorescentiae paniculatae ramis dense glomerato-corymbosis, pedicellis 1-4 mm longis dense puberulis. Capitula ca. 5 mm alta; flores ca. 20-25; squamae involucri ca. 20 subimbricatae ca. 2-3-seriatae inaequilongae bicostatae anguste ovatae vel lineari-lanceolatae anguste acutae vel apiculatae margine distincte scariosae extus sparse et distincte puberulae; corollae ca. 3 mm longae lavendulae extus plerumque in lobis setiferae; filamenta antherarum in parte superiore 250-300 μ longa; thecae ca. 1 mm longa, appendicibus oblongo-ovatis ca. 1 1/3 longioribus quam latioribus; rami stylorum angustati; achaenia nigra ca. 1.5 mm longa plerumque in costis setifera; carpodia prominentia, cellulis breviter oblongis; setae pappi 27-30 contiguae dense scabrae. Grana pollinis ca. 18 μ diam. breviter spinosa.

Type: COLOMBIA: El Valle: La Cumbre, alt. 1550-1700 meters, May 7-10, 1922, Pennell 5019 (Holotype US!). Paratypes: COLOMBIA: Antioquia: Chigorodo; carretera a Turbo, alt. 100-200 meters, Garcia-Barriga 17638(US); Choco: Alto Guillermo, over Rio Arquia behind Sautata, Premontane Forest, el. ca. 1500', Duke 15394(FSU); El Valle: San Antonio, alt. 6800 ft, Miller & Miller 28(US).

The species seems restricted to lower elevations in western Colombia. The species has sharply pointed involucre bracts and has been previously determined as F. pycnocephaloides (B.L.R.) K. & R., but it is distinct by the totally black achenes, the contiguous pappus setae and the very slender style braches. Of the associated Colombian species, F. magdalenensis (B.L.R.) K. & R. differs by glabrous rather succulent leaves, F. klattiana (Hieron.) K. & R. differs by glabrous achenes and white flowers and F. pennellii (B.L.R.) K. & R. differs by blunt phyllaries and very broad styles.

Fleischmannia haughtii R.M.King & H.Robinson, sp. nov.

Plantae erectae herbacea usque ad 50 dm altae perennes multo ramosae. Caules fulvi teretes vix striati minute puberuli. Folia opposita anguste breviter petiolata, petiolis 2-3 mm longis; lamina anguste elliptica membranacea 1-2 cm longa 3-5 mm lata base anguste cuneata trinervata margine superne paucе serrulata ad apicem anguste acuta supra perpaucе breviter pilosa subtus sparse puberula vel subglabra, nervis puberulis. Inflorescentiae laxе cymosae, pedicellis 2-12 mm longis minute puberulis. Capitula

ca. 3.5 mm alta; flores ca. 20; squamae involucri ca. 20 eximbricatae ca. 2-seriatae inaequilongae bicostatae margine anguste scariosae ad apicem anguste acutae vel apiculatae extus ad medium plerumque puberulae; corollae ca. 1.5 mm longae lavendulae vel albae, lobis extus breviter setiferis; filamenta antherarum in parte superiore 250μ longa; thecae ca. 600μ longae, appendicibus breviter oblongis crenulatis vix longioribus quam latioribus; rami stylorum non incrassati; achaenia nigra ca. 1.2 mm longa glabra; carpopodia prominentia cellulis subquadratis; setae pappi ca. 35-40 vix contiguae ca. 1 mm longae inferne dense scabrae. Grana pollinis ca. 18μ diam. breviter spinosa.

Type: COLOMBIA: Choco: Cupica, altitude about 100 m, February 10, 1947, Haught 5560 (Holotype US!).

The new species is from the same general area as F. misera (B.L.R.) K. & R. and has a very similar appearance with small narrowly elliptical leaves and very narrow sharply pointed involucre bracts. The new species is distinct by the leaves lacking glandular punctations, the pappus only half to two-thirds as long as the corolla and the glabrous achenes.

Fleischmannia imitans (B.L.Robinson) R.M.King & H.Robinson, Phytologia 19: 203. 1970. Eupatorium rivulorum B.L.Robinson, Contr. Gray Herb. n.s. 77: 34. 1926.

Fleischmannia matudae R.M.King & H.Robinson, sp. nov.

Plantae erectae vel subscaedentes herbaceae perennes paucis ramosae. Caules flexuosi subfulviteretes vix striati sparse minute puberuli vel subglabri. Folia opposita peranguste petiolata, petiolis usque ad 4 cm longis; lamina anguste ovata vel lanceolata membranacea usque ad 8 cm longa 3.7 cm lata base rotundata vel subtruncata trinervata margine multo serrulata ad apicem caudato-acuminata, superficiis glabris vel subglabris. Inflorescentiae delicate paniculatae, ramis corymbosis, corymbis aliquantum densis paucis capitatis, pedicellis plerumque 2-3 mm longis subglabris. Capitula ca. 4 mm alta; flores 10-12; squamae involucri ca. 15 subimbricatae 2-3-seriatae, inaequilongae bicostatae glabrae margine distincte scariosae exteriores ovatae breviter acuta, interiores oblongae apice rotundatae vel apiculatae; corollae ca. 1.5 mm longae plerumque albae? extus glabrae;

filamenta antherum in parte superiore ca. 200 μ longa; thecae ca. 700-800 μ longae, appendicibus quadrato-ovatis parum latioribus quam longioribus; rami stylorum ad apicem parum clavati; achaenia ca. 1.0-1.3 mm longa multo setifera in costis persistentiter flava; carpodia brevia, cellulis quadratis vel brevioribus; setae pappi ca. 20 distincte parum non contiguae angustatae regulariter minute scabrae. Grana pollinis ca. 18 μ diam. breviter spinosa.

Type: MEXICO: Chiapas: Sta. Rita, Mapastepec, Enero 1938, Matuda 2019 (Holotype US! Isotype US!).

The new species is distinct in the lax habit and the small number of flowers and involucre bracts in the head. The Costa Rican F. valeriana (Standley) K. & R. has also been described with ca. 10 flowers per head but the type specimens prove to be indistinguishable from F. hymenophylla (Klatt) K. & R. which has ca. 20 flowers per head and glandular punctations on the under surface of the leaves.

Fleischmannia monagasensis (Badillo) R.M.King & H.Robinson, comb. nov. Eupatorium monagasense Badillo, Bol. Soc. Venez. Cienc. Nat. 10: 293. 1946. Venezuela.

Fleischmannia nix R.M.King & H.Robinson, sp. nov.
Eupatorium nix Standley & L.O.Williams, ined.
Plantae erectae vel decumbentes herbaceae usque ad 1 m altae perennes paucis ramosae. Caules flavo-virides vel rubescentes teretes minute striati puberuli vel pilosi. Folia opposita anguste petiolata, petioli 0.5-1.0 cm longis; lamina ovata papyracea 1.5-2.5 cm longa 1.0-2.0 cm lata base truncata valde trinervata margine multo crenata apice argute acuta vel vix acuminata supra et subtus plerumque dense hirsuta subtus glandulifera. Inflorescentiae laxae paniculatae, ramis remotis, corymbis aliquantum densis pauci-capitatis, pedicellis 1-3 mm longis puberulis, bracteis subinvolucratis paucis. Capitula ca. 4 mm alta; flores ca. 20-25; squamae involucri ca. 18-20 subimbricatae 2-3-seriatae inaequilongae bicostatae margine aliquantum late scariosae extus parce vel dense pilosae, exteriores ovatae apice anguste acutae vel aristatae; interiores anguste oblongae apice plus scariosae vix vel distincte apiculatae; corollae 2.0-2.5 mm longae plerumque albae extus non setiferae,

lobis extus pauce glanduliferis; filamenta antherarum in parte superiore ca. 200 μ longa; thecae ca. 600 μ longae, appendicibus oblongo-ovatis vix longioribus quam latioribus; rami stylorum ad apicem latiores; achaenia ca. 1.3-1.5 mm longa superne et in costis setifera in costis persistentiter flava; carpodia prominentia, cellulis quadratis vel brevioribus; setae pappi ca. 20-25 vix contiguae vel distincte non contiguae per angustatae scabrae base scabriores. Grana pollinis ca. 18 μ diam. breviter spinosa.

Type: HONDURAS: El Paraiso: near Manzaragua, alt. 1400 meters, February 7, 1956, L.O. Williams & Molina 19020 (Holotype US!). Paratypes: HONDURAS: El Paraiso: Cuesta Galeras road to Guinope, 1400 meters, Molina 25911 (US); Guinope, 1400 meters, Williams & Molina 11515 (US); 5 km W of Guinope, near Manzaragua, Williams & Molina 23256 (US). Morazan: between Montana Uyuca and La Montanita, 1500 meters, Williams et al 23238 (US). Comayagua: vicinity of Siguatepeque, Standley 55892, 56007, 56531 (all US).

The species seems endemic to Honduras and is superficially similar to many other species of the area some of which remain undescribed at this time. The new species has a lax habit similar to F. viscidipes (B.L.R.) K. & R. and F. multinervis (Benth.) K. & R. both of Guatemala. The former is clearly distinct in the totally dark achenes and the more scabrous more contiguous pappus setae. The more closely related F. multinervis is distinct by the leaves lacking glands below, by the longer nearly glabrous pedicels and by the even thinner less scabrous bases on the pappus setae. The material of the new specie shows variation in the form of the glands on the leaves. The specimens from Siguatepeque have smaller distinctly stipitate glands while the glands on the other specimens are essentially sessile.

Fleischmannia panamensis R.M.King & H.Robinson, sp. nov. Plantae erectae grosse herbaceae usque ad 2 m altae perennes pauce ramosae. Caules plerumque fulvi teretes minute striati glabrescentes vel dense puberuli. Folia opposita anguste petiolata, petiolis 1.0-3.5 cm longis; lamina late rhomboidi-ovata papyracea usque ad 8 cm longa 6.5 cm lata base late cuneata valde trinervata margine leniter vel valde crenata ad apicem late acuta supra sparse grosse setifera subtus glandulo-punctata in nervis puberula. Inflorescentiae corymboso-paniculatae, ramis dense

corymbosis, pedicellis 1-4 mm longis puberulis. Capitula ca. 5 mm alta; flores ca. 15-20; squamae involucri ca. 18-20 subimbricatae ca. 2-3-seriatae inaequilongae bicostatae breviter acutae margine anguste scariosae extus glabrae vel minute sparse puberulae interiores ad apicem plus scariosae plus rotundatae vel mucronatae; corollae ca. 3 mm longae lavendulae, lobis extus non setiferis; filamenta antherarum in parte superiore ca. 300 μ longa; thecae ca. 750 μ longae, appendicibus oblongo-ovatis ca. 1 1/3 longioribus quam latioribus; rami stylorum aliquantum incrassati; achaenia nigra ca. 1.5 mm longa superne et in costis sparse setifera; seti pappi 20-22 vix contiguae scabrae. Grana pollinis 18-20 μ diam. breviter spinosa.

Type: PANAMA: Cocle: in cloud forest near La Mesa, February 11, 1971, Croat 13354 (Holotype MO!).

Paratypes: PANAMA: Cocle: La Mesa above El Valle, 900 meters, Liesner 749 (MO); Panama: Cerro Campana, ca. 75 meters, Kennedy et al 2063 (MO), Cerro Campana, Lazor 3322 (FSU, MO), Porter et al 4254 (MO), Busey 859 (MO); Cerro Pilon; 900-1173 meters, Liesner 759 (MO).

The plants are very coarse large leaved herbs apparently endemic to Central Panama. The species most resembles a large F. microstemon, but is more closely related to the widely distributed F. pratensis. The new species is distinct by its narrow nearly glabrous outer involucre bracts with only narrow scarious margins, by the corolla lobes lacking hairs and by the somewhat thicker style branches.

Fleischmannia purpusii R.M.King & H.Robinson, sp. nov.

Plantae erectae herbaceae usque ad 50 dm altae perennes multo ramosae. Caules fulvi teretes vix striati sparse minute puberuli vel subglabri. Folia opposita peranguste petiolata, petiolis 0.5-2.2 cm longis; lamina anguste ovata vel lanceolata membranacea vel tenuiter papyracea 2.2-4.5 cm longa 0.9-2.0 cm lata base breviter cuneata trinervata margine multo serrata vel serrulata ad apicem anguste acuminata supra sparse pilosa subtus sparse puberula vel subglabra, nervis pilosis. Inflorescentiae laxae cymosae, pedicellis 7-33 mm longis sparse puberulis. Capitula ca. 5 mm alta; flores ca. 20; squamae involucri ca. 20 subimbricatae 2-3-seriatae inaequilongae bicostatae margine anguste scariosae extus glabrae, exteriores lanceolatae argute acutae, interiores anguste oblongae breviter acutae; corollae ca. 2.5 mm longae lavendulae,

lobis extus pauce setiferis; filamenta antherum in parte superiore 250-300 μ longa; thecae ca. 700 μ longae, appendicibus subquadratis vix latioribus quam longioribus; rami stylosum aliquantum incrassati; achaenia ca. 1.5 mm longa superne et in costis dense breviter setifera in costis late persistentiter flava; carpodia prominentia, cellulis subquadratis; setae pappi ca. 25 vix contiguae angustatae inferne dense scabrae. Grana pollinis ca. 18 μ diam. breviter valde spinosa.

Type: MEXICO: Veracruz: Zacuapan, August 1906, Purpus 1868 (Holotype US!).

The new species is one of many showing narrowly acute involucre bracts with very narrow scarious margins and a lax rather cymose inflorescence. Two related Mexican species, F. trinervia (Sch.-Bip.) K. & R. and F. holwayana (B.L.R.) K. & R., differ by their very short acute rather than acuminate leaves. The latter species also differs by the presence of prominent glandular punctations on the lower surface. The new species is somewhat similar to F. imitans (B.L.R.) K. & R. of Guatemala, El Salvador, Honduras and Nicaragua. This last species is distinct in the great number of flowers per head, 30-60, and has leaves and pedicels usually densely stipitate glandular. The new species seems particularly distinct in the usually wide and pubescent pale ribs of the achene.

Fleischmannia sonora (A.Gray) R.M.King & H.Robinson, comb. nov. Eupatorium sonora A.Gray, Pl. Wright 2: 74. 1853. Mexico, Arizona.

Fleischmannia tysonii R.M.King & H.Robinson, sp. nov.
Plantae erectae suffrutescentes usque ad 2 m altae perennes pauce ramosae. Caules virides vel fulvi teretes minute striati dense hirtelli. Folia opposita anguste petiolata, petiolis 1.0-2.5 cm longis; lamina late ovata papyracea usque ad 9 cm longa 7 cm lata base late rotundata vel cordata valde trinervata margine obtuse serrato-crenata vel duplicato serrato-crenata ad apicem acuta vel vix acuminata supra pilosa subtus dense pilosa non glandulo-punctata in nervis tomentosa. Inflorescentiae late corymboso-paniculatae, ramis dense corymbosis, pedicellis 2-4 mm longis hirtellis. Capitula 5-6 mm alta; flores 20-25; squamae involucri ca. 20 subimbricatae ca. 3-4-seriatae inaequilongae bicostatae plerumque breviter acutae vel

minute mucronatae margine late saepe prominentiter scariosae extus pilosae vel puberulae interiores ad apicem plus rotundatae plus scariosae minute fimbriatae; corollae ca. 3 mm longae lavendulae, lobis extus paucè vel multo breviter setiferis; filamenta antherarum in parte superiore ca. 250 μ longa; thecae ca. 900 μ longae, appendicibus oblongo-ovatis ca. 1 1/3 longioribus quam latioribus; rami stylorum ad apicem leniter clavati; achaenia nigra 1.2-1.5 mm longa, costis dense setiferis; setae pappi 22-25 non contiguae dense scabrae. Grana pollinis 18-20 diam. breviter spinosa.

Type: PANAMA: Chiriqui: West slope of El Baru between 8000-9000 ft elevation, March 27, 1970, Tyson & Loftin 6116 (Holotype US!). Paratypes: PANAMA: Chiriqui: W slopes of El Baru between 8000-9000 ft, Tyson & Loftin 6117 (FSU,MO); W slope of El Baru between 7000-8000 ft, Tyson & Loftin 5982 (FSU); 8 mi NE of El Volcan, 8100-8400 ft, Tyson 843 (FSU,MO).

The new species is apparently endemic to the Volcan Chiriqui. Closest relationship is to F. chiriquensis from the nearby Cerro Punta area. The present species is distinct by the shrubby rather than subscandent habit, by the densely pubescent leaves, by the non-contiguous pappus setae and by the prominently setiferous ribs of the achene.

Acknowledgement

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Fleischmannia allenii R.M.King & H.Robinson,
Holotype, Missouri Botanical Garden.



PLANTS OF PANAMA

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



HONDURAS

FRUITING ST.

NO. 11111111111111111111

Fleischmannia ciliolifera R.M.King & H.Robinson, Holotype, Gray Herbarium.



Fleischmannia croatii R.M.King & H.Robinson,
Holotype, Missouri Botanical Garden.



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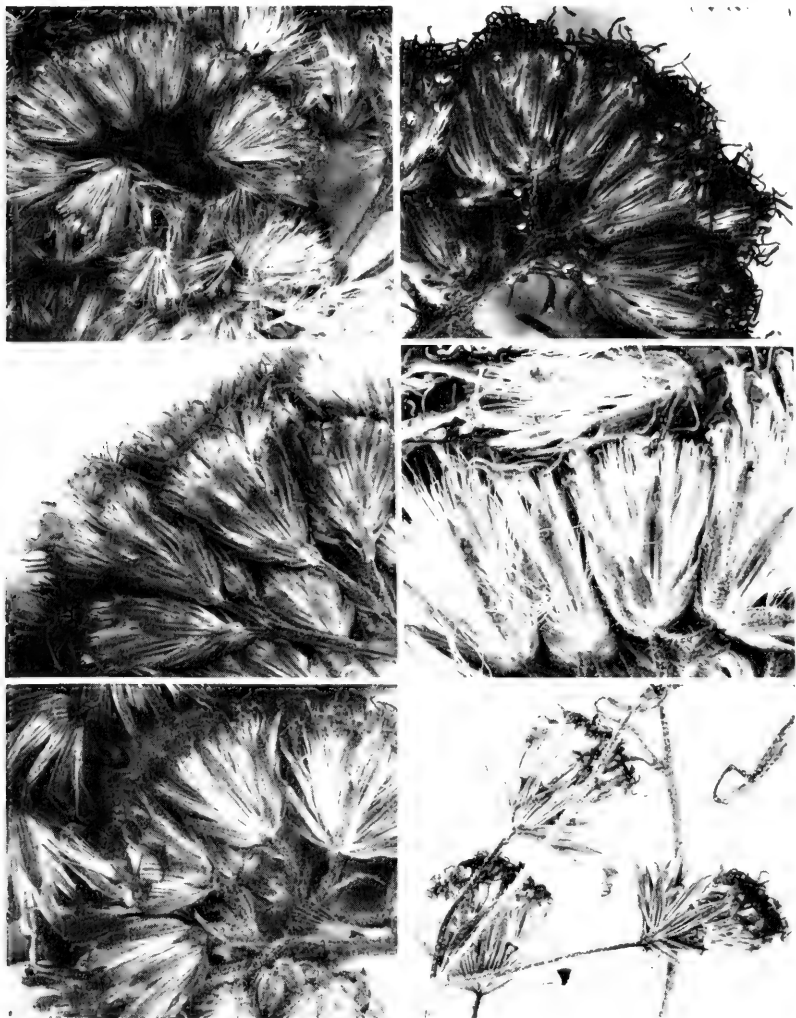
PLANT SYSTEMATICS
HERBARIUM

Fleischmannia granatensis R.M. King & H. Robinson

Fleischmannia granatensis R.M. King & H. Robinson, Holotype, United States National Herbarium.



Fleischmannia haughtii R.M.King & H.Robinson,
Holotype, United States National Herbarium.



Enlargements of heads of *Fleischmannia*. Top left; *F. allenii*. Top right; *F. chiriquensis*. Middle left; *F. ciliolifera*. Middle right; *F. croatii*. Bottom left; *F. granatensis*. Bottom right; *F. haughtii*.



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Fleischmannia matudae R.M.King & H.Robinson,
Holotype United States National Herbarium.



HONDURAS

Holotype
Y. nix R.M. King & H. Robinson

Fleischmannia nix R.M.King & H.Robinson,
Holotype, United States National Herbarium.



Fleischmannia panamensis R.M.King & H.Robinson,
Holotype, Missouri Botanical Garden.



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STATE OF MEXICO

Eupatorium incarnatum Roll
juvencianum
 Aug. 1911 S. 1948
 Rural slopes

Fleischmannia purpusii R.M.King & H.Robinson,
 Holotype, United States National Herbarium.



2586786 A

Fleischmannia tysonii R.M.King & H.Robinson,
Holotype, United States National Herbarium.



Enlargements of heads of Fleischmannia. Top left; F. matudae. Top right; F. nix. Middle left; F. panamensis. Middle right; F. purpusii. Bottom left; F. tysonii.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXII.

A NEW GENUS, SARTORINA.

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

In the years since the revision in the genus concept of Fleischmannia that genus has seemed to hold a rather isolated position in the tribe Eupatorieae. The cellular structure of the corolla and the very narrow very annulated collars of the anthers have always seemed completely unique even though some other characters have tended to imply a simple Gyptoid relationship for the genus. Now, material of a related previously undescribed genus having both the corolla and collar features of Fleischmannia shows other very distinctive features that seem to confirm the isolated position of both genera.

The material of the new genus is from the part of the Schultz-Bipontinus Herbarium in the Paris Museum and had already been named as an undescribed genus and species Sartoria eupatorioides by Schultz. The Schultz genus was never published, and in any case the name Sartoria was already preoccupied by a genus in the Leguminosae from the Middle East. The Paris material is obviously a duplicate specimen with part of an inflorescence and one lower leaf from an original that must have been destroyed at Berlin. The Paris duplicate is labelled from the Herb. E. Cosson, 18 and bears many notes that must have represented Schultz's observations including one of the most distinctive features of the genus: "nov. Eupat. genus ob ach & pappus connata" "Sartoria n. g., ach. teretia (non striate) oblonga glabra albida apice in cupulam brevem spongiosam expansa e qua pappas oritur l ser pilosa" "cap. 22 flora, rec. plana." A date is given "11/5/54" and a figure " $2\frac{1}{2}$ " which may refer to the height of the plant. The writing may be misinterpreted in a few parts.

One of the primary distinctions of the genus as noted by Schultz is the terete achene with a spongy upper callus. Actually the achene is very different from that of Fleischmannia in many features including its small size, its more tapering base with poorly differentiated carpopodium, and its walls consisting almost entirely of enlarged thin-walled hyalin cells with only narrow vascular strands and no angles. The

other distinctive features not seen by Schultz involve the style. The base of the style is enlarged in the one fully mature style examined, unlike any species of Fleischmannia. The shafts of all styles seen are unique among the Asteraceae by bearing scattered non-glandular hairs and long-stalked glands. The stylar appendage of the new genus has papillae smaller and not crowded together as in most species of Fleischmannia.

Unfortunately, among all the notes on the Paris specimen there is none giving any collection data even the country of origin. The relationship of the plant does not allow one to pinpoint the locality closer than Tropical America. The only probable clue on the specimen to the place of origin seems to be the name given to the plant by Schultz. It seems likely that "Sartoria" was intended to honor Carlos Sartorius 1796-1872 who lived at Mirador in Veracruz, Mexico for most of his life following 1820. Hopefully the new genus can be rediscovered and further analysed.

Sartorina schultzii R.M.King & H.Robinson, gen. et sp. nov. Asteracearum (Eupatorieae). Plantae erectae vel procumbentes herbaceae ca. 1 m ? altae. Caules fulvi tereti vel subquadrangulares dense minute puberuli. Folia opposita anguste longe petiolata, petiolis 5-20 mm longis; lamina late ovata vel deltoidea base truncata distincte trinervata ad apicem breviter acuta margine crenulata vel obtuse-serrulata supra dense minute puberula subtus breviter dense pilosa subcanescens, lamina inferiora ca. 3 cm longa et lata, lamina superiora 1-2 cm longa 0.7-1.5 cm lata. Inflorescentia subpaniculata, ramis subcorymbosis, pedicellis angustis 2-12 mm longis dense minute puberulis. Capitula ca. 3.0-3.5 mm alta; flores ca. 15-22; squamae involucri ca. 20 subimbricatae ca. 3-seriatae inaequilongae bicostatae margine late scariosae, exteriores ovatae ca. 1 mm longae ad apicem breviter acutae extus puberulae, interiores oblongae usque ad 2.5 mm longae ad apicem rotundatae vel breviter apiculatae extus subglabrae; receptacula plana glabra; corollae anguste infundibulares ca. 2.5 mm longae inferne glabrae, lobis extus glanduliferis extus et intus papillosis, papillis in partibus superioribus cellularum, cellulis plerumque elongatis, parietibus sinuosis; filamenta in parte superiore ca. 200 μ longa perangustata, cellulis elongatis, parietibus valde transverse annulatis; cellulae exotheciales subquadratae; appendices antherarum breviter oblongae ca. 150 μ longae ca. 110 μ latae; styli inferne subnodulosi glabri, scapis sparse piliferis et glanduliferis, ramis sublinearibus superne minute papillosis subclavatis complanatus; achaenia ca. 1 mm

longa teretia glabra, cellulis exterioribus laxis, parietibus tenuibus; carpopodia indistincta; pappus setiferus uniseriatus, setis ca. 15 non vel fere contiguis tenuis ca. 2 mm longis scabrellis, cellulis apicibus argute acutis. Grana pollinis ca. 18 μ diam. breviter spinosa.

Type: MEXICO? Sartorius? ex herbarium Schultz-Bipontinus under the name Sartoria eupatorioides (Holotype P!).

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB 20502 A #1 and A #2 to the senior author.



Sartorina schultzii R.M.King & H.Robinson,
Holotype and enlargements of heads, Paris Herbarium.
Photos by Victor E. Krantz, Staff Photographer,
National Museum of Natural History.

NOTES ON NEW AND NOTEWORTHY PLANTS - LXVI

Harold N. Moldenke

DURANTA SERRATIFOLIA var. *VARIEGATA* Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum marginibus albo-maculatis vel albo-vittatis recedit.

This variety differs from the typical form of the species in having its leaf-blades white-margined or irregularly white-blotched.

The type of the variety was collected by Mohamed El Mahdi (no. 62) in outdoor cultivation in the Barrage Medicinal Garden north of Cairo, Egypt, on January 22, 1968, and is deposited in the herbarium of Cairo University at Gizah.

ERIOCAULON COLLINUM var. *NANUM* Moldenke, var. nov.

Haec varietas a forma typica speciei recedit planta nana, pedunculis floriferis 2--12 cm. longis, foliis tenuissimis membranceis levissimis 1--4 cm. longis saepe ad apicem subflaccidis subfiliformibusque 0.5--1.5 mm. latis ad basin perspicue fenestratis glabris.

The type of this variety was collected by J. M. Silva on a river bank on the Horton Plains, Nuwara Eliya District, Central Province, Sri Lanka, on March 20, 1911, and is deposited in the herbarium of the Sri Lanka Botanical Garden at Peradeniya.

ERIOCAULON QUINQUANGULARE f. *VIVIPARUM* Moldenke, f. nov.

Haec forma a forma typica speciei capitulis saepe viviparis recedit.

This form differs from the typical form of the species in having its flowering-heads more or less viviparous.

The type of the form was collected by Henry Trimen at Heneratgoda, Colombo District, Western Province, Sri Lanka, in May of 1896 and is deposited in the herbarium of the Sri Lanka Botanical Garden at Peradeniya.

ERIOCAULON SETACEUM var. *CAPILLUS-NAIADIS* (Hook. f.) Moldenke, stat. nov.

Eriocaulon capillus-naiadis Hook. f., Fl. Brit. Ind. 6: 572 & 769. 1893.

PREMNA ALSTONI Moldenke, nom. nov.

"*Premna corymbosa* Rottl." apud Trimen, Handb. Fl. Ceylon 351. 1895 (not *P. corymbosa* Rottl. & Willd., Gesel. Naturforsch. Freund. Neue Schr. 4: 187--188. 1803).

PREMNA RESINOSA f. *GROSSEDENTATA* Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum marginibus grosse dentatis recedit.

This form differs from the typical form of the species in having the margins of its leaf-blades coarsely dentate.

The type of the form was collected by M. Kassas somewhere in the Sudan on January 10, 1956, and is deposited in the herbarium of Cairo University at Gizah.

PREMNA THWAITESII f. GLABRESCENS Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum utrinque glaberrimis recedit.

This form differs from the typical form of the species in having its leaf-blades completely glabrous on both surfaces.

The type of the form was collected in September of 1893 by an unknown collector at Eluwana Kande, Lagalla, Matale District, Central Province, Sri Lanka, and is deposited in the herbarium of the Sri Lanka Botanical Garden at Peradeniya.

STACHYTARPHETA DICHOTOMA f. ALBIFLORA (Moldenke) Moldenke, comb. nov.

Stachytarpheta australis f. albiflora Moldenke, Phytologia 3: 63. 1949.

STACHYTARPHETA DICHOTOMA var. NEOCALEDONICA (Moldenke) Moldenke, comb. nov.

Stachytarpheta australis var. neocaledonica Moldenke, Phytologia 3: 117. 1949.

BOOK REVIEWS

Alma L. Moldenke

"A DICTIONARY OF FLOWERING PLANTS AND FERNS" by J. C. Willis, Eighth Edition, revised by H. K. Airy Shaw, xdi & 1245 & lxvi pp. Cambridge University Press, London NW1 2DB & New York, N. Y. 10022. 1973. \$32.50.

Taxonomic and systematic botanists the world over have appreciated this tremendously valuable book since 1897 when the first edition appeared. They will be glad that this even more detailed work is now available since it includes new taxa, newly resurrected taxa, a key to angiosperm families and a concordance of family equivalents as taken from (1) this new-flavored "Dictionary", (2) the twelfth edition of Engler's "Syllabus" by Melchior and (3) the "Genera Plantarum" of Bentham & Hooker. Now if only the many highly competent other type botanists and biologists to whom plants or plant names are only incidental to their main studies would use this and other pertinent taxonomic literature, much nomenclatural confusion could be avoided!

One would not expect that reading a book like this could evoke

an automatic smile, but for an example see "Actinotinus Oliv. Imaginary genus, founded through the trick of a native Chinese collector who had carefully inserted an infl. of Viburnum into the terminal bud of an Aesculus!"

"ELECTRON MICROSCOPY OF ENZYMES: Principles and Methods" Volume I edited by M. A. Hayat, xv & 204 pp., illus., Van Nostrand Reinhold Company, Cincinnati, Toronto, London, Melbourne, and New York, N. Y. 10001. 1973. \$16.95.

"The primary objective of this book is to provide the reader with a detailed description of the methodology employed to localize enzymatic activity at the subcellular level...."

"The topics were carefully selected and written by competent investigators from several countries who have pioneered in their respective fields.....and are likely to be in the vanguard of improvements to come...."

"The reader should find this book an excellent reference, for it summarizes the major procedures which have evolved within the past two decades. An exhaustive list of references with complete titles is provided for each chapter, as are full author and subject indices."

These claims in the Preface are all true and therefore this volume should prove useful to many scientists and students in electron microscopy, enzymology, and those biological and medical fields dependent upon this type of study. The chapters include specimen preparation with emphasis on fixation with aldehydes, phosphatases, glyco- and glucosidases, transaminases, myrosinase associated with the characteristic taste and odor in cruciferous plants and enzyme immunocytochemistry employing the specificity of antibodies for the detection of cell components bearing antigenic determinants.

"PRINCIPLES OF DISPERSAL IN HIGHER PLANTS" Second edition by Leendert van der Pijl, xi & 162 pp., illus., Springer-Verlag, Heidelberg, Berlin, and New York, N. Y. 10010. 1972. \$12.60.

Those assorted botanists, biologists, ecologists, etc., familiar with the 1969 edition of this wonderful little book will be eager to see what has been added or changed in this new edition which also makes fascinating reading supplemented with excellent and unusual illustrations.

The best use of this book and its earlier companion volume on "Principles of Pollination Ecology" by K. Faegri and this author is putting them in the hands (really the minds) of those who teach the various introductory courses. These two books offer fascinating and easily comprehensible material and ideas: they are too good to reserve for only advanced students.

Unfortunately, the accepted spellings for the generic names

Clerodendrum and Petrea are not herein used. The words "man" and "is" are misspelled on pages xi and 97 respectively.

"CHROMOSOME BOTANY — and the Origins of Cultivated Plants", Third (Revised) Edition by C. D. Darlington, xvii & 237 pp., illus., Hafner Press, New York, N. Y. 10022. 1973. \$12.95.

The previous editions of 1956 and 1963, and even more so this one, effectively stress "that civilization has always been the work of men who grew grain crops and lived on them. Since we also know (partly by their chromosomes) what wild grains they first grew we also know where to find the origins and how to trace the movements of civilization." Then this well qualified author traces the genetic stories of our major agricultural and horticultural crops, but this follows a very careful treatment of the major chromosomal and intrachromosomal processes and aberrations and their effects upon dividing and fusing cells. "The breakage of a chromosome is often the first visible step in the breakage of a species."

The bibliography is arranged by chapter topics and has had pertinent new items added to it. Appendix I lists the earliest use in English of names for cultivated plants. Appendix II by E. B. Ford considers similar evolutionary processes in animals. There is a helpful modern table listing the "regions of origin of crop plants (after Vavilov, revised in the light of work by Baker, Barrau, Burkill, Collins, Helbaek, Hutchinson, Kuptsov, Rick, Salaman, Simmonds, Whitaker, Zohary and others)".

So many valuable facts and their interpretations are presented effectively in this small, yet very useful, book that no genetics course should bypass it.

 ADDITIONAL NOTES ON THE GENUS VERBENA. XIX

Harold N. Moldenke

Additional & emended bibliography: Blewitt, Fl. Waterbury 105. 1926; Clute, Am. Botanist 33: 112--114. 1927; Tischler, Tabul. Biol. 4: 24 & 43. 1927; Gough, Gard. Book Malaya 248. 1928; Anon., Kew Bull. Misc. Inf. 1929, App. 3: 108. 1929; Wangerin in Just, Bot. Jahresber. 51 (1): 554 [520]. 1929; Besant, Gard. Chron., ser. 3, 88: 133, fig. 47. 1930; T. H. Everett, Gard. Chron., ser. 3, 87: 144. 1930; Herter, Florul. Urug. 105--106 & frontisp. 1930; Grieve & Leyel, Modern Herb., pr. 1, 2: 486, 830--832, & 887. 1931; Vansell, Univ. Calif. Agr. Exp. Sta. Bull. 517, pr. 1, 52. 1931; M. Woodward, Leaves Gerard's Herb., pr. 1, 231--232. 1931; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 1076 [1058]. 1932; Kräusel in Just, Bot. Jahresber. 51 (1): 643 [35]. 1932; Rydb., Fl. Prairies & Plains, pr. 1, 677--679 & 967, fig. 479. 1932; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 & 1171

[366 & 367] (1932) and 52 (1): 482 [114]. 1933; Fedde in Just, Bot. Jahresber. 51 (2): 382 (1933), 52 (1): 825 (1934), and 54 (2): 747. 1934; Jex-Blake, Gard. East Afr., ed. 1, 78 & 266. 1934; Wangerin in Just, Bot. Jahresber. 55 (1): 834 & 835 (1935), 56 (1): 668 & 669 (1936), 57 (1): 696 (1937), and 58 (1): 845. 1938; Fedde in Just, Bot. Jahresber. 57 (2): 909. 1938; Gathorne-Hardy, Wild Fls. Brit. 22 & 120. 1938; Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 402 (1938), 58 (2): 329 (1938), and 59 (2): 417. 1939; A. H. Evans, Fl. Cambridg. 129. 1939; Fedde in Just, Bot. Jahresber. 58 (2): 668. 1939; Jex-Blake, Gard. East Afr., ed. 2, 87, 286, 301, & 332. 1939; Oertel, U. S. Dept. Agr. Circ. 554: 19, 21, 22, 24, 27, 33-35, & 49. 1939; R. E. Clarkson, Green Enchantment 269 & 328. 1940; Furusato, Bot. & Zool. Theoret. & Appl. Tokyo [Syokubutu Oyobi Dobuti] 8: [1303]-1311 [8 (8): 39-47], fig. 3. 1940; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 670 (1940) and 60 (2): 573 & 575. 1941; Biswas, Indian Forest Rec., ser. 2, Bot. 3: 42. 1941; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): [371], [372], 704, 753, 754, & 823. 1941; M. G. Palmer, Fauna & Fl. Ilfracomb. Dist. 212. 1946; Hara, Enum. Sperm. Jap., pr. 1, 1: 190. 1948; Higgins, Occas. Pap. San Diego Soc. Nat. Hist. 8: 121. 1949; E. G. López, Recours. Med. Biol. 262. 1949; Parsa, Fl. Iran 4 (1): 532, 537, & 538, fig. 253. 1949; Rambo, An. Bot. Herb. Barb. Rodr. 1: 123, 125, & 126. 1949; Batalla & Masclans, Collect. Bot. 2: 394. 1950; Faegri & Iversen, Text-book Mod. Pollen Analys., ed. 1, 147 & 168. 1950; Jex-Blake, Gard. East Afr., ed. 3, 77, 114, & 336. 1950; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [typescript]. 1951; Martin, Zim, & Nels., Am. Wildlife & Pl., pr. 1, 444 & 499. 1951; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 449 & 538, fig. 256 A. 1952; Goossens, Suid-Afrik, Blompl. 185 & 188. 1953; W. A. Weber, Handb. Pl. Colo. Front Range, ed. 1, 156-157 & 232. 1953; Angely, Taxon 4: 120. 1955; Bolós & Masclans, Collect. Bot. 4: 432. 1955; L. J. Bradley, Ferns & Flow. Pl. Audub. Center 17, 67, & 100. 1955; Evers, Ill. Nat. Hist. Surv. Full. 26: 392, 400, 421, & 436. 1955; Fell, Fl. Winnebago Co. 122-123. 1955; Ikuse, Pollen Grains Jap. 128. 1956; C. E. Phillips, Weeds Northeast 32, 34, & 80. 1956; Natarajan, Pyton 8: 24, 25, & 35. 1957; R. C. Foster, Contrib. Gray Herb. 184: 170-171. 1958; Wherry, Horticulture 36: 279. 1958; Bullock, Taxon 7: 2, 34, & 163 (1958) and 8: 204. 1959; Grieve & Leyel, Modern Herb., pr. 2, 2: 830-832 & 887. 1959; Cain, Man. Veg. Anal., pr. 1, 229. 1959; Braga, Pl. Nordest., ed. 2, 476. 1960; Martin & Noel, Fl. Albany & Bathurst 92. 1960; Foley, Ground Covers, pr. 1, 134-135, 188, 214, 216, 219, & 224. 1961; Martin, Zim, & Nels., Am. Wildlife & Pl., pr. 2, 444 & 499. 1961; P. Fournier, Quat. Fl. France 806 & 807, fig. 3352 & 3353. 1961; W. A. Weber, Handb. Pl. Colo. Front Range, ed. 2, 156-157 & 232. 1961; Eiteb in Ferré, Simpos. S8bre Cerrado 190. 1962; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: [1]-5 & 8, pl. 1, fig. 1, & text fig. 1-5. 1962; Erdtman, Berglund, & Praglowski, Introd. Scand. Pollen Fl. 2: 49 & 89. 1963; Fourcroy, Atlas Recon. Pl. Comm., ed. 2, pl. 158 [inf.]. 1963; Graf, Exotica 3: 1482, 1483, & 1733. 1963; Faegri & Iversen, Text-book

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It is perhaps worth mentioning here that the Chodat & Hassler (1904) reference in the above bibliography is sometimes erroneously cited as "Plantae Hasslerianae IX, 477"; the Benke (1933) reference is sometimes cited as "Rhodora 10. 1943" or "34: 45"; and the Pase & Johnson (1968) reference has been cited previously inaccurately as "U. S. Dept. Agr. Forest Serv." In regard to the J. C. & M. Willis (1911) publication, M. Willis is mentioned as

co-author on the cover of the work but not on its title-page!

Alcock (1876) credits the name, Verbena, to Pliny and says "Speaking of 'Sagmen' and 'Verbena' Pliny says: 'These two names no doubt originally signified the same thing — a green turf torn up from the citadel, with the earth attached to it, and hence, when envoys were despatched to the enemy for the purpose of clarification, or, in other words, with the object of clearly demanding restitution of property that had been carried off, one of these officers was always known as the 'verbenarius', — or bearer of the verbenae. The etymology of the name is dubious. It has been said to be derived from Keltic ferfaen, having the same significance as Saxifraga.....The word verbenae (L.) signified generally sacred boughs, or branches of trees that were used in religious ceremonies; hence it has been suggested that it is a corruption of two G. words, hiera botane, or sacred plant."

Vansell (1931) reports the name "valley vervena" for species of Phacelia in California — obviously a typographic error for "valley verbena". Gibert (1873) cites Gibert 445, 448, 451, 452, & 979 as unidentified species of Verbena, but, of course, his concept of Verbena included Aloysia, Phyla, and perhaps other genera now recognized as distinct. The J. P. Simon 477, distributed as Verbena sp., is actually Diostea scoparia (Gill. & Hook.) Miers.

It is worth noting that Raeuschel (1797) divides the genus Verbena into two sections: (1) Diandrae (including what we now recognize as Bouchea, Stachytarpheta, and Phyla stoechadifolia) and (2) Tetrandrae (including Phyla nodiflora, Priva adhaerens, Aloysia, Lippia alba, and true Verbena spp.).

Fell (1955) reports of the verbenas of Winnebago County, Illinois: "Variations in individuals and extensive hybridization among our 5 native verbenas produce such a mingling of characters that picking out the parents is difficult and at times quite impossible. Dr. Moldenke has named some of these hybrids in his account of the genus in the New Illustrated Britton and Brown and he has revised some of our specimens. Hybrids are much more common in some pastures than in others where the opportunity of crossing seems as great. The prairies about Camp Grant and pastures in Kishwaukee River bottom near Perryville road bridge and on River Road south of Cherry Valley are especially prolific. The most common crosses are x rhybergii and x moechina."

Additional excluded species:

Verbena undulata Reitz, Sellowia 13: 67. 1961; Reitz, Sellowia 22: 145. 1970 = Lantana undulata Schrank.

The L. F. Ward s.n. [Washington, May 18, 1886], distributed as a species of Verbena, is actually a species of Veronica in the Scrophulariaceae.

VERBENA ABRAMSI Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 53: 6374 (1972)

and 54: 1729. 1972; Moldenke, *Phytologia* 24: 216 (1972) and 25: 234. 1973; Anon., *Biol. Abstr.* 55 (10): B.A.S.I.C. S.270. 1973; Howitt & Howell, *Suppl. Vasc. Pl. Monterey Co.* 28. 1973.

Additional citations: CALIFORNIA: Riverside Co.: M. Hall s.n. [May 18, 1940] (Ba).

xVERBENA ADULTERINA Hausskn.

Additional bibliography: Moldenke, *Phytologia* 23: 213. 1972.

VERBENA ALATA Sweet

Additional & emended bibliography: Paxt., *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed. 2, 328. 1849; Reitz, *Sellowia* 22: 145. 1970; Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 838 & xix. 1971; Anon., *Biol. Abstr.* 54 (7): B.A.S.I.C. S.280. 1972; Moldenke, *Phytologia* 23: 258 & 436. 1972.

According to Paxton (1840) this species was introduced into cultivation in England in 1828.

The Lindeman & Haas 3010, distributed as V. alata, is more probably V. montevidensis Spreng., even though it is referred to on the label as a "shrub 1.2 m. tall, almost leafless".

VERBENA ALATA f. ALBA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 213. 1972.

VERBENA AMBROSIFOLIA Rydb.

Additional & emended bibliography: Rydb., *Fl. Prairies & Plains*, pr. 1, 677, 678, & 967. 1932; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 575. 1941; Waterfall, *Rhodora* 51: 27. 1949; Kearney, *List Citations Place Publ. Spp. Ariz. Fl.* 112 [typescr.]. 1951; W. A. Weber, *Handb. Pl. Colo. Front Range*, ed. 1, 156 (1953) and ed. 2, 156. 1961; W. A. Weber, *Rocky Mtn. Fl.*, ed. 1, 305. 1967; Solbrig in *Heywood, Mod. Meth. Pl. Tax.* 88 & 89. 1968; Rydb., *Fl. Prairies & Plains*, pr. 2, 2: 677, 678, & 967. 1971; Moldenke, *Biol. Abstr.* 54: 1194. 1972; Moldenke, *Phytologia* 24: 20, 54, 242, & 255. 1972; W. A. Weber, *Rocky Mtn. Fl.*, ed. 2, 305. 1972; Anon., *Biol. Abstr.* 55 (10): B.A.S.I.C. S.270. 1973; Stacey, *Ariz. Highw.* 49 (3): 7. 1973.

Illustrations: Stacey, *Ariz. Highw.* 49 (3): 7 [in color]. 1973.

Dress refers to this plant as having decumbent stems and found it growing "in low barren dry (but vernaly moist) ground". Reveal and his associates encountered it on steep mountain slopes, associated with Yucca, Opuntia, and other shrubs. Tharp reports it from "valleys and roadsides". The Spellenberg's describe the plant as forming "clumps with many stems". The corollas on Spellenberg & Spellenberg 3062 are said to have been "pink". The color illustration in the Stacey (1973) article referred to above does not show enough detail to make identification certain, but it seems likely that it depicts V. ambrosifolia.

An artificial cross between this species and V. canadensis (L.) Britton is described by Solbrig (1968) but has not been

named. The Denham 2001, distributed as V. ambrosifolia, is actually V. ambrosifolia f. eglandulosa Perry.

Additional citations: COLORADO: Archuleta Co.: Weber & Livingston 6258 (Bl--71228). Boulder Co.: W. A. Weber 3911 (Bl--16775). Huerfano Co.: M. Douglass 54-133 (Bl--134645). Las Animas Co.: W. A. Weber 3303 (Bl--19629). Pueblo Co.: M. Douglass 54-81 (Bl--134859). TEXAS: Loving Co.: Stuessy 184 (Ws). Pecos Co.: Tharp 43-796 (Bl--53320). Zavala Co.: Ramirez & Cardenas 13 (Bl--209430, Bl--209443). NEW MEXICO: Chavez Co.: W. A. Weber 44511 (Bl--257053). Guadalupe Co.: Dress 2883 (Ba). ARIZONA: Cochise Co.: Spellenberg & Spellenberg 3062 (N). MEXICO: Coahuila: Reveal, Hess, & Kiger 2574 (N, W--2632235); Rinehart 7004 (Mi).

VERBENA AMBROSIFOLIA f. EGLANDULOSA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Waterfall, Rhodora 51: 27. 1949; Moldenke, Phytologia 23: 213. 1972.

Waterfall (1949) cites Waterfall 7437 from Cimarron County, Oklahoma, growing on a stony hillside. The Denham 2055, distributed as V. ambrosifolia f. eglandulosa, is actually V. gooddingii var. nepetifolia Tidestr.

Additional citations: NEW MEXICO: Luna Co.: Denham 2001 (Bl--244669).

VERBENA AMOENA Paxt.

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Moldenke, Phytologia 23: 214. 1972.

Paxton (1840) avers that this species was introduced into cultivation in England in or before 1839.

VERBENA ARISTIGERA S. Moore

Additional bibliography: Moldenke, Phytologia 23: 182 & 419 (1972) and 24: 236, 238, & 239. 1972.

The corollas on Hatschbach 23884, Krapovickas, Cristóbal, Mroginski, & Fernandez 22730, V. Maruffak 126, and Schinini & Mroginski 4476 are said to have been "violet" when fresh. Recent collectors have found this plant in bloom in April, September, and November, growing in white sandy soil on "campo limpo algo úmido".

Additional citations: BRAZIL: Mato Grosso: Hatschbach 23884 (N). PARAGUAY: V. Maruffak 126 (Ws). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Mroginski, & Fernandez 22730 (Ld); Schinini & Mroginski 4664 (Ld).

VERBENA ATACAMENSIS Reiche

Additional bibliography: Moldenke, Phytologia 23: 182. 1972.

Additional citations: CHILE: Atacama: Worth & Morrison 16154 (Ba).

VERBENA BALANSAE Briq.

Additional bibliography: Reitz, *Sellowia* 22: 145. 1970; Moldenke, *Phytologia* 23: 214--215 (1972) and 24: 232 & 242. 1972.

VERBENA BANGIANA Moldenke

Additional bibliography: R. C. Foster, *Contrib. Gray Herb.* 184: 170. 1958; Moldenke, *Phytologia* 23: 215. 1972.

VERBENA BARBATA Grah.

Additional bibliography: Paxt., *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed. 2, 328. 1849; Moldenke, *Phytologia* 23: 215 (1972) and 25: 234. 1973.

Paxton (1840) states that this plant was introduced into cultivation in England in 1826.

VERBENA BERTERII (Meisn.) Schau.

Additional bibliography: Moldenke, *Phytologia* 23: 258, 284, & 377. 1972.

Morrison refers to this plant as "not common; bush 0.3 m. tall; flowers lilac" and found it in flower and fruit in December. My wife and I, however, found it extremely common in the Santiago area when we collected there in 1948.

Material of *V. berterii* has been misidentified and distributed in some herbaria under the name of *Glandularia laciniata* (L.) Schnack & Covas.

Additional citations: CHILE: Aconcagua: Zöllner 6483 (Ac), 6817 (Ld). Colchagua: Zöllner 6471 (Ac). Santiago: Mahu 758-L (Bl--208643), 4232 (Bl--248578); J. L. Morrison 16771 (Ba). Valparaiso: Zöllner 7024 (Ac).

VERBENA BIPINNATIFIDA Nutt.

Additional & emended bibliography: Rydb., *Fl. Prairies & Plains*, pr. 1, 677--679 & 967. 1932; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 575. 1941; Kearney, *List Citations Place Publ. Spp. Ariz. Fl.* 112 [typescr.]. 1951; Foley, *Ground Covers*, pr. 1, 134. 1961; Solbrig in *Heywood, Mod. Meth. Pl. Tax.* 88 & 89. 1968; Drar, *Publ. Cairo Univ. Herb.* 3: 111. 1970; Agarwal, *Journ. Indian Bot. Soc.* 50: 374--376. 1971; Foley, *Ground Covers*, pr. 2, 134. 1971; Rydb., *Fl. Prairies & Plains*, pr. 2, 677--679 & 967. 1971; Vyas, Agarwal, & Garg, *Phyton Rev. Int. Bot. Exp.* 28: 161--164. 1971; Anon., *Biol. Abstr.* 54: 2495 (1972) and 54 (5): B.A.S. I.C. S.272. 1972; Farnsworth, *Pharmacog. Titles* 7 (10): xvi. 1972; Fong & al., *Lloydia* 25: 117--119. 1972; Moldenke, *Phytologia* 23: 258--259, 302, 414, 426, & 435 (1972) and 24: 51, 53, 131, 238, & 239. 1972; G. W. Park, *Parks Flow. Book* 1973: 86. 1972; R. R. Stewart in *Nasir & Ali, Fl. West Pakist.* 608. 1972; Anon., *Biol. Abstr.* 55 (5): B.A.S.I.C. S.267. 1973; Kral, *Rhodora* 75: 400. 1973; "L. E.", *Biol. Abstr.* 55: 2879. 1973.

Agarwal (1971) treated seeds of what he says was this species (but I suspect strongly that they were *V. tenuisecta* Briq.!) with various combinations of thio- and ascorbic acid for 12 hours and

then let them germinate under continuous light or in continuous darkness. Ascorbic acid affected germination poorly when applied alone, but markedly increased the stimulation caused by thiourea. With increasing proportion of thiourea greater germination occurred in continuous light, while with increasing proportion of ascorbic acid germination was greater in continuous darkness. Vyas, Agarwal, & Garg (1971) studied germination and growth of the same species in different soil types and found that field capacity, as well as Ca and organic content of the soil, control the growth and distribution of this species [again, probably V. tenuisecta]. Drar (1970) records V. bipinnatifida as cultivated in the Sudan, but here again it is virtually certain that the plant he refers to is the commonly cultivated V. tenuisecta Briq.

Recent collectors have found V. bipinnatifida growing along roadsides, in dry stony rough ground, open neglected fields, and xeric pastures without crops. Lawrence refers to it as a "floppy perennial, 15 inches tall". Ruth refers to it as common throughout Tarrant County and the entire state of Texas. The flowers are sometimes referred to as fragrant. The corollas are described as having been "lavender" on Fryxell 1238 and Lundell & Lundell 12132, "purple" on C. L. Lundell 10955 & 11704 and Lundell & Lundell 11364, "purplish" on C. L. Lundell 11457 & 11462 and Lundell & Lundell 10369 & 11450, "pink-purple" on C. L. Lundell 10975, and "mauve-purple" on G. H. M. Lawrence 459, while on H. E. Moore 951 they are said to have been "bluer than in V. canadensis".

Kral (1973) cites Kral 31082 from Greene County, Kral 31215 from Marengo County, Kral 30953 from Montgomery County, and Kral 23786 & 39643 from Sumter County, Alabama, noting that the species is "Very abundant and showy in late spring and into the summer on the black earths and outcrops of the chalk prairies in Alabama; probably in every black belt county. However, not reported by Small from east of Louisiana. A common verbena of the prairie provinces of the west and midwest, already reported for Alabama by Harper.....and.....Perry."

The F. R. Fosberg 44661 and L. C. Higgins 3951, distributed as V. bipinnatifida, are actually V. ciliata var. longidentata Perry, Gould & Haskell 3253a is V. elegans H.B.K., Plowman & Kilham AP.18 is V. gooddingii Briq., Nafday 112 is V. tenuisecta Briq., and I. Collins s.n. [July 29, 1941] is in part V. tenuisecta Briq. and in part V. tenuisecta var. alba Moldenke.

Additional citations: SOUTH DAKOTA: Fall River Co.: G. N. Jones 35990 (Bl--191471). KANSAS: Smith Co.: Horr E.108 (Bl--55877). ARKANSAS: Franklin Co.: O. E. White s.n. [27 May 1947] (W--2646208). OKLAHOMA: Beckham Co.: Dress 2876 (Ba). Comanche Co.: Hopkins, Nelson, & Nelson 801 (Ba). Murray Co.: M. Hopkins 3959 (Ba). TEXAS: Bandera Co.: Ramirez & Cardenas 40 (Bl--209469). Bexar Co.: J. O. Perez 25 (Bl--209672). Dallas Co.: C. L. Lundell 11704 (Mi); Lundell & Lundell 11315 (Ba, Bl--71834), 12132 (Mi);

J. Reverchon s.n. [Curtiss 1962*] (Mi). Deaf Smith Co.: C. L. Lundell 11457 (Mi). Fannin Co.: McCart 2032 (Bl--103874). Gillespie Co.: Fryxell 1238 (N). Kinney Co.: Strother 263 (Bl--198050). Oldham Co.: C. L. Lundell 11462 (Mi); Lundell & Lundell 11450 (Mi). Reagan Co.: Cory 53507 (Bl--90474). Smith Co.: H. E. Moore 951 (Ba). Sutton Co.: Rohrbaugh 390 (Bl--174980). Tarrant Co.: A. Ruth 107 (Ba). Taylor Co.: Lundell & Lundell 11364 (Mi). Uvalde Co.: C. L. Lundell 10955 (Mi), 10975 (Mi). Williamson Co.: Lundell & Lundell 10369 (Mi). CULTIVATED: Canada: G. H. M. Lawrence 459 (Ba).

VERBENA BIPINNATIFIDA var. LATILOBATA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [typescr.]. 1951; Moldenke, Phytologia 23: 216 & 302. 1972.

xVERBENA BLANCHARDI Moldenke

Additional bibliography: Rydb., Fl. Prairies & Plains, pr. 1, 677. 1932; Fell, Fl. Winnebago Co. 122. 1955; Rydb., Fl. Prairies & Plains, pr. 2, 677. 1971; Moldenke, Phytologia 23: 216. 1972.

VERBENA BONARIENSIS L.

Additional & emended synonymy: Verbena bonariense L. ex Moldenke, Alph. List Invalid Names Suppl. 1: 22, in syn. 1947; Martin & Noel, Fl. Albany & Bathurst 92. 1960. Verbena bonarriensis L. ex Dhillon & Bajwa, Bull. Bot. Surv. India 11: 241, sphalm. 1969. Verbena bonaviensis Farnsworth, Pharmacog. Titles 7 (10): xvi, sphalm. 1972.

Additional & emended bibliography: Rausch., Nom. Bot., ed. 3, 3. 1797; Desf., Tabl. Écol. Bot., ed. 1, 55. 1804; Willd., Enum. Pl. Hort. Berol. 2: 633. 1809; Desf., Tabl. Écol. Bot., ed. 2, 66. 1815; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Gibert, Enum. Pl. Montevid. 43. 1873; Kuntze, Rev. Gen. Pl. 3 (1): 255. 1893; J. G. Baker in Thiseit.-Dyer, Fl. Trop. Afr. 5: 286--287. 1900; Stearn, Fl. Batava 27: pl. 2093. 1925; Anon., Kew Bull. Misc. Inf. 1929, App. 3: 108. 1929; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366] (1932) and 55 (1): 835. 1935; Jex-Blake, Gard. East Afr., ed. 2, 332. 1939; Oertel, U. S. Dept. Agr. Circ. 554: 21. 1939; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 704, 754 [372], & 823. 1941; Rambo, An. Bot. Herb. Barb. Rodr. 1: 125. 1949; R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; P. Fournier, Quat. Fl. France 806. 1961; Watt & Breyer-Brandwijk, Med. & Poison. Pl. S. & East. Afr., ed. 2, 1054 & 1453. 1962; N. P. Singh, Bull. Bot. Surv. India 11: 357. 1969; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 838 & xix, map 1391. 1971; V. Singh, Journ. Bomb. Nat. Hist. Soc. 68: 343. 1971; Amaral Franco in Tutin & al., Fl. Eur. 3: 123. 1972; Beadle, Evans, Carolin, & Tindale, Fl. Sydney Red., ed. 2, 507. 1972; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1396 & 1397. 1972; De Fillips, Webbia 27: 360. 1972; Encke & Buchheim in Zander, Hand-

wörterb. Pflanzennam., ed. 10, 520. 1972; Farnsworth, Pharmacog. Titles 7 (10): xvi. 1972; Fong & al., Lloydia 25: 117-149. 1972; Kunkel, Monog. Biol. Canar. 3: 62. 1972; F. Perry, Fls. World 303 & 320. 1972; R. R. Stewart in Nasir & Ali, Fl. West Pakist. 608. 1972; Tutin in Tutin & al., Fl. Eur. 3: 369. 1972; Venter, Journ. S. Afr. Bot. 38: 231. 1972; Moldenke, Phytologia 24: 216-217 (1972) and 25: 232, 233, & 244. 1973.

Emended illustrations: Stearn, Fl. Batava 27: pl. 2093. 1925.

Recent collectors have encountered this plant in grasslands, in "brejo", at the foot of small hills, and (in New Zealand) in "poor dry yellow soil on southerly-sloping hillsides", and as a weed in cotton fields, at 125 m. altitude, flowering from December to February and fruiting in December and January. Martin & Noel (1960) assert that it blooms regularly in Australia in January and February. It has been described as an erect herb to 2 m. tall. The corollas are described as "lilac" on Hatschbach 28483 and Philson, Doore, & Nash 234, "violet" on Hatschbach, Smith, & Klein 28206, "pale-purple" on Darbyshire 534, "light-purple" on Lindeman & Haas 3935, "mauve" on Bayliss BS.2236, and "blue" on MacDaniels 2044. Martin & Noel (1960) describe the flowers as "purple". Paxton (1840) asserts categorically that the plant is "worthless" in cultivation (yet it has been or is in cultivation in at least 16 countries!). In Africa and Australia it is known as "blue-top" or "purple-top". A French vernacular name for it is "verveine de Buénos-Ayres". Oertel (1939) calls it "blue vervain" and lists it among the "honey and pollen plants" of Louisiana.

Venter (1972) refers to V. bonariensis as a "Woody herb on flood sands" in South Africa, flowering there from September to November. Dhillon & Bajwa (1969) describe it as a "weed in gardens" in Rajasthan, citing Dhillon 301; Singh (1969) refers to it as "Frequent, along the sides of the sugarcane and paddy fields" in India, flowering there from April to October and fruiting from July to October, citing his nos. 19636 & 25497. The Corrells (1972) give its habitat and distribution in the south-western United States as "Sandy loam, ditch banks, wet or moist flatlands and along rice field fences, in Okla. (McCurtain Co.) and in e. Tex. from Red River to Jefferson cos.", blooming there from April to June. Santa Cruz reports that in Chile it occurs in "Toda la República de 36° a 41° Lat. Sur".

Baker (1900) tells us that V. bonariensis is "a native of Extratropical South America, is now established at the Cape and in Mauritius, Bombay, Madagascar, and the Canary Islands, but we have no specimens from Tropical Africa". Stewart (1972) asserts that it is "A weed from Brazil which seems to be spreading in Hazara [Pakistan]. It has been found in Abb., Mansera and Thandiani." Waterfall (1949) cites Waterfall 7599 from McCurtain County, Oklahoma — "an adventive in.....roadside ditch — either recently spread into the state or previously overlooked... It has been known previously from near-by Texas, Arkansas and Louisiana."

Watt & Breyer-Brandwijk (1962) report that it "has been sus-

pected in Australia of causing abortion in the bovine...No ill effects, however, have resulted from the experimental feeding of 300 gm. of dry flowering plant on each of four consecutive days."

Fournier (1961) most amazingly reduces V. bonariensis to synonymy under what he calls V. chamaedryfolia [now known as V. peruviana (L.) Britton], a species belonging to a completely different section of the genus! Perry (1972) reduces it to synonymy under "V. patagonica" [now known as Junellia patagonica (Speg.) Moldenke] -- the plant here referred to doubtless being V. bonariensis Rendle rather than the true V. bonariensis of Linnaeus, although no authorities are cited by her.

The Bracelin 1517 & 2827, Gallinal, Aragone, Bergalli, Campal, & Rosengurt PE. 5461, Rosengurt Gallinal 5804, and Stearn s.n. [H. N. Moldenke 9160], distributed as V. bonariensis, are all actually V. bonariensis var. conglomerata Briq., Repton 716 is V. brasiliensis Vell., Archer 4831, Cowgill 903, Dress 1393, and Herb. Pl. Ind. 121505 are xV. intercedens Briq., Balakrishnan NBK. 113 is V. rigida Spreng., Bayliss BS. 5318 is V. tenuisecta Briq., and C. N. Forbes 546H is Stachytarpheta dichotoma (Rufz & Pav.) Vahl.

Additional citations: SOUTH CAROLINA: Colleton Co.: Bell 2347 (Bl--150279). GEORGIA: Burke Co.: Shacklette 6893 (Bl--202028). FLORIDA: Bay Co.: Moldenke & Moldenke 26693 (Ac). ALABAMA: Pike Co.: Moldenke & Moldenke 26869 (Ld). MISSISSIPPI: Perry Co.: Moldenke & Moldenke 26836 (Ba). ARKANSAS: Drew Co.: Demaree 23251 (Ba). TEXAS: Orange Co.: Cory 48132 (Bl--253595). CALIFORNIA: Marin Co.: Howell 19323 (Ba, Bl--53365), s.n. [Sept. 5, 1943] (Bl--103493). BRAZIL: Paraná: Hatschbach 28483 (Ld); Hatschbach, Smith, & Klein 28206 (Ac). Rio Grande do Sul: Lindeman & Haas 3935 (N). CHILE: Malleco: Santa Cruz 1938 (Ba). ARGENTINA: Buenos Aires: A. T. Hunziker 4062 (Ba). Formosa: I. Morel 159 (Bl--104281), 1221 (Bl--104257). Misiones: Bertoni 2436 (Bl--104280). Santa Fé: Querín 657 (Ld). EGYPT: Maire 142 (Gz). SOUTH AFRICA: Cape Province: Bayliss BS. 2236 (Ba, Ba). INDIA: Khasi States: Hooker & Thomson s.n. [alt. 1-3000 ped.] (Pd). SRI LANKA: Amaratunga 695 (Pd); Balakrishnan NBK. 1038 (Pd). NEW CALEDONIA: MacDaniels 2044 (Ba). AUSTRALIA: Capital Territory: Darbyshire 534 (Ba). Queensland: K. Russell s.n. [7 Nov. 1943] (W--2716963). NEW ZEALAND: North Island: Philson, Doore, & Nash 234 (Ws). CULTIVATED: Sri Lanka: Collector undetermined s.n. [Hakgala, Sept. 22, 1897] (Pd); Silva s.n. [Hakgala, May 22, 1911] (Pd).

VERBENA BONARIENSIS var. CONGLOMERATA Briq.

Additional & emended bibliography: Angely, Fl. Anal. & Fito-geogr. S. Paulo, ed. 1, 4: 838 & xix. 1971; Moldenke, Phytologia 23: 259. 1972.

Bracelin describes the flower-color on Bracelin 1512 as "RHS [Royal Horticultural Society] 35/2 Amethyst Violet; tube 29/1 Rhodamine Purple" and found the plant in flower in July and in fruit in December. Through some palpable error in transcription, the label with Bracelin 2827 is inscribed "Tree: up to 6 feet high".

Additional citations: URUGUAY: Gallinal, Aragone, Bergalli, Campal, & Rosengurtt PE.5461 (Ba); Rosengurtt Gallinal 5804 (Ba). CULTIVATED: California: Bracelin 1512 (Ba), 2827 (Ba). Egypt: Din s.n. [29/4/1970] (Gz, Gz, Gz). England: Stearn s.n. [H. N. Moldenke 9160] (Ba, N).

VERBENA BRACTEATA Lag. & Rodr.

Additional synonymy: Verbena bractiosa Lag. & Rodr. ex C. C. Black in Cragg [ed.], Advances Ecol. Res. 7: 108, sphalm. 1971.

Additional & emended bibliography: Desf., Tabl. Écol. Bot., ed. 1, 55. 1804; Willd., Enum. Pl. Hort. Berol. 2: 634. 1809; Desf., Tabl. Écol. Bot., ed. 2, 66. 1815; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Stearn, Fl. Batava 27: pl. 2082. 1925; Blewitt, Fl. Waterbury 105. 1926; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366]. 1932; Clute, Am. Botanist 33: 113--114. 1927; Rydb., Fl. Prairies & Plains, pr. 1, 677, 678, & 967. 1932; Higgins, Occas. Pap. San Diego Soc. Nat. Hist. 8: 121. 1949; W. A. Weber, Handb. Pl. Colo. Front Range, ed. 1, 156. 1953; Evers, Ill. Nat. Hist. Surv. Bull. 26: 421 & 436. 1955; Fell, Fl. Winnebago Co. 122. 1955; W. A. Weber, Handb. Pl. Colo. Front Range, ed. 2, 156. 1961; W. A. Weber, Rocky Mtn. Fl., ed. 1, 306. 1967; Delorit, Illustr. Tax. Man. Weed Seeds 96 & 97. 1970; C. C. Black in Cragg [ed.], Advances Ecol. Res. 7: 108. 1971; Eilers, Univ. Iowa Stud. Nat. Hist. 21: 60 & 123. 1971; Ellis, Wofford, & Chester, Castanea 36: 242. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 2: 677, 678, & 967. 1971; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1397 & 1400. 1972; Cronq., Holmg., Holmg., & Reveal, Intermount. Fl. 1: 124 & 125. 1972; Dowden, Wild Green Things 50. 1972; Wallace & Romney, Radioecol. & Ecophys. Desert Pl. vi. 1972; W. A. Weber, Rocky Mtn. Fl., ed. 2, 306. 1972; Wilkinson & Jaques, How Know Weeds, ed. 2, 123, 207, & 231, fig. 295. 1972; Moldenke, Phytologia 24: 21, 51, & 134 (1972) and 25: 226, 234, & 244. 1973; Halse, Fl. Canyon de Chelly 147 [typescr.]. 1973; Howitt & Howell, Suppl. Vasc. Pl. Monterey Co. 28. 1973.

Additional illustrations: Stearn, Fl. Batava 27: pl. 2082. 1925; Delorit, Illustr. Tax. Man. Weed Seeds 97 [in color]. 1970; Wilkinson & Jaques, How Know Weeds, ed. 2, 123, fig. 295. 1972.

Recent collectors have encountered this plant in open grassland, along railroad tracks, and on the edges of gravel roads. Smith, in New York, describes it as a gray-green plant "locally abundant in railroad yards, forming mats 3 feet across". Hitchcock & Muhlick, in Montana, assert that it forms "mats 4 feet wide on roadsides". In Idaho it was found by Baker along road-

sides in sagebrush-grass zones. Higgins (1949) cites Higgins 6788. Desfontaines (1804) records the French common name "verveine à longues bractées". The corollas are described as "bluish" on Lundell & Lundell 16973, "lavender-blue" on Dress 4089 and Plowman & Kilham AP.91, "pale lavender-blue" on Dress 4887, "pale-lilac" on Dress 4886, and "pink" on S. J. Smith 2704.

Wilkinson & Jaques (1972) assert that the species is "widely distributed in waste land. Often takes over part of a barnyard", flowering from May to September. Bennett found it in moist open ground in the Transition Zone of New Mexico. The Corrells (1972) describe its habitat and distribution in the southwestern United States as "Low and newly cleared land, in mud about lakes, ponds and along sloughs, river bottoms, grassy places, waste ground and roadsides, in Tex. from the Trans-Pecos and Plains Country through the Edwards Plateau e. to Newton Co., Okla. (Waterfall), N. M. (widespread) and Ariz. (throughout state), Apr.—Oct.; almost throughout the w. U. S. and s. Can., introd. and local eastw." Ellis, Wofford, & Chester (1971) record it from Trigg County, Kentucky, while Eilers (1971) says that it is infrequent along low sandy roadsides in Benton, Blackhawk, Delaware, Floyd, Linn, and Tama Counties, Iowa. Evers (1955) avers that, although "abundant along roadsides", this plant was seen only once on a hill prairie in Illinois. Paxton (1840) asserts that it was introduced into cultivation in England in 1820.

Black (1971) reports that this is a plant with only low photosynthetic capacity: 702 grams of water are required to produce one gram of dry matter.

Delorit (1970) describes the seeds as follows: "Oblong in outline; about the same width throughout except usually slightly wider at the base. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where they join. Both ends of the seed usually bluntly rounded. Dorsal side usually with five longitudinal ribs, and occasionally four, which are joined by transverse ribs in the upper one-half of the seed forming a prominent network of veins. Inter-rib spaces large, shallow, usually flared or wider at the base. Seed scar oval, oblique, white. Golden-brown to reddish-brown, 2.0—2.4 mm long, 0.7—0.9 mm wide."

In speaking of his V. rudis, regarded as a synonym of V. bracteata by most authorities, Greene (1900) says "Its remarkable thick woody perennial roots alone would completely separate it from V. bracteosa." He describes it as a common weed "of roadsides and cultivated lands."

Material of V. bracteata has been misidentified and distributed in some herbaria as Veronica serpyllifolia var. neomexicana Cockerell.

Additional citations: NEW YORK: Chemung Co.: S. J. Smith 2704 (Ba). MARYLAND: Baltimore City: Sollers s.n. [1890] (W--2761251). ALABAMA: County undetermined: Rugel s.n. [Sept. 1843] (Bl--97103). OHIO: Hamilton Co.: E. L. Braun s.n. [VI-12-06] (W--2712373). IOWA:

Story Co.: F. C. Stewart s.n. [July 30, 1892] (Ba). KENTUCKY: Mc Creary Co.: E. L. Braun 4246 (W--2667626). SOUTH DAKOTA: Fall River Co.: G. N. Jones 35991 (Bl--191280). Jackson Co.: G. N. Jones 35171 (Bl--185496). KANSAS: Douglas Co.: Horr E.570 (Bl--88329). MONTANA: Park Co.: Hitchcock & Muhlick 13567 (Ba). Powell Co.: Hitchcock & Muhlick 11520 (Ba). Sweetgrass Co.: Hitchcock & Muhlick 13305 (Ba). IDAHO: Blaine Co.: W. H. Baker 11074 (N). Canyon Co.: W. H. Baker 8167 (N), 12930 (N). Idaho Co.: W. H. Baker 10016 (N). Nez Perce Co.: W. H. Baker 5895 (N), 5918 (N), 11343 (N), 11589 (N). Owyhee Co.: W. H. Baker 8182 (N). UTAH: Beaver Co.: Dress 4886 (Ba). Tooele Co.: Dress 4089 (Ba). NEVADA: Clark Co.: Clokey 8473 (Bl--58049). COLORADO: Alamosa Co.: Bean 51-61 (Bl--3661). Archuleta Co.: Weber & Livingston 6259 (Bl--71227). Baca Co.: W. A. Weber 5189 (Bl--56277). Boulder Co.: Ewan 1090 (Bl--76109); Moldenke & Moldenke 27479 (Ld). Denver Co.: Porter s.n. [Denver, July 13-15, 1872] (Bl--101510). Fremont Co.: Gillett & Mosquin 12125 (Bl--211363). La Plata Co.: J. Green 11 (Bl--64227). Larimer Co.: Crandall 172 (Ba). Moffat Co.: MacLeod 71a (Bl--196630). Montezuma Co.: Erdman 228 (Bl--201073). Park Co.: J. M. Coulter s.n. [Latte River, June 26] (Bl--100895). Sedgwick Co.: W. A. Weber 6407 (Bl--71229). Weld Co.: Moir 696734 (Bl--256395). OKLAHOMA: Cimarron Co.: Waterfall 10756 (Bl--85539). TEXAS: Dawson Co.: Lundell & Lundell 16973 (Ld). Tarrant Co.: A. Ruth 109 (Ba). Wood Co.: C. L. Lundell 12081 (Mi). NEW MEXICO: Dona Ana Co.: Wooton & Standley 3330 (Bl--90196). Roosevelt Co.: W. A. Weber 11399 (Bl--172251). Sandoval Co.: Plowman & Kilham AP.91 (Oa). Taos Co.: H. R. Bennett 8061 (W--2446297). ARIZONA: Apache Co.: Cutler, Goodman, & Payson 2951 (Ba). WASHINGTON: Benton Co.: L. S. Rose 48153 (Bl--253596). Chelan Co.: Dress 4887 (Ba). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. [Snake country, N. Am.] (Pd).

VERBENA BRASILIENSIS Vell.

Additional & emended bibliography: Gibert, Enum. Pl. Montevid. 43. 1873; R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; Eiten in Ferré, Simos. Sobre Cerrado 190. 1962; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 838 & xix, map 1391. 1971; R. C. Clark, Ann. Mo. Bot. Gard. 58: 232 & 233. 1971; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1396 & 1397. 1972; Stalter, Castanea 37: 225 & 300. 1972; Moldenke, Phytologia 24: 217, 219, & 256 (1972) and 25: 225. 1973.

Recent collectors have found this plant growing on streambanks, sandy road edges, and in clumps in open areas in new growth of pines on sandy clay soil. The corollas are described as "lavender" on Fryxell 1769, "purple" on Repton 716, "blue-lavender" on Shinners 23803, and "violet" on Krapovickas, Cristóbal, Mroginski,

& Fernandez 22296. The Corrells (1972) describe its habitat and distribution in the southwestern United States as "Waste places, dry sandy soil, coastal prairies, in swamps and marshes about lakes and on seepy banks of ponds, in Okla. (Woodward Co.) and mainly in s.e. Tex., May--Oct., introd.; nat. to most of S. A.; naturalized from Va. to Fla. and Gulf Coast, Ore., Calif., Jam., S. Afr. and elsewhere." Clark (1971) records it from Covington, Dallas, Escambia, Greene, Hale, Lee, Lowndes, Marshall, Monroe, Perry, Pike, and Tuscaloosa Counties, Alabama. Bostick (1971) found it in Henry and Rockdale Counties, Georgia, and Stalter (1972) in Georgetown County and on Outer Otter Island in Colleton County, South Carolina. Eiten (1962) cites Eiten 1595.

Additional citations: NORTH CAROLINA: Bertie Co.: Ahles & Duke 46161 (Bl--150605). Northampton Co.: Fox, Boyce, & Moreland 2097 (Bl--88344). ALABAMA: Baldwin Co.: Moldenke & Moldenke 26766 (Ac). Escambia Co.: Dress & Read 7467 (Ba). Houston Co.: Moldenke & Moldenke 26823 (Ac). Marion Co.: Moldenke & Moldenke 26819 (Ba). Stone Co.: Moldenke & Moldenke 26783 (Id). ARKANSAS: Ashley Co.: Demaree 55972 (Bl--249318). LOUISIANA: Bossier Par.: Shinners 23803 (Ea). Ouachita Par.: Morris 262 (Bl--244309). TEXAS: Brazos Co.: Fryxell 1769 (N). CALIFORNIA: Stanislaus Co.: Howell 30107 (Bl--230589). BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 29512 (N). ARGENTINA: Buenos Aires: Krapovickas, Cristóbal, Mroginski, & Fernandez 22296 (Ld). SOUTH AFRICA: Transvaal: Repton 716 (Ba). MADAGASCAR: J. H. Shaw s.n. [10 Oct. 1962] (W--2626877).

VERBENA CABRERAE Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 182--183, 418, & 431. 1972.

Additional citations: BOLIVIA: Santa Cruz: R. F. Steinbach 321 (Ws).

VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, *Phytologia* 23: 218 & 279 (1972) and 24: 149 & 237. 1972.

Material of this species has been misidentified and distributed in some herbaria under the designation "Glandularia aff. selloi (Spr.) Tronc."

Additional citations: ARGENTINA: Misiones: Krapovickas, Cristóbal, & Maruffak 15492 (Ws).

VERBENA CAMERONENSIS L. I. Davis

Additional bibliography: Moldenke, *Phytologia* 23: 218. 1972.

Lundell encountered this species along roadsides at 500 feet altitude and describes it as "prostrate". Recent collectors have found it in bloom in March and July. The corollas are described as "purple" on C. L. Lundell 10771 & 12256.

Additional citations: TEXAS: Cameron Co.: L. I. Davis s.n. [Southmost, March 22, 1942] (Ba). [to be continued]

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20. 21

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**CATALOGUS
Euphorbiarum**

1973

E. JABLONSKI

Vol. IV

**PRINCIPAL CATALOGUS
ALPHABETICUS**

2808

The Total Number of Binominals

Treated in this Catalogus is

2808

listed in Alphabetic order.

A	234	Boissier's original	
B	160	numbers were.....	723
C	353		
D	127	Added to this came	
E	127	Post Boissier...	2085
F	94		
G	135		
H	115	Now we have.....	2808
I	80		
J	28		
K	45	The following binominals have	
L	157	so far not been classified:	
M	189		
N	60	A	10
O	73	B	20
P	300	C	34
Q	73	D	14
R	121	E	12
S	263	F	14
T	157	G	13
U	27	H	15
V	88	I	11
W	28	J	3
X	8	K	12
Y	6	L	16
Z	13	M	27
		N	5
		O	5
		P	54
		Q	1
		R	15
		S	33
		T	25
		U	7
		V	11
		W	6
		X	1
		Y	3
		Z	2
<hr/>		<hr/>	
2808		369	

<u>Nomina.</u>	<u>Authors.</u>	<u>Year.</u>	<u>Post-Boissier.</u>	<u>Geographical Distribution.</u>
abbottii	Baker	1894	282-A	Ins. Aldabra
abchazica	Woronow	1912	(490)	Caucas.
abdelkuri	Balf.f.	1901	375-A	Socotra Archip.
abdita	(Burch)	1969	222-B	
abdita	A.R.Sm.	1971	22-A	Galapag.
abolini	Korovin	1933	491-B	
abortiva	Forsk.	1775	179	Arabia
abortiva	Porta	1892	179	Hispan.
abramsiana	Wheeler	1934	161-C	Calif., Ariz., Sonora
abyssinica	J.F.Gmel.		318	Abyss.
acalyphoides	Hochst.	1862	380	Nubia
acanthothamnos	Heldr.		520	
acaulis	Roxb.		361	
acerensis	Boiss.	1862	187	Boliv.
achenocarpa	Spreng.		465	
acurensis	N.E.Brown	1912	318-H	Erythraea
aculeata	Forsk.		311	Arab.
aculeata	E.Mey.		670-A	
acuminata	Lam.	1788	552	
acuta	Engelm.	1859	31	N.Mex., Texas, Coahuil.
adenensis	Deflers	1887	431-C	Arab.
adenochlora	E.Moor & Decne	1836	694	Japan
adenophylla	Hort.		179	Hab.?
adenopoda	Baill.	1860-1	286	Madag.
adenoptera	Bertol.	1843	166	S.Domingo, Fla.
adhearens	(Small)	(1928)	158-F	Florida
adianthoides	Lam.	1788	197	Peru
adicioides	(Small)	(1903)	32-A	Florida
adinophylla	Donn.Sm.	1909	213-E	Am.cent.
adriana	St.Hil.	1860	446-A	Brasil.
aegyptiaca	Boiss.	1860	102-B	Aegypt
aellenii	Rech.f.	1951	605-B	Persia
aeruginosa	Schweickerdt	1935	323-B	Transvaal.
aequata	(Lunell)	(1910)	161-A	N.Dakota
aequoris	N.E.Brown	1915	272-C	C.of G.Hope
aethiopum	Croizat	1914	313-A	China
affinis	Boiss.	1860	625	Bahamas
affinis	DC.		625	
afzelii	N.E.Brown	1911	154-C	Sierra Leone
aggregata	A.Berger	1907	339-A	Afr.austr.Cape
agowensis	Hochst.	1862	256	Abyss.
agraria	Bieb.	1808	647	Europ.austr.
agrorum	Willd.		647	
akdaghensis	Stapf	1886		Asia min.
akenocarpa	Guss.	1821	465	Mediterr.occ.

akenocarpa	Roux & Blaise	1862	464	
alaica	Prokh,	1933	450-A	
alata	Hook.		280	Jamaica
alatafica	Boiss.	1860	485	Soongana
albanica	N.E.Brown	1915	670-B	C.of G.Hope
albertensis	N.E.Brown	1915	326-D	C.of G.Hope
albescens	(Urb.)	(1899)	80-A	
albicaulis	(Rydb.)	1900	141-C	Am.bor.:Nebr., Montana
albiflora	Taub.	1896		Brasil
albomarginata	Torr.&Gray	1855	83	Calif.,Ariz., N.Mex.,Baja Cal. Afr.austr.
albovillosa	Pax		257-A	
alcicornis	Baker	1887	300-A	Madag.
alcicornis	Hort.Par.	1912	300-B	Madag.
alepica	Linn.	1753	547	Europ.austr.Or.
alexandrina	Delile		625	
alberiensis	Boiss.Diagn.		515	Alger.
aliceae	Nelson	1906	170	Am.bor.
alluaudi	Drake	1903	57	Madag.
alpigena	Kern.	1866	503	
alpina	C.A.Mey.	1830	483	Sibir.
alsinaeflora	Baill.	1866	19-A	Augstal.
alsinaefolia	Boiss.	1860	165	Brasil
alsinoides	Miq.	1853		Ind.or.
alta	Norton	1900	541	N.Mex.,Ariz.,Mex.
altaica	Boiss.Diagn.		506	Sibir.
alternicolor	N.E.Brown	1915	336-B	Afr.austr.
altissima	Boiss.Diagn.		455	As.min.:Syria
altotibetica	Paulsen	1922		E.Tibet
amarifontana	N.E.Brown	1915	271-D	C.of G.Hope
ambacensis	N.E.Brown	1913	318-7	Angola
ambigua	Waldst.& Kit.		707	
ambohipotsiensis	Ursch & Leandri	1955	290-X	Cult.
ambroseae	Leach	1964	323-77	Mozambique
ammak	Schweinf.	1899	319-G	Arab
ammanioides	H.B.K.	1817	73	Fla.,Pan.,Mex.
ammatotricha	Boiss.	1860	79	Mexico
amoena	Klotsch	1948	166-M	Guiana
amoena	(Millsp.)	(1914)	392	
amphimalaca	Standley	1929	210-B	Honduras
ampla	Hook.f.	1862	619-A	Afr.trop.
amplexicaulis	Hook.f.	1851	11	Galapag.
amplexicaulis	Ledeb.		497	
amphophylla	Pax		295-A	Afr.trop.
amygdaloides	Lam.	1788	655	Montpelier
amygdaloides	Linn.	1753	673	Europ.;Orient
anacampseroides	Lam.	1788	262-A	Martinique
anacampsores	Bal.	1862	688	

anacampsores	Boiss.Diagn.		687	Asia Min.
anacantha	Ait.		328-A	Afr.austr.
anagalloides	Baker	1890	4	Madag.
analameræ	Leandri	1945	288-G	Madag.
anceps	Benth.		166	
ancyrensis	Aznov	1964	464-A	Turcia
andersonii	Millsp.	1900	28-A	Galapag.
andina	Phil.	1857	401	Chili
andongensis	Hiern.		155-C	Afr.trop.
andrachnoides	Schrenk	1844	639	
andrefandrovana	Ursch & Leandri		290-E	Cult.
andromedæ	Millsp.	1900	80-D	Cuba
androsaemifolia	Presl.		52	
androsaemifolia	(Schousb.)Willd.		52-A	Lusitan.
androsaemifolia	Steud.		646-A	
androsaemoides	Dennst.		49	
anegadensis	(Millsp.)	(1914)	43-B	Bahamas
angolensis	Pax	1894	98-A	Angola
angræ	N.E.Brown	1915	272-D	Gr.Namaq.
angularis	Kl.	1859	318	Zanzibar
angulata	Jacq.	1788	504	Europ.med.
angusta	Engelm.	1859	33	Texas
angustata	(Rochel)Borza	1949	642-A	Romania
angustiflora	Pax		323-12	Afr.trop.
angustifolia	Buch.Ham.		701	Nepal
angustifolia	Lockh.	1862	262	
angustifolia	Parodi	1881		Reg.Argent.
angustifolia	Sweet		637	
angustifolia	Glaziou	1912	170-B	Minas Geraes
angustifrons	Borb.	1886	658-A	Hungary
anisopetala	(Prokh.)	(1930)	100-B	Turkestan
ankaranae	Leandri	1945	288-F	Madag.
ankarensis	Boiteau	1942		Madag.
annulata	Nutt.	1939		Hab.?
anomala	Salzm.	1862	206	
anomala	Pax	1908	382-B	Afr.austr.
anoplia	Stapf.	1928	332-D	Afr.austr.
antankara	Leandri	1946	323.57	Madag.
anthonyi	Brandege	1899	4-A	Baja Calif.
antiquorum	Forsk.		300	
antiquorum	Linn.	1753	302	Ind.or.
antiquorum	E.Mey.		348	
antiquorum	Wall.		293	
antisiphylitica	Zucc.	1829-30	251	Mexico
antso	Dennis	1921	282-C	Madag.
antunesii	Pax	1905	323.3	Afr.trop.
anychioides	Boiss.	1860	124	Mexico
apatzingana	McVaugh	1961	54-A	Mex.,Michoacan
aphylla	Brouss		374	Teneriffa
apicata	Wheeler	1936	80-A	Calif.inf.
apiculata	Anders.	1855	26	Galapag.

apios	Linn.	1753	499	Graecia,As.Min.
apocynifolia	Small	1898	239-A	Florida
apocynoides	Kl.Seem.	1856	217	Panama
aprica	Baill.	1886	282-D	Madag.
apurimacensis	Croiz.	1946	412-A	Peru
arabica	Hochst.&Steud.	1862	97	Arabia,Abyss.
arabicoides	N.E.Br.	1913	97-A	Angola
aragonensis	Losc.&Pard.		649	
arahaka	H.Poisson	1912	699-D	Madag.
aramophila	A.Cunn.		255-A	Austr.
ararica	Jord.		637	
araucana	Phil.	1895	396-A	Chili
arborea	Boiss.	1862	426	
arborescens	Hort.Angl.		310	
arborescens	Hort.Par.	1862	307	
arborescens	E.Mey.			Synadenia
arborescens	Roxb.		302-A	
arborescens	C.Sml.		310	
arbuscula	Balf.	1888	373-D	Socotra
arceuthobioides	Boiss.	1860	277	
arenaria	Engelm.& Grey	1845	77	Texas
arenaria	H.B.K.	1817	193	N.Granat,Peru
arenaria	Nutt.	1837	73	Arkansas
arenaria	Willd.		552-A	
arenarioides	Gagnep.	1921	441-A	Laos
arenicola	Parish			Calif.
arequipensis	(Croiz.)	(1945)	45-D	Peru
argillicola	Dinter	1914	326-E	Afr.austr.-occ.
argillosa	Chod.& Hassl.	1905	43-I	Parag.
arguta	N.E.Br.	1915	459	Graecia;Syria
arida	N.E.Br.	1915	326-A	C.of G.Hope
ariensis	H.B.K.	1817	194	Mexico
arillata	Edgew.	1847	98	
aristata	Schmalk.	1892	477-A	Reg.Cauc.
arizonica	Engelm.	1859	163	Arizona,Calif., N.Mex.,Sonora Texas,Colorado
arkansana	Engelm.& Grey	1845	533	
armata	Thunb.		347	
armena	Boiss.	1866	595-A	
armena	Prokh.	1949	691-A	Armen.
armeniaca	Boiss.	1879	895-A	
armourii	Millsp.	1895	198-A	Yucatan
armstrongiana	Boiss.	1862	159	Australia
arnottiana	Endl.	1836	5-B	Hawaii
arrecta	N.E.Br.	1914	275-B	Rhodesia
arrecta	N.E.Br.	1915	275	C.of G.Hope
artaudiana	DC.		575	
articulata	Lam.	1788	21	
articulata	Anderss.	1855	28	Galapag.
articulata	Aubl.	1775	20-K	Porto Rico
articulata	Dennst.		8	

<i>articulata</i>	(Britton)	(1916)	28	
<i>artifolia</i>	N.E.Br.		669-B	C.of G.Hope
<i>artvinensis</i>	Bornmüller	1912	478	Trancaucas.
<i>arundelana</i>	Bartlett	1911	391-A	Maryland
<i>arvalis</i>	Boiss.	1855	567-A	As.min.,Persia
<i>arvensis</i>	Schleich.		552	
<i>ascendens</i>	Willd.	1862	86	
<i>asclepiadea</i>	Milne-Redhead	1951	300-X	Angola
<i>aserbajdzhanica</i>	Bordz.	1928	388-A	Caucas.
<i>aspera</i>	Bieb.		490	Reg.Caucas.
<i>aspericaulis</i>	Pax	1901	297-A	Afr.austr.
<i>asperifolia</i>	Engelm.	1862	267	Mexico
<i>assamica</i>	Hook.f.	1887		Himal.
<i>astrachanica</i>	C.A.Meyer Claus	1851	630-E	Romania, USSR
<i>astrispina</i>	N.E.Br.	1915	336	C.of G.Hope
<i>astroites</i>	Fisch.& Mey.		200	Mexico
<i>asturii</i>	Holuby	1891	658-A	
<i>astyla</i>	Engelm.	1862		
<i>atlantica</i>	Coss. ex Boiss.	1862	512	Texas,Mex., Persia
<i>atlantica</i>	Pers.		593	
<i>atlantis</i>	Maire	1941	512-A	
<i>atoto</i>	Forst.f.		6	As.,Austral., Pacif.
<i>atoto</i>	Guill.	1837	12	
<i>atrococca</i>	A.A.Heller	1897	2-B	Hawaii
<i>atropurpurea</i>	Brouss.	1805	421	Teneriffa
<i>atrorubens</i>	Engelm.	1862	391	
<i>atrosanguina</i>	Pöpp	1860	396	Chile
<i>aubryana</i>	Baill.	1861-2	6-A	N.Caled.
<i>aucheri</i>	Boiss.Diagn.	1846	612	Persia
<i>aulacosperma</i>	Boiss.Diagn.	1855	554	Syria
<i>aureocincta</i>	Croiz.	1943	261-A	Parag.,Jujuy
<i>aureola</i>	(Millsp.)	(1915)	146-E	Calif.
<i>auricularia</i>	Boiss.	1860	169	
<i>australis</i>	Boiss.	1860	109	Austral.
<i>austriaca</i>	Kern.	1875	454-A	Europ.
<i>austrina</i>	(Small) Jabl.	(1933)	561-A	Florida
<i>austroanatolica</i>	Hub-Mar & Kahn	1964	543-A	Turcia
<i>austro-occidentalis</i>	Thellung	1916	102-C	Hereroland
<i>avasmontana</i>	Dinter	1928	318-V	Afr.austr.occ.
<i>avenia</i>	Thibaut		589	
<i>azorica</i>	Hochst.		575-A	
<i>azorica</i>	Welw.	1862	575-A	

bachmanii	Pax	1897	616-B	Afr.trop.
backeri	P + H	1930	50-A	Java
baetica	Boiss.	1860	592	Gibraltar
baga	A.Cheval			Sudan.Gall.
bahiensis	Boiss.	1862	57	Brasil
bahlensis	(Kl.& Gke.)	1968	57-A	
bailloni	Boiss.	1860-1	289	Malag.
baja-californica	(Millsp.)	(1901)		
bajeri	Göyena	1909		Nicaragua
bakeriana	Baill.	1886	286-B	Madag.
balbisii	Boiss.	1860	117	Bahamas
balearica	Poir	1860	589	Lusit.,Hispan.
balfouri	Sennen	1925		Hispan.
baliola	N.E.Br.	1915	326-E	Gr.Namaq.
balkhanica	Tarass.	1951		Turkmenia
ballyi	S.Carter	1963	331-D	Somaliland
balsamea	Webs.		382-6	Afr.trop.
balsamifera	Ait.	1965	418-A	Canari
bancana	Miq.			Ins.Banca
barbellata	Engelm.	1859	264	Mexico
barbellata	Hurusava	1940		Manchur.
barberiana	(Croiz.)	(1943)	45-E	Parag.,N.Reg.
barbicaria	(Millsp.)	(1916)		
barbicarina	Standley	1930		
baribicollis	Bally	1965	551-A	Somaliland
barkeri	Urb.& Ekm.	1926	52-D	Haiti
barnardi	White & Sloan	1941	331-D	Transvaal.
barnhartii	Croiz.	1934	395-A	
baroni	Boj.		290-YY	
barrelieri	Savi		652	Ital.
barteri	N.E.Br.	1912	323-16	Nigeria
bartolomaei	Greene	1889	144-A	L.Calif.
basarabica	Prodan	1930	647-A	Ruman.
baselicis	Tenore		652	
basutica	Marloth	1910	355-C	Afr.austr.
baueri	Engelm.ex Boiss.	1862	70	Austral.
baumii	Pax	1908	433-A	Afr.trop.
batabanensis	Urb.	1908	156-D	Cuba
baylissii	Leach	1964	323-25	Mozambique
bazargica	Prodan	1936	658-B	Ruman.,Bulg.
beaumierana	Hook.f.& Cross.	1874	320-A	Moroc.
becguersi				China
begoniaefolia	Lehm.ex Steud.		179	Hab.?
beharensis	Leandri	1946	323-62	Madag.
beillei	A.Cheval.	1933		Afr.Gall.Centr.
bejariensis	DC	1841	227	Texas
belgradica	Forsk.			Byzant.,Serb.
bellica	Hiern.	1900	318-L	Afr.trop.
benedicta	Greene	1889		Calif.,S.Benik
				Isl.,Pittonia
benguelensis	Pax	1898	433-A	Afr.austr.

benoisti	Leandri	1947	323	Madag.
benthami	Hiern.		381-A	Afr.trop.
berberiana	Croiz.	1943	45-E	
bergeri	N.E.Br.	1915	327-A	Afr.austr.
bergeriana	Dinter	1914	379-D	Afr.austr.-occ.
bergii	A.White, D.,S.	1941	326-N	Orange Free St.
bermudiana	Millsp.	1900	156-B	Bermuda
berotica	N.E.Br.	1912	373-Y	Angola
berteriana	Balb.		45	Ind.occ.
bertheloti	Bolle ex Boiss.	1862	425	Ins.Canar.
berythea	Boiss.& Blanch.		540	Syria
bessarabica	Klokov	1955	654-A	Bessarab.
besseri	Boiss.	1862	137	Chili
betacea	Baill.	1886	282-D	Madag.
bevilaniensis	Croiz.	1934	290-A	Madag.
biaculeata	Denis	1921	290	Madag.
bialata	Link		538	Lusitania
bicapitata	T.S.Brandegee	1917	46-B	Mexico
bicephala	Bertol.		45	W.I.
bicolor	Engelm.& Gray	1845	229	Ark.,Texas
biconvexa	Domin	1927	61-A	Queensland
bifida	Hook.& Arn.	1927	59	China
bifida	Thw.		12-A	
biformis	Wats.	1882-3	176-A	Mexico
bifurcata	Engelm.	1859	183	N.Mexico
biglandulosa	Boiss.	1862	655	Medit.
biglandulosa	Desf.	1808	692	Graecia,As.min.
biglandulosa	Willd.		179	
bilobata	Engelm.	1859	178	N.Mexico
bilocularis	N.E.Br.		295-B	Afr.Brit.or
bimensis	Miq.		50	Java
biramensis	Urb.	1930	80-F	Cuba
bisserrata	Millsp.	1890	165-A	L.Calif.
bileau			323-60	
biumbellata	Poir.		576	Afr.bor.
biumbellata	Un. ex Boiss.	1862	588	Sicil,Cupani
biuncinalis	McVaugh	1961	205-A	Mexico
bivonae	Steud.		516	Afr.bor.,Sicil.
blancheti	Miq.	1849	54-D	Brasil
blepharophylla	C.A.Mey.		447	Soongaria
blepharostipula	Millsp.ex Rose	1890	218-A	L.Calif.
blodgettii	Engelm.ex Hitch.	1893	80-M	Bahamas
bodinieri	Leveille & Vaniot	1906		China
boerhaavioides	Rusby	1907	396-A	Boliv.
boerrhavifolia	Boiss.	1862	185	Am.cent.
boetica	Boiss.	1860	592	Hispan.
boinensis	Denis ex Léandri	1935		Madag.
boissieri	Baill.	1860-1	289	Madag.
boissieriana	(Woronow) Prokh.	1949	634-A	
boiteau	Leandri	1946	323-60	Madag.
boivini	Boiss.	1862	283	Madag.

bojeri	Hook.		291	Madag.
boliviana	Rusby	1907	157-C	Boliv.
bolusii	N.E.Br.	1915	326-A	Transvaal.
bombaiensis	Santapau	1954	80-A	Bengal
bombensis	Jacq.	1760	73-A	Am.cent.
bongensis	Kotschy & Peyr.		257-A	Afr.trop.
bonifaciensis	Requien		588-b	Medit.
bonplandii	Sweet		228	Mexico
boöphthona	C.A.Gardner	1942		
borbonica	Boiss.	1862	622	Ins.Borbon
borodini	Sambuk	1928	638-A	Rossia
borszczowii	Prokh.	1949	637-B	Rossia, Saratov.
bosseri	Leandri	1965	323-66	Madag.
bothriosperma	Boiss. & Kotschy	1860	600	Armenia
botryoides	Noronha	1790		Java
bottae	Boiss.	1860	367	Arabia
bougeyi	Leach	1964		Mozambique
bouleyi	S.Moore	1920		N.W.Austral.
bounophila	Boiss.	1862	612	Persia
bourgaeana	J.Gay.ex Boiss.	1862	422	Ins.Teneriff.
bracei	Millsp.	1906	20-C	Bahamas
brachiata	Jan.		476	Europ.
brachiata	E.Mey.	1862	270	Afr.aust.
brachycera	Engelm.	1859	582	N.Mexico
brachyphylla	Denis	1921	323-X	Madag.
brachypoda	(Small)	(1903)	81-A	Florida
bracteata	Jacq.	1804	276	
bracteolaris	Boiss.	1860	48	India or.
brakdanensis	N.E.Brown	1915	326-B	Little Namaq.
brandegeei	Millsp.	1889	144-D	Calif., Magd. Isl.
brasiliensis	Lam.	1788	54	Am.trop.
braunsii	N.E.Br.	1915	326-C	Cape
bravoana	Svent.	1954	421-A	Ins.Canar.
breoni	Ann.Fl. & Pom	1833	396	Madag.
breviarticulata	Pax	1905	323-17	Afr.trop.
brevicornu	Pax	1909	637-A	Afr.trop.
brevirama	N.E.Br.	1915	384-K	
brevis	N.E.Br.	1911	323-10	Angola
brevitorta	Bally	1959	323-B	Kenya Col.
bridgesii	Bert.ex Boiss.		396-G	Chili
briquetii	Emberger & Maire	1929		Marocc.
brittingeri	Opiz ex Reichb.		509	S.W.Europ.
brittonii	Millsp.	1906	54-B	Bahamas
brochoni	Deysson	1908	465-A	
broteri	Daveau	1885	686-B	E.Portugal
broussoneti	Willd.ex Link		365	Teneriff.
brownii	Bail.	1866	431-B	Austral.
brunellii	Chiov.	1951	852-B	Abys.
bryophylla	Donn.Smith	1913	169-C	Guatem.
bubalina	Boiss.	1860	344	Afr.austr.
buchanani	Pax	1901	616-C	Afr.trop.

buchtormensis	C.A.Mey.		484	Sibir.
budensis	T.Simon	1949		Hungary
buhsei	Boiss.	1862	659	Persia
bulleyana	Diels	1912	443-C	China (Yunnan)
bungei	Boiss.	1862	450	Persia
bupleurifolia	Jacq.	1797	357	Afr.austr.
bupleurifolia	E.Mey.		345	Afr.austr.
bupleuroides	Diels	1912	443-C	China (Yunnan)
bupleuroides	Desf.		593	Afr.bor.
bupleuroides	Willd.& Boiss.	1862	630	
bupleuroides	Willd.ex Ledeb.		633-A	
burchelli	Müll.Arg.	1874	150-A	Goyaz
burmanica	Hook.f.	1886	157-B	Burma
burmanni	E.Mey.	1862	272	Afr.austr.
burmanniana	J.Gay.		157	Totius Orbis
buruana	Pax	1901	323.19	Afr.trop.
buschiana	Grosch.	1940	632-A	
bussei	Pax	1901	318-B	Afr.trop.
buxifolia	Lam.	1788	20	W.I.
buxoides	A.R.Sm.	1971	431-A	New Guinea
cactus	Ehrenb.ex Boiss.	1862	309	Arabia
cadrilateri	Prodan	1953	595-A	Ruman.
caducifolia	Haines	1914	292-A	Ind.or.(Centr. Prov)Pakistan
caecorum	Mart.& Boiss.	1862	173-C	Brasil.
caerulescens	Haw.		315-B	Cape
caesaraugustana	Auct.ex Willk.			Hispan.
caesia	Kar & Kir	1841	637	
caespitosa	Lam.	1788	397	
caespitosa	Tenore		575	
cajogala	Ehrh.	1783	658	
calabrica	Burkill.	1901	433-K	Afr.trop.
calabrica	Huter.Porta.	1907	569-A	Ital.
calcareo	Coss.& Dur.	1854	575	
calpicola	Fern.	1901	200-A	Mexico,Morelos
calderensis	Phil.	1895	896-XX	Chili
calendulaefolia	Delile		459	
californica	Benth.	1844	249	Calif.
californica	Boiss.	1860	4	
calliadenia	Engelm.ex Boiss.	1862	111	
callirichoides	H.B.K.	1817	158	
callitrichoides	Schau.	1847	166	
calonesiaca	Croiz.	1938	478-A	
calva	N.E.Br.	1911	257-C	Cameroon
calyciflora	Sesse & Moc.	1894		Portoric.
calycina	N.E.Br.	1912	295-D	Sudan.
calyculata	H.B.K.	1817	435	Mexico

calyptрата	Coss.& Dur.	1857	435	Algeria
camaguayensis	Urb.	1924	43-C	Cuba
cambodiana	Lecomte	1911		Indochina
cameronii	N.E.Br.	1911	290-C	Nyasaland
campestris	Cham.&Schlecht.	1830	579	Mexico
canaliculata	Lam.	1788	342	Insl.Canar.
canaliculata	Lodd.			
canaliculata	Pers.		184	
canariensis	Forsk.		317	
canariensis	Linn.	1753	314	Insl.Canar.
canariensis	Thunb.		316	
canariensis	Tremaux.		310	323.15
candelabrum	Tremaux.	1857	319	Afr.trop.
canescens	Linn.	1753	101	
canophylla	Croiz.	1939	260-A	
cantabrica	Rouy	1883	454	
canterviflora	N.E.Br.	1915		C.of G.Hope
canuti	Parl.		482-B	Alp.mari.
capansa	Ducke	1938	323-67	Brasil.(Amaz.)
capansa	Leandri		323-67	Brasil
capazii	Caballero	1935		Morocc.
caperonioides	Dyer.,Mey.	1966	382-A	
capillaris	Gagnep.	1921	51-A	Siam,Laos,Phil,
capitata	Buch.-Ham.		37-A	
capitata	Lam.	1788	43	
capitellata	Engelm.	1859	46-D	Mexico,Arizona
capitulata	Reichb.		524	Thessal,Graecia
captiosa	N.E.Br.	1915	337-A	C.of G.Hope
capuronii	Ürsch & Leandri	1955	323-67	Cult.
capuronii	Leandri	1957	323-67	Madag.
caput-aurem	Denis	1921	287-A	Madag.
caput-medusae	Linn.	1753	326	Afr.austr.
caracasana	Boiss.	1862	215	Venezuela
cardiophylla	Boiss.& Heldr.	1853	498	Lycia
careyi	F.Müller			Australia
carinata	Donn.	1827		Trinidad
carinifolia	N.E.Br.	1911	467-B	Angola
carinthiaca	Traunf ex Boiss.	1862	454	
carissoides	F.M.Bailey	1906		Austral.
carmenensis	Rose	1892	146-A	Ins.Carmen.
carniolica	Brot.		592-A	
carniolica	DC.		510	
carniolica	Jacq.	1778	507	Tyrol
carniolica	Lapeyr.		481	
carnosa	Paulsen	1906		Turkestan
carpasus	Ehrenb.ex Boiss.	1862	379	
carpatica	Woloszczak	1892	476-C	Carpath.
cartheriana	Bally	1964	326-B	Somaliland
carthaginensis	Porta & Rigo	1891		Hispan.
carullae	Sennen	1922	625-A	Hispan.
carunculata	Waterf.	1948	169-A	Oklahoma,Texas

cashmeriana	Royle		472	
cassia	Boiss.	1853	543	Syria
cassioides	F.M. Bailey	1906	49	Austral.
cassythoides	Boiss.	1860	279	Cuba, Santo Dom.
catamarcensis	(Croiz.)	(1943)	173-D	Argentina
caterviflora	N.E.Br.	1915	297-B	C.of G.Hope
cattimandoo	W.Ell.		312	
cavaleriei	Leveillé & Vaniot	1906		China
caudata	Boiss. & Haussk.	1866	552	
caudiculosa	Bois.	1862	613	Syria
cayensis	Millsp.	1904	20-B	Bahamas
cebrina	Hochst.	1860	615-A	
cechica	Opiz		454-A	
celastroides	Boiss.	1862	2	Hawaii
celerieri	Emberger	1953	575-A	
centunculoides	H.B.K.	1817	149	Cuba
ceratocarpa	Tenore		475	Sicil.
cerebrina	Hochst. ex Boiss.	1862	615-A	Abyss.
cereiformis	Linn.	1753	335	Afr. austr.
cerifera	Alcocer	1911	291-A	Mexico
cerinthifolia	Fisch. ex Boiss.	1862	483	
cernua	Coss. & Dur.	1862	545	Algeria
ceroderma	Johnston	1924	251-A	Mexico
cervicornis	Boiss.	1860	358	Afr. austr.
cervicornu	Baill.	1890	348	Congo Gall.
cespitosa	Lam.		307	Reg. Argent.
cestrifolia	H.B.K.	1817	413	Peru
chaborasia	Gombault	1956	595-A	Syria
chaculana	Donn. Sn.	1899	176-D	Guatemala
chaetocalyx	(Wooton & Standl.)	1935	120-B	
chaixiana	Timb.	1856	673	
chalicophyla	Weatherby	1910	54-A	Mexico
chamaebuxus	Bernard		523	Mont. Pyren.
chamaecaula	Weatherby	1910	158-A	Mexico
chamaeclada	Ule	1908		Brasil
chamaecormos	Chiov.		302	Somaliland
chamaepeplus	Boiss. & Gaill.	1859	558	Palestina
chamaepeplodes	Lotsy	1895	558-A	Guatem.
chamaerrhodos	Boiss.	1860	175	Brasil. merid.
chamaesyce	Linn.	1753	101	Reg. Medit.
chamberlini	Johnston	1924	46-A	Calif.
chamissonis	Boiss.	1862	13	Ins. Fiji
chamoecise	St. Amans		101-A	Fl. Agen.
chancoana	Vorosh.	1961		Sibir. or.
characias	Host.		681	
characias	Linn.	1753	680	Reg. Medit. occ.
characias	Sibth. & S.		682	
chasmophyla	Rech.	1951	612	Persia
cheiradenia	Boiss. & Hohen	1853	601	
cheirolepis	Fisch. & Mey.	1839	254	Turcomania
cheirolepioides	Rechinger	1855	434-B	Persia

chenopodifolia	Boiss.	1866	187-A	Bolivia
chersina	N.E.Br.	1915	271-A	Gr.Namaq.
chesneyi	Boiss.	1862	602	Assyria
chiapensis	Brandeggee	1914	203	Mexico
chilensis	Gay,C	1849	396-B	Chili
chilensis	Echeg.		396-C	
chioera	Lipsky			Caucasus
chiogenes	(Small)	(1903)	73-C	Florida
chiogenoides	Rusby	1920	73-C	Colombia
chrysochaeta	W,V.Fitzg.	1918		W.Austral.
chrysocoma	Leveille & Vaniot	1906	43-B	China
chrysophylla	R.E. ex Boiss.	1862	405	Brasil
cibdela	N.E.Br.	1915	271-C	Gr.Namaq.
ciliata	Spreng.		179	Hab.?
cilicica	Boiss.	1859	688	
ciliolata	Pax		467-B	Afr.austr.
cinerascens	Engelm.	1859	80-H	Texas,Mexico
cinerea	W.V.Fitzg.			Australia
cirsioides	Const. & Gall.	1905		Madag.
clandestina	Jacq.	1804	355-A	Afr.austr.
clarionensis	Brandeggee	1899	4-B	Mexico
clarkeana	Hook.f.	1887	104-A	Ind.bor.occ.
clava	Jacq.		342	Afr.austr.
clavarioides	Boiss.	1860	353	Afr.austr.
clavata	Salisb.		342	Burma
clavidigitata	Gage	1914	353-A	Burma
clavigera	N.E.Br.	1915	323-X	Swaziland
clavigera	Lacaita	1928		Hispan.
claytonioides	Pax	1897	326-Y	Afr.trop.
clementei	Boiss.	1838	514	Hispan.
clementei	Bourg.ex Boiss.	1862	517	
clementii	Domin.	1927	40-A	N.W.Austr.
cleopatra	Baill.	1861-a	431-A	N.Caledonia
clivicola	R.A.Dyer	1851	323-12X	Transvaal.
clusiaefolia	Hook.& Arn.		1	Hawaii
clutioides	(Forst.f.)	1942		Austr.
coccinea	Roth.		112	Ind.or.
coccinea	Willd.ex Boiss.	1862	259	
coderiana	DC.	525		
codecorum	Müll.Arg.	1874	173-C	
coeladenia	Boiss.Diagn.	1859	436	Beluchist.
coerulans	Pax	1898	323-B	Afr.austr.
coerulescens	Haw.	1827	315-A	
cofradiana	Brandeggee	1905	200-B	Mexico
coghiani	F.M.Bailey			Australia
cognata	Boiss.	1862	468	Himal.
colimae	Rose, J.N.	1895	200-C	Mexico
collettioides	Benth.	1844	454-A	
colliculina	A.White, DC.	1941	353-K	Afr.austr.
collina	Phil.	1857-8	402	Chili
collina	Willd.		163-B	

collina	Brandege	1911	163-A	Mexico
colorata	Engelm.		265	Mexico
columnaris	Bally	1964	323-X	Somaliland
comans	W.V.Fitzg.	1918		W.Austral.
commelini	DC.		326	
commersonii	Baill.	1886	282-L	Madag.
commiphoroides	Dinter	1909	376-C	Afr.trop.
commutata	Engelm.ex Gray	1856	561	Am.bor.
comoduana	Millsp.	1889		L.Calif.
comosa	Vell.	1825	237	Brasil
compacta	C.Moore	1895		Ins.Pacif.
complanata	Warb.	1894		Oceania
complexa	Dyer	1937	323-26	Transvaal
compressa	Boiss.	1862	134	Venezuela
conceptionis	Rupr.ex Boiss.	1862	196	
condensata	Fisch.ex Bieb.		547	
condylocarpa	Bieb.ex Bieb.	1808	497	Armenia
conferta	(Small)	(1903)	166-A	Florida
confertiflora	Volken	1899	318-B	Afr.trop.
confinalis	Dyer		232-XX	Transvaal.
confluens	Nel.	1933		Little Namaq.
conformis	N.E.Br.	1912	272	Angola
confusa	Blume ex Boiss.	1862	82	
congenera	Blume	1925	50	Malaya
congesta	Willd.		575	
conifera	Steph.ex Boiss.	1862	486	
coniosperma	Boiss.& Buhse	1860	529	Persia
conjuncta	Millsp.	1887	160-A	Calif.
connata	Boiss.	1862	438	Persia
consanguinea	Engelm.	1862	441	
consanguinea	Kl.		468	
consanguinea	Schrenk.	1841	389	Sibir.
consobrina	N.E.Br.	1911	270-E	Nubio
consoquitlae	Brandege	1920	724	Mexico
conspicua	N.E.Br.	1912	318-E	Angola
contorta	Leach	1964	323	Mozambiq.
controversa	N.E.Br.		318-A	Abyss.
convolvuloides	Hochst.ex Boiss.	1862	154	Afr.trop.
cooperi	N.E.Br.	1915	331-B	Natal.
copiapina	Phil.	1857	396-E	Chili
corallifera	M.E.Jones	1933-5	222-A	Calif.inf.
coralloides	Linn.	1753	456	Italia
coralloides	Thunb.& Boiss.		627	
corallothamnus	Dinter	1930	273-A	Afr.austr.occ.
cordata	Meyer	1843	10	Hawaii
cordata	Larrañaga	1923		Uruguay
cordata	Schrank		509-A	
cordellata	Haw.			
cordifolia	Ell.Sketch		81	America bor.
cordifolia	C.A.Mey.	1860	677	
coriacea	C.Koch	1848	434-A	Persia

coriariaefolia	Boiss.	1862	5	
corifolia	Lam.	1788	663	Afr.austr.
corniculata	Dyer	1949	323-22	Afr.Lusil.or.
cornigera	Boiss.	1862	480	
cornuta	Pers.		435	Aegypt,Arab.
corollata	Linn.	1753	239	Am.bor.
coronata	thunb.		343	Afr.austr.
correntina	Parodi	1881		Reg.Argent.
corrigioloides	Boiss.	1860	92	Ind.or.
corsica	Requien	1825	690	Ins.Corsica
corymbosa	N.E.Br.	1915	272-A	c.of G.Hope
corynoclada	F.Mill.	1886		Austral.
cosinosperma	Reichb.		575	
cossoniana	Boiss.	1862	531	Alger.
costata	Schur	1852	454-A	Transylvania
costeana	Rouy	1910	467-A	Gallia
cottampala	Rheed.		49	
cotinifolia	Linn.	1753	210	India occ.
cotinoides	Miq.	1850	214	Guian.,Surinam
cotyliifera	Steud.Sphalm.		179	
cotylophora	Spreng.	1800	179	Hab.?
coudercii	Gagnep.	1921	70-A	Cambod.
cowellii	(Millsp.)	(1916)	80-H	Porto Rico
cozumelensis	Millsp.	1900	45-A	Amer.Cent., Cozumel Isl.
craspedia	Boiss.	1842	689	Syria
crassinoides	Urb.	1899	149-A	Cuba
crassipes	Marloth	1909	326-1	Afr.austr.
crenulata	Engelm.	1859	564	
crepitata	Wheeler	1939	146-A	Mexico,Coahuila
cretica	Mill.		680	
cretophila	Klokov.	1955		Ukraina
crispata	Hornem.		530	
crispata	Lem.	1857	331	
cristate	Heyne ex Roth	1821	38	India or.
cristata	Roth.		37	India
cristata	Dietrich		688	
croizati	Leandri	1946	323.55	Madag.
croizati	(Hurusawa)	1956	230-B	
crossadenia	Pax & K.Hoffm.	1923	230-A	Bahia
crotonoides	Boiss.	1862	382	Nubia
cruentata	Grah.	1832	655-A	Am.bor.,Missouri
cryptospinosa	Bally	1963	317-B	Kenya
csatol	(Simonkai)	1949	647-A	
cuatrecasasii	Pau	1929		Hispan.
cubensis	Boiss.	1866	418-A	Cuba
cuchumatansensis	Standl.& Stey.	1944		Guatemala
cucumerina	Willd.		721	Afr.austr.
culminicola	A.Molina	1965		Honduras
cumbrae	Boiss.	1860	162	Mexico
cumulata	Dyer	1931		Afr.austr.

cumulicola	(Small)	(1833)	72-B	Florida
cuneata	Vahl.		379	Arabia
cuneata	Anders.		379	
cuneifolia	Guss.		532	Medit.
cuneifolia	Roxb.		703	
cupani	Guss.		588	Sicil.,Sardin.
cupani	Schultz		587	
cyhosperma	Boiss.	1862	263	Mexico
cupularis	Boiss.	1860	158	
currori	N.E.Br.	1911	379-A	Angalo
curtifolia	Chaub.		686	
curtisii	Engelm.in Chapm.		240	Am.bor.
curvirama	Dyer	1931		Afr.austr.
cussonioides	Bally	1958	295-B	Kenya col.
cuspidata	Bernh.	1845	671	
cuspidata	Bertol.		51	
cyanophylla	Leveillé	1913	43-1	China
cyanogala	Wright ex Griseb			Cuba
cyathophora	Murr.	1786	262-B	Cult.
cybirensis	Boiss.	1842	464	Medit.
cylindrica	W.DS	1941	355-A	Cape
dalechampii	Haw.	1866	637	
dallachyana	Baill.	1866	108-A	Australia
dalmatica	Vis.		571	
damascena	Boiss.	1853	657	
daphnoides	Balf.	1877	282-K	Ins.Mascar.
daphnoides	Baill.	k877	282-K	Madag.
darbandensis	N.E.Br.	1913	723	French Cent.Afr.
darlingtonii	A.Gray	1848	466	Am.bor.
dasycarpa	Coss.	1875		Morocc.
dasyclada	Dusen	1914		Patagonia
daviesii	E.A.Bruce	1940	589-A	Tanganika Terr.
davyi	N.E.Br.	1915	355-A	Transvaal.
dawei	N.E.Br.	1912	303-B	Uganda
decariana	Croiz.	1934		Madag.
decaryi	Guillaumin	1934	299-B	Madag.
decepta	N.E.Br.	1915	326-K	Cape
decidua	Bally & Leach		323-11	S.Cent.Afr.
decipiens	Boiss.& Buhse	1850	598	Persia
decorsei	Drake	1903	282-D	Madag.
decumbens	Willd.		49	
decussata	E.Mey.	1862	271	Afr.austr.
decussata	Salisb.		384	
deflexa	Sibth.& Sm.		610	Graecia
defoliata	Urb.	1912	216-A	Sto.Domingo
degeneri	Sherff	1936	10-A	Madag.

deightonii	Croiz.	1938	305-A	Sierre Leone
dejecta	N.E.Br.	1911	616-C	Nyasaland
dekindtii	Pax		318-L	Afr.trop.
delicatula	Boiss.	1860	191	Mexico
delorti	Timb.ex Nym.		191	
delphinensis	Ursch.& Leandri	1955	288-D	Madag.
deltobracteata	Prokh.	1933	612-A	
deltoidea	Engelm.ex Chapm.	1897	158-B	Florida
demnatensis	Coss.	1888		Marocc.
dendroides	Linn.	1753	427	Medit.
denisiana	Guillaumin	1929		Madag.
densa	Schott.& Kotschy		522	
densa	Schrenk	1845	386	Persia
densiflora	Kl.	1862	166-F	Mexico
densifolia	C.Koch	1849	704	Caucasus
densiuscula	Popov.	1923		Bokhara
dentata	Michx.	1893	260	Am.bor.
dentosa	J.M.Johnston	1922	144-B	
denticulata	Lam.	1788	688	Asia Min.,Syria
denudata	Bertol.		456	
depauperata	Hochst.	1841	467	Abyss.
depeana	Boiss.	1850	4	Calif.
depressa	C.Gay		138	
depressa	Phil.	1860	139-B	
depressa	Torr.ex Spreng.		156-A	
deseglisei	Bor.ex Boiss.	1862	505	
desertorum	Weinm.	1837	705	Rossia
desmondi	Key	1955	292-13	Nigeria
dichotoma	Roxh.		36	India
dichotoma	Forsk.		706	Egypt
dictyosperma	Fisch.& Mey.		533	Am.bor.
didiereoides	Denis	1934	299-A	Madag.
diffusa	J.D. Hook	1851	29	Galapagos
diffusa	Jacq.Misc.		549	
diffusa	L.Dufour	1851	517	Galapagos
digitata	S.Wats.	1891		Mexico
dilatata	Torr.et Gray	1857	82	
dilatata	E.Mey.		578	
dilatata	Hochst.		617	Abyss.
dimorphocaulon	P.H.Duc	1940		Creta,Cypr.
dinteri	A.Berger	1906	323-24	Germany S.W.
dioeca	H.B.K.	1817	166	
dioica	Hieron.		166-L	Argent.
dioscoreoides	Boiss.	1860	205	Mexico
disclusa	N.E.Br.	1912	318-F	Afr.trop.
discoidalis	Chapm.	1860	241	Florida
discolor	Boiss.	1862	186	Am.cent.
discolor	Shuttler	1862	466	
discolor	Bertol.		239-S	
discolor	Kl.ex Boixx.	1862	404	
discolor	Ledeb.		637	Rossia

discreta	N.E.Br.	1915	354	Ponololand
dissimilis	Cordemoy	1895	106-A	Ins.Borb La Ren.
distans	W.V.Fitzg.	1918		W.Austr.
disticha	Engelm.ex Boiss.	1862	93	
distincta	Stschegleaf	1854	639	
distincta	Schur	1853	454-A	
distinguenda	Schur	1852	454-A	
diuretica	Laranaga	1923		Urug.
divaricata	Jacq.		427	
divaricata	A.Cunn.ex Benth.		51-B	Austral.
divergens	Kl.		621	
divergens	Kl.		620	
diversifolia	Schrad.ex Steud.		625	
diversifolia	Willd.ex Boiss.	1862	259	
diversifolia	Hochst.ex	1862	575	
diversifolia	Poir.		615-A	
djimilensis	Boiss.	1879	509-A	As.min.
djurensis	Schweinf.	1894	257-A	Afr.trop.
dobrogensis	Prodan	1936	595	
domingensis	Spreng.& Boiss.	1862	548	
dominii	Rohl.	1904		Montenegro
dorsiventralis	Urb.	1908	158-J	Cuba
dracunculoides	Lam.	1788	551-A	As.Afr.trop.
drastica	Sievers		483	
dregeana	E.Mey.	1892	371	Afr.austr.
drummondii	Boiss.	1860	108	Austral.
drupacea	Staf.	1906	296	
drupifera	Thonn.		296	Afr.trop.
dubia	Dierb.		520	
duckei	(Croiz.)	1943	50-A	Paraguay
duclouxii	Leveille & Vaniot	1908	43-D	China
dugandiana	(Croiz.)	1943		Colombia
dulcis	Asso		544-A	
dulcis	Bertol.		509	Italia
dulcis	Jacq.		503	
dulcis	Ruegel ex Boiss.	1862	511	
dulcis	Linn.	1753	509	Europe
dulcis	Sibth.& Sm.		518	
dumentorum	Coss.& Dur.	1862	517	
dumosa	Boiss.	1853	518	
dumosa	E.Mey.		667	Afr.aust.
dumosa	A.Rich.		409	
durandoi	Chabert.	1900		Alger.
durani	Ursch.& Leandri	1955	288-G	Madag.Cult.
duriuscula	P.& H.	1945	400-A	Bolivia
duseimata	Dyer	1934	326-K	Betschuanaland
dussii	Krug & Urb.	1896	413-E	Martinique
duvalii	Lecoq & Lamotte		508	Gallia

eanophylla	Croiz.	1939	260-A	Bolivia
ebracteolata	Hayata	1911		Japan
echinata	Salm - Dyck		335	
echinocarpa	Brot.	1843	179	
echinocarpa	Sieber ex Boiss.	1862	464	
echinus	Hook.f. & Goss.	1874	320-B	Marocc.
ecklonii	Kl. & Gke.	1843	358-B	Cape
ecorniculata	Kitamura	1958	658-B	Afgan.
edgeworthii	Boiss.	1862	471	Himalaya
edmondii	Hochst.			Afr.bor.
edulis	Lour.		294	Cochinch
edulis	Sesse & Moc.	1887-90		Mexico
eendornensis	Dinter	1932	326-H	Gr.Namag.
effusa	Ehrenb.ex Boiss.	1862	256	
eggersii	Urb.	1899	547	W.I.
ehrenbergii	Sweet		625	
eichleri	Müll.Arg.	1874	136-A	Argent.
elastica	Dinter	1938	371-A	Namaland
elastica	Poisson & Pax	1902		Afr.tropocc.
elastica	Marloth	1910	371	Afr.aust.
elastica	Jumelle			Madag.
elastica	Altamirano	1905	411-A	Mexico
elata	Brandege	1914	213-B	Mexico
elegans	Heyne		39-A	
elegans	Spreng.		36	Ind.or.
ellenbeckii	Pax		323.9	Afr.trop.
elliotti	Leandri	1945	288-L	Madag.
elliptica	Boiss.	1860	224	Peru
elliptica	Thunb.		360	Afr.aust.
elodes	Boiss.	1860	404	Brasil
elongata	Poir.		593	
elquiensis	Phil.	1895	402-A	Chili
elwendica	Stapf.	1886	601-A	Asia occ.
elymaitica	Bornmüller	1911	601-A	Persia
emarginata	Ait.	1789	481	
emarginata	(Kl.& Gke.)Croiz.	1943	91-A	
emarginata	Boiss.	1862	91	Brasil
emarginata	Lam.	1788	116	Peru
emetica	Padilla	1905		Am.Centr.
emirnenis	Baker	1883	634-A	Madag.
emodi	Hook.f.	1887	111-A	Reg.Himal.
enalla	Brandege	1914	281-A	Mexico
engelmanni	Boiss.	1860	138	
engleri	Pax	1895	467.6	Afr.trop.or.
engleriana	Dinter	1921	352-D	Afr.austr.occ.
enneagona	Haw.		335	
enopla	Boiss.	1860	338	Afr.austr.
enormis	N.E.Br.	1915	323-Y	Transvaal.
ensifolia	Baker	1883	551-A	Madag.
enterophopra	Drake	1899	300-D	Madag.
ephedroides	E.Mey.	1862	273	Afr.austr.

ephedromorpha	Bartlett	1907	219-A	Guatem.
epicyparissias	Krauss	1862	666	
epicyparissias	E. Mey.	1860	668	
epicyparissias	E. Mey.	1862	665	Afr. austr.
epiphylloides	Kurz	1873		Ins. Adam.
epithymoides	All.		512-A	
epithymoides	Bab.		454-A	Fl. Bath
epithymoides	Brot.		709	
epithymoides	Linn.	1753	492	Europ.
epithymoides	Jacq.		494	
equisetiformis	Stewart	1911	30-C	Galapagos
eranthos	R.A. Dyer & Mal.	1937	433-D	N. Rhodesia
erecta	(Lunell) Jabl.	(1910)	161-B	N. Dakota
eremica	Jepson	1925	72-D	Calif.
eremocarpus	Pharm.		255-A	
eremophila	A. Cunn. ex Hook.		255	Austral.
eriantha	Benth.	1844	266	Calif.
ericetorum	Zumag			Italia
ericifolia	Pax		636-A	Afr. trop.
ericoides	Lam.	1788	664	Afr. austr.
erinacea	Boiss. & Kotschy		521	Syria
eriocarpa	Bertol.	1839	681-A	
erioclada	Boiss. & Heldr.		496	
erioclada	Sart. ex Nym.		530-A	
eriogonoides	Small	1898	391-C	Georgia
eriphora	Boiss. Diagn.	1944	460	As. Min., Persia
eriphylla	Kar. & Kir.	1841	639-A	
erlangeri	Pax	1904	317-A	Afr. trop.
ernesti	N.E. Br.	1915	353	Cape
erosa	Willd.	1809	333	
erubescens	Boiss. Diagn.	1847	679	
erubescens	E. Mey.	1862	456	Afr. austr.
erythradenia	Boiss. Diagn.	1846	604	Persia
erythrantha	F. Muell.		113-A	
erythraea	Hemsl.	1891		China
erythraea	N.E. Br.	1911	295-C	
erythrina	Link.		669	Afr. austr.
erythrocarpa	Kl.			Guiana
erythrocephala	Bally	1951	300-Y	N. Rhodesia
erythroclada	Boiss.	1862	62	Ind. or.
erythrocoma	Leveillé	1913	43-H	Yunnan
erythron	Boiss.	1853	597	As. Min.
erythrophylla	Bertol.		259	
erythrorhiza	Boiss.	1862	400	Brasil
erythroxyloides	Baker	1883	685-X	Madag.
esculenta	Marloth	1908	353-C	Afr. austr.
espinosa	Pax	1894	382-B	Afr. trop. or., China.
espirituensis	M. E. Jones	1933	114-A	S. Calif. inf.
esquitolii	Leveillé & Van.	1906		
esula	Bisb.		634	

esula	Forsk.		615	
esula	Kotschy	1862	634	
esula	Linn.	1753	637	Europ.
esula	Pollich		658	
esula	Tenore		643	
esulaeformis	Schauer	1847	519-B	
esuloides	Velen.	1886	658-A	Bulg.
esuloides	Tenore		636	
esulo-lucida	Andrae	1855	637-A	Ruman.
euboea	Halacsy		475-A	Graecia
eugeniae	Prokh.	1947	476-A	Caucas.
eumymodes	Baker	1921	286-C	
euonymoclada	Kroiz.	1940	481-B	N.Guin.
euryops	Bullock	1932	665-A	Afr.trop.or.
eustacei	N.E.Br.	1913	327-A	Cape
evansii	Pax	1909	323.15	Transvaal.
evonymicarpa	Chad. & Willcz.	1902	396-A	Reg.Argent.
excelsa	A.White & Sloan	1941	316-A	Transvaal.
excisa	Urb. & Englm.	1929	80	Haiti
exclusa	S.Wats.	1882-3		Mexico
exigua	Linn.	1753	549	Europ.
exserta	(Small) B.E. Smith	1946	410-A	
expansa	Janka	1859-60	504	
exstipulata	Engelm.	1859	179	Texas
exumensis	(Millsp.)	(1909)	20-E	Bahamas
eylesii	Rendle	1905	80-C	Afr.trop.
fageliaefolia	Boiss.	1866	187-A	
falcata	Linn.	1753	552	Medit.As.
falsa	N.E.Br.	1915	332-A	
famata	Sakalaves		286-C	
fallax	Deysson	1908	574-A	
fasciculata	Thunb.	1908	707	Afr.austr.
fastuosa	Sessé & Moc.	1887-90		Mexico
fauriei	Leveille & Vaniot	1908	43-6	Corea
feddemaie	McVaugh.	1961	54-D	Michoacan
fendleri	Torr. & Gray	1855	120	S.W.U.S., N.Mex.
ferdinandi	Baill.	1866	108-B	N.Austr.
ferganensis	Fedtsch	1916	447-A	Turkestan
ferox	Marloth	1913	338-A	Cape
festiva	Sheriff	1936	5-A	Hawaii
fianarantsoae	Ursch & Leandri	1955	288-J	Madag.Cult.
fidjiana	Boiss.	1862	430	Fidji
fieldii	Shiriaev	1950		Iraq
fierowi	Woronov	1940		Transcauc. (Georgia)
figerti	Dörfler	1902		Austria
fiha	Decary	1921		Madag.

fiherensis	H.Poisson	1912	373-C	Madag.
filicaulis	Urb.	1924	149-D	Cuba
filicina	Portenschl.		644	Dalmat.
filiflora	Marloth	1921	326-A	Namaqual.
filifolia	Glaziou	1912	174-B	Brasil
filiformis				
filipes	Benth.			Austr.
fimbriata	Heyne ex Roth		37-A	
fimbriata	Hort.	1862	303-A	
fimbriata	Scop.	1788	333	
fimbriata	Wall.ex Boiss.	1866	37-B	
fimbrilligera	Mart.	1847	198	
finlaysonii	J.M.Black	1935		centr.Austr.
firma	Ledeb.		656	
fischeri	Pax	1894	103-A	Afr.trop. or.
fischeriana	Stued.		445	
flabellaris	Anders ex Boiss.	1862	25	Galapagos
flagelliformis	(Rydb.)	(1906)		Am.bor.occ.
flamandi	Battand.		350-A	Afr.bor.
flanagani	N.E.Br.	1915	354-D	Cape
flavicomma	DC.		510	Hispan.
flavopurpurea	Willk.	1875		
fleckii	Pax	1898	270-A	Afr.austr.
flerowi	Woronow ex Flerov			
fleuroti	Jord.		637	
flexicaulis	Scheele	1849	80-B	
flexuosa	H.B.K.	1817	20-B	
floccosiuscula	M.E.Jones	1929	114-G	Mexico
floresii	Standley	1935	279-A	Yucatan
floribunda	Engelm.	1859	122	Mexico
florida	Engelm.	1859	153	Arizona, Mexico
floridana	Chapm.		392	
fodhliana	Defiers		317-A	Arab.
foetida	Hoppe ex Koch		526	
foetida	Schult.		525	
foliata	Buch.-Ham.		157	
foliilua	Ule	1908		Brasil
foliosa	N.E.Br.	1915	669-A	
fontanesii	Steud.		260	
forbesii	Sherff.	1936	1-B	Hawaii
formosana	Hayata	1911		Formosa
forskalei	Bourg.ex Boiss.	1862	98	
forskalii	J.Gay., W.B.	1850	102-A	
fortuita	A.White, W.B.	1941	353-H	Afr.austr.
fossulata	Boiss.ex Gaill.	1859	554	
foveolata	Radlkofer	1913		Luzon
fragifera	Jan.ex Link	1818	492	Italia
fragifera	Schur		454-B	
fragilis	Decne	1834	98	
franchetti	B.Fedtsch	1915	552-A	
franckiana	A.Berger	1907	316-C	Hab.?

francoana	Boiss.	1860	202	Hispan.
francoisi	Leandri	1946	323.58	Madag.
frangulaefolia	H.B.K.	1817	261	
franksiae	N.E.Br.	1915	354-E	Natal
fraseri	Boiss.	1862	188	Ecuador
fraterna	N.E.Br.	1912	323.14	Angola
frickiana	N.E.Br.	1931	339-B	Cape Prov.
fridrichsthalii	Boiss.	1862	219	Guatemala
friedrichiae	Dinter	1914	326-K	Afr.austr.occ.
frivaldszkyana	Dörfl.& Degen		682-B	Greece
froedinii	Rech.f.	1952	657-A	Kurdistan.,Pers.
fructuos-pini	Mill.Gard.Dict.	1915	326	
frutescens	N.E.Br.	1915	378-B	Little Namag.
fruticosa	Bivona		516	
fruticosa	Edgew.	1847	370	
fruticosa	Forsk.	1775	321	Arabia
fruticulosa	Engelm.ex Boiss.	1862	115	Mexico
fuchsii	Bornm.& Sint.	1916	658-B	
fulgens	Karw.ex Kl.	1834	247	Mexico
fulva	Stapf.	1907	411-A	
furcata	N.E.Br.	1911	323.15	Afr.Brit.or.
furcillata	H.B.K.	1817	580	Mexico
fusca	Marloth	1912	326-G	Afr.austr.
fusiformis	Buch- Hamilt.		362	Ind.or.
gaditana	Cosson.		527	Hispan.
gallardoti	Boiss.& Blanche	1859	461	Mesopot.
galapageia	Robins & Greenm.	1895	25-A	Galapagos
galiciana	McVaugh	1961	184-B	Najaret
galilaea	Boiss.	1853	552-D	
galioides	Boiss.	1860	107	
galpini	Pax	1898	433-B	Afr.austr.
garanbiensis	Hayata	1920		Formosa
garberi	Engelm.ex Chapm.	1897	158-B	Florida
garberi	(Small)	(1913)	158-D	Florida Key
gariopina	Boiss.	1860	349	Afr.austr.
garkeana	Boiss.	1862	119	Sto.Domingo
garrullae	Sennen	1921-2		Hispan.
garuana	N.E. Br.	1912	323.17	Cameroons
gasparrinii	Boiss.	1862	493	Sicilia
gatbergensis	N.E.Br.	1915	354-A	Tembulonsi Cop- land Insul.
gaudichaudii	Boiss.	1860	60	Marion.
gaumerii	Millsp.	1898		Yucatan
gayeri	Boros ex Javorka	1924		Hungary
gayi	Salis.	1834	628	Corsica

geayi	Costant.& Gall.	1905	699-D	Madag.
gedrosiaca	Rech.f.	1951	604-A	Persia
gemella	Lag.	1816	43-D	Amphig.trop.
geminata	(Ait.) Marloth	1941		
gemicicola			164-A	
geminiloba	Millsp.	1889		L.Calif.
geminispina	Haw.		179	Mexico
geniculata	Ortega	1797	261	Am.trop.
geniculata	Sasse & Moc.	1887-90		Mexico
genistoides	Berg.Linn.Mant.II		662	Afr.austr.
gentilis	N.E.Br.	1915	377-A	Cape
gerardiana	Jacq.	1778	658	Europ.
gilgiana	Pax	1909	376-H	Ostaftr.
gilberti	Berger	1907	299-A	S.Afr.
giumboënsis	A.Hässler	1931		Somaliland
glabella				
glaberrima	Kl.	1858	121	Mexico
glaberrima	C.Koch	1848	675	Caucasus
glabrata	Sw.		20	
glabriflora	Vis.	1864	519-A	
gladiosa	M.E.Jones	1929	46-A	Mexico
glanduligera	Pax	1894	103-B	
glareosa	Bieb.		658-A	
glariosa	Pall.ex Bieb.		656	Europ.or.
glauca	Ehrenb.ex Boiss.	1862	551	As.,Afr.trop.
glauca	Forst.		428	N.Leb.
glauca	Roxb.		620	Ind.or.
glaucella	Pax	1898	255-A	Afr.austr.
glaucescens	Willd.	1803	658	
glaucophylla	Poir.	1811	5	Afr.trop.
glaucopoda	Diels	1912	470-A	China Yunnan
glebulosa	Coss.& Dur.	1857	550-X	Algeria
globosa	Sims	1826	328	Afr.austr.
globulifera	H.B.K.	1817	43	
globulosa	Coss.& Dur.Boiss.	1862	550	
glochidiata	Pax		323-B	Afr.trop.
glomerata	Bieb.		179	Caucasus
glomerifera	(Millsp.)	1913	43-E	Guatemala
glomerifera	Wheeler	1939	156-B	S.Amer.,Fla., S.Texas
glomerulans	Prokh.	1933	642-A	
glyptosperma	Engelm.	1859	161	Mexico
gmelini	Steud.		634	
goeringii	Steud.ex Boiss.	1862	82	
goetzei	Pax	1896	167-6	Afr.trop.
goldei	Prokh.	1949	657-A	Crimea
goliana	Lam.	1788	113	Ins.Borbon
golisana	N.E.Br.	1911	323-22	Somaliland
gollmeriana	Kl.ex Boiss.	1862	236	Venezuela
golondrina	Wheeler	1940	32-B	Texas
gomesii	Croiz.	1935		Afr.Lusit.Or.

goodingii	(Millsp.) Jabl.	(1916)	74-A	
gorgonis	A. Berger	1910	354-B	Afr. austr.
gorinii	Chiov.	1932		Somaliland
goudoti	Boiss.	1862	414	N. Granat.
gossweileri	Pax	1909	433-A	Afr. trop.
gossypina	Pax	1894	379-A	Afr. trop. or.
goyazensis	Boiss.	1860	230	Brasil
gracilior	Cronquist	1949	391-A	Georgia
gracilipes	Baill.	1860-1	282-A	Ins. Ma.
graciliramea	Pax	1905	322-A	Afr. trop.
gracilis	Bess. Ind.	1816	638	
gracilis	Ell.		391-B	
gracilis	Loisel		633	
gracilis	Pav. ex Moq.		269	
gracillima	S. Wats.	1886	77-A	Arizona, Mexico
graeca	Boiss. & Sprun.	1842	571	Graec., As. min.
graminea	Jacq.	1788	184	Am. centr.
graminea	Koenig. ex Boiss.	1862	620	
graminea	Schlecht. & Cham.	1830	192	
graminifolia	Will.		633	
graminifolia	Michx.		262-B	
grandialata	Dyer	1937	331-E	Transvaal.
grandicornis	Goebel	1889	331-C	Afr. austr.?
grandidens	Haw.	1825	310	Afr. austr.
grandidens	Goebel		331-C	
grandidieri	Baill.	1886	110-C	Madag.
grandifolia	Haw.		296	
grandilobata	Chiov.			Somali., Ital.
grandis	Lem.	1857	318-C	
graniticola	Leach	1964	323-25	Mozambique
grantii	Oliver	1875	433-H	Afr. trop., Unyanyembe
granulata	Forsk.	1775	98	Afr. as. trop.
graveolens	N. E. Br.	1915	433-C	Little Namag.
greenei	Millsp.	1890	161-A	Idaho
gregaria	Marloth	1910	378-A	Afr. austr.
gregersenii	K. Maly ex G. Beak	1920	481-A	Bosnia
greggii	Engelm. ex Boiss.	1862	583	Mexico
griffithii	Hook. f.	1887	141-A	Himal.
grisea	Engelm. ex Boiss.	1862	130	Mexico, Texas
griseola	Pax	1905	323-25	Afr. austr.
grosseri	Pax	1904	433-V	
groenwaldii	Dyer	1938	223-C	
grossheimii	Prokh.	1930	434-A	
guachanca	Azara ex Steud.		358-A	Peruvia
guadalajarana	S. Wats.	1887		Mexico
guadalupensis	Howell	1933		Baja Calif.
guanarensis	Pittier	1929	73-F	Venezuela
guateraulensis	Standl. & Steyer.	1944	219-B	
gueinzii	Boiss.	1862	257	Afr. austr.
guerichiana	Pax	1894	378-A	Afr. austr. occ.

guestii	Blakelock	1942	539-A	Iraq.,As.Min.
guiliei	A.Gray	1858-9	627	Japan
guillauminiana	Boiteau	1942	323-56	Madag.
guillemetii	Ursch.&Leandri	1955	288-E	Cult.
guineensis	Brot.	1843	179	Afr.trop.
gummifera	Boiss.	1860	378	Afr.austr.
gundlachii	Urb.	1908	166-C	Cuba
guntensis	Prokh.	1933	339-C	
gussoneana	Lojacono	1907	530-A	Sicil.
gutemalaensis	Standl.& Steyerm.	1944	219-B	Guatemala
guyoniana	Boiss.& Reut.	1852	546	Algena
gymnadenia	Urb.	1908	143-B	Cuba
gymnoclada	Boiss.	1860	234	
gymnoclada	Engelm.	1861-2	222	Calif.
gymnonota	Urb.	1908	410	Bahamas
gynophora	Pax	1904	382-C	Afr.trop.
gypsicola	Rech.f.	1951	566-A	Persia
hadramautica	Baker	1894	324-B	Arabia
haeleeleana	Herbst	1971		
haematantha	Boiss.	1862	225	Ecuador
haematodes	Boiss.	1862	179	Ecuador
hainanensis	Croiz.	1940	282-C	China,Hawaii
hakutosanensis	Hurusawa	1940		Corea
halacsyi	Formansk	1894-5		Europ.or.
halemanui	Sherff.	1936	1-D	Hawaii
halleri	Dinter	1937	379-A	Afr.austr.occ.
hallii	Dyer	1953		Cape Prov.
halophila	Mig.		8	Malabar
halophila	Bornm.& Gauba	1939	436	Persia
hamata	Sweet		351	Afr.austr.
handiensis	Burchard	1942	314-A	Ins.Canar.
hararensis	Pax	1907	316-A	Abyss.
harmandii	Gagnep.	1921	58-A	Laos,Cambodia
hartwegiana	Boiss.	1862	85	Mexico
hassleriana	Chod.	1901	170-D	Paraguay
hastisquama	N.E.Br.	1915	271-C	Cape
haussknechtii	Boiss.	1866	539	Europ.,Asia, Arabia
havanensis	Willd.ex Boiss.		262	Amer.bor.austr.
haworthii	Sweet		342	Cape
haworthii	Sweet		519	Europ.austr.
hebecarpa	Boiss.	1846	635	Persia
hebegyne	Pax & K.Hoffm.	1937	173-A	Rio Gr.Sul
hedyotoides	N.E.Br.	1911	551-A	Afr.trop.or.
heldreichii	Orph.ex Boiss.	1859	685	Graecia
helenae	Urb.	1908	413-D	Cuba

heleniana	Thellung & Stapf	1916	103-E	S.Helena
helicothele	Lem.	1857	293	India or.
helioscopia	Hausk.ex Boiss.	1866	539-A	Aleppo
helioscopia	Linn.	1753	658	Europ.,As.bor.
helioscopioides	Losc.& Pard.		539	Aragonia
helioscopioides	Blatter	1933		Ind.or.Waziristan
helleri	Millsp.	1898		Texas
helwigii	Urb.& Ekman	1929	80-J	Haiti
hepatica	Urb.& Ekman	1929	116-C	Ind.occ.
heptagona	Linn.	1753	337	Afr.austr.
heptagona	Munro			Ind.or
heraldiana	(Millsp.)	(1916)	675-A	
hercegovina	G.Beck	1920		Hercegov
hereroensis	Pax	1889	238	
hermentiana	Lem.	1858	306	Afr.trop.
hernandez-pachecoi	Caballero	1935		Marocc.
herniariaefolia	Willd.		614	As.min.
herniaroides	Nutt.	1837	80	
herpetoriza	Prokh.	1933	612-B	
herrei	A.White	1941	352-B	Afr.austr.
herronii	Riddell		260	
herteri	Arech.	1910		Uruguay
heteracantha	Pax		323-15	Afr.trop.
heteradena	Boiss.& Buhse.	1860	604	Persia bor.
heteradena	Jaub.& Spach		434	Persia,Ispaha.
heterantha	Nutt.	1837	177	Arkans.,Texas
heterochroma	Pax	1895	318-A	Germ.E.Afr.
heterodoxa	Müll.Arg.	1874	535-A	Brasil
heterophylla	Desf.		625	Reg.Medit.
heterophylla	Linn.Amoena	1753	262	Amer.bor.austr.
heteropoda	Pax		325-B	Afr.trop.
hexadenia	Denis	1921	282-F	Madag.
hexagona	Nutt.		177	Texas
heyneana	Boiss.	1862pp	104	India or.
heyiana	Spreng.		80	India or.
hiberna	Lepech		503	Europ.
hiberna	Welw.ex Nyman		513	Lusitania
hibernica	Spreng.		481	Europ.
hieroglyphica	Coss.& Dur.	1862	568	Algeria
hierosolymitana	Boiss.	1853	518	Syria
hillebrandii	Baillon	1886	3-A	Madag.
himalayensis	Boiss.	1862	439	Reg.Himalaya
himalayensis	Kl.		439	Reg.Himalaya
hindsiana	Benth.		248	Calif.
hinkleyorum	Johnst.	1924	396-A	Peru,Argentina
hirsuta	Kit.ex Boiss.	1862	454	Europ.
hirsuta	Schur.	1853	637	Europ.
hirta	Linn.	1753	43-G	Florida,Amer.tr.
hirtella	Boiss.	1860	55	Brasil
hirtula	Engelm.ex S.Wats.	1880	127-A	Calif.
hislopia	N.E.Br.	1913		Madag.?

hispidia	Boiss.	1860	111	Reg.Himalaya
hoffmanniana	Boiss.	1862	383	Costa Rica
hohenackeri	Hochst.ex Boiss.		658	Europ.
hohenackeri	Orph.ex Boiss.	1859	654	Gracea
holstii	Pax	1894	382-A	
homophylla	Lange ex Boiss.	1862	658	Europ.
hookeri	Steud.	1840	5	Hawaii
hookeri			125-A	
horombensis	Ursch.& Leandri	1955	288-E	
horrida	Boiss.	1860	340	Afr.austr.
hortensis	Engelm.ex Boiss.		138	Chili
hottentotta	Marloth	1930	318-7	Namaqualand
huachanhana	Ruiz ex Kl.Gke.	1860-71	399	Boliv.,Arg.
huachanhana	Boiss.	1862	399	Peru
huberti	Pax	1911	318-C	Afr.Brit.or.
huillensis	Pax		616-B	Afr.trop.
humayensis	T.S.Brandege	1905	191-A	Mexico
humbertii	Denis	1922	290	Madag.
humbertiana	Maire	1934		Marocc.
humboldtii	Willd.	1809	184	Mexico,Amer. centr.
humifusa	Hort.ex Boiss.	1862	138	Chili
humifusa	Willd.	1813	82	Ural
Humilis	C.A.Mey.	1833	607	Siberia
humilis	Royle		362	Himalaya
humistrata	Engelm.ex Gray	1855	143	Amer.bor.
huttonae	N.E.Br.	1915	354-H	Cape
hyberna	Linn.	1753	481	Europ.
hyberna	Viv.		482-A	
hydnoae	E.Mey.		369	Afr.austr.
hylonoma	Hand.-Mazz.	1931		China
hypericifolia	Auct.	1967	51	
hypericifolia	Hochst.ex Boiss.	1967	51	
hypericifolia	Linn.	1753	51	
hypericifolia	Phil.ex Kl.&Gke.	1860	142	
hypogaea	Marloth	1910	326-E	Afr.austr.
hypoleuca	Prokh.	1933	659-A	
hyrcana	Grossheim	1920		Caucasus
hyssopifolia	Linn.	1759	54-C	Jamaica
hystrix	Jacq.	1778	347	Afr.austr.
hystrix	Marloth	1915	327-A	

iberica	Boiss.	1860	645	Reg.Cauc.
idzuensis	Nakal ex Hurusawa	1940	624-A	Manzuria
illyrica	Lam. H.R.	1817	454	Europ.austr.
imaii	Hurusawa	1940		Corea
imbricata	E.A.Bruce	1933	589-A	Tanganika Terr.
imbricata	Sesse & Moc.	1894		Cuba
imbricata	Wahl.		589	Lusitania
imitata	N.E.Br.	1911	323-11	Angola
imperfoliata	Vis		644-A	Dalmatia
implexa	Stapf.	1908	379-A	Afr.trop.Uganda
impresa	Chiov.in Nuov.	1929		Abyss.
inaequalis	N.E.Br.	1911	80-A	Somaliland
inaequalis	(Kl.Gke)(Millsp.)	1914	166-K	
inaequilatera	Engelm.	1859	103-A	
inaequilatera	Sond.	1850	103	
inaequispina	N.E.Br.	1911	323-21	Somaliland
inappendiculata	Domin	1927	159-A	N.W.Australia
inarticulata	Schweinf.			Arabia
incana	Schur	1852	642	
incerta	Brand.	1891	4-C	L.Calif.
inciformis	Sesse & Moc.	1894		Mexico
incisa	Engelm.	1860	586	Arizona
inclinata	Hort.ex Boiss.	1862	138	
incompta	Cesati	1838	503	
inconspicua	Ball.	1875	550-Y	Marocc.
inconstantia	Dyer	1931		Cape Prov.
incurta	Bally	1964	323020	Somaliland
incurva	N.E.Br.	1911	380-A	Afr.trop.or.
indecora	N.E.Br.	1915	271-B	Little Namaq.
inderiensis	Less.	1842	385	
indica	Lam.	1786	49	
indica	Wall.		51	Arizona,Mexico
indivisa	Engelm.	1859	166-N	
indivisa	(Millsp.)	(1914)		
inelegans	N.E.Br.	1915	378-C	Griqualand
inelegans	N.E.Br.	1911	378-C	Afr.trop.or.
inermis	Mill.Gard.Dict		326-B	Hab.?
inermis	Panc.ex Boiss.	1866	492-A	
infausta	N.E.Br.	1912	317	Erythrea
infausta	N.E.Br.	1915	332-A	Afr.austr.
inflexa	Urb.& Eckman	1929	80-I	Haiti
ingallsii	(Small)	(1903)	72-A	
ingens	E.Mey.	1835	331	Afr.austr.
ingezalahiana	Ursch.& Leandri		290-D	Cult.
innocus	Wheeler	1939		Texas
inometa	N.E.Br.		326-M	
inopina	Wheeler	1941	156-A	Texas
insarmentosa	P.G.Mey.	1966	352-B	G.SW.Africa
insulaealis	(Millsp.)	(1914)	54-F	Bahamas
insulae-europae	Pax	1909	323-X	Insul.Mascar.
insulana	Vell.	1825	206	Brasil

<i>insularis</i>	Boiss.	1860	482	Corsica
<i>interaxillaris</i>	Fern.	1901	131-A	Mexico
<i>intercedens</i>	Pax		318-1	Afr.trop.
<i>intercedens</i>	Podpera	1922		Czechoslov.
<i>intermedia</i>	Brebiss.	1924	637	Gallia
<i>intermedia</i>	Fisch.& Mey.	1862	645	
<i>intermedia</i>	Hochst.ex Boiss.	1862	103	
<i>intermedia</i>	Engelm.		75	Arkansas
<i>intermixta</i>	S.Wats.	1889	81-C	Mexico
<i>intisi</i>	Drake	1900	373-C	Madag.
<i>inundata</i>	Torr.ex Chapm.	1860	393	Florida
<i>invaginata</i>	Croiz.	1943	236-A	Parag.
<i>involucrata</i>	E.Mey.	1862	666	Afr.austr.
<i>involucrata</i>	Wall.Cat.7696			Reg.Himal.
<i>involuta</i>	Millsp.	1889	167-B	Calif.
<i>ipecacuanha</i>	L		391	Amer.bor.
<i>irgisensis</i>	Litw.	1922		Rossia,Asia, Turcia
<i>isalensis</i>	Leandri	1946	449	Hispan.
<i>isaloensis</i>	Drake	1737	323-61	Hoh Cliff
<i>isatidifolia</i>	Lem.	1788	449	
<i>isatis</i>	Pers.		449	Madag.
<i>isaurica</i>	Khan.	1964	614-A	
<i>isophylla</i>	Bornm.	1908	605-A	Elburs.
<i>ispahanica</i>	Boiss.	1846	434	Persia
<i>issykkulensis</i>	Prokh.	1933	444-A	
<i>isthmia</i>	V.Täckh.	1932	433-B	Aegipt,Iraq.
<i>italica</i>	Lam. Encycl.2.	1788	569	Italia
<i>italica</i>	Salzm.ex Boiss.		569	
<i>italica</i>	Tineo	1802	625	
<i>iteophylla</i>	Boiss.	1860	675	Reg.Cauc.
<i>jacquemontii</i>	Boiss.	1862	442	Reg.Himal.
<i>jacquini</i>	Fenzl.ex Boiss.	1862	537	Hab.?
<i>jaquiniaeflora</i>	Hook.		247	Mexico
<i>jaegeriana</i>	Pax	1909	378-13	Afr.trop.
<i>jaliscensis</i>	Robins & Greenm.	1894	262-A	Mexico
<i>jamesonii</i>	Boiss.	1860	88	Ecuador
<i>jansenvillensis</i>	Nel.	1935		Afr.austr.
<i>japonica</i>	Siebold ex Boiss.	1866	475	Japan
<i>japonica</i>	Zoll.ex Boiss.	1862	658-A	
<i>japygica</i>	Tenore		655	
<i>jaroslavii</i>	P.Poljakov	1953	447-B	As.cent.
<i>jatrophoides</i>	Pax		379-A	Afr.trop.
<i>javanica</i>	Jungh.	1845	623	Java
<i>jaxartica</i>	Prokh.	1937	634-A	

jejuna	M.C.Johns.	1960	120-A	Texas
jenningsii	(Millsp.)	(1916)	149-G	Cuba
johnsonii	N.E.Br.	1911	323-13	Port.East Afr.
jolkini	Boiss.cent.	1860	475	Japan
jonesii	Millsp.Pittonia	1890	153-A	Arizona
juba phylla	Svent.	1960	374-A	Ins.Canar.
jubata	Leach	1964		Zambia
jucula	Prodan	1953	637-A	Transyl.
juglans	Compton	1935		Afr.austr.
juncea	Jacq.	1804	547	Medit.
juncooides	Steud.		547-A	
juniperifolia	Rich.ex Boiss.	1866	651	
juttae	Dinter	1914	352-A	Afr.austr.occ.
juvoklanti	Pax		296	Afr.trop.
kahirensis	Rausch.	1930	433	
kalaharica	Marloth			Cape Prov.
kaleniczenkii	Czern.ex Trautw.	1884		As.bor.or.
kamerunica	Pax		323-21	Afr.trop.
kanalensis	Boiss.	1866	431-A	N.Caled.
kanaorica	Boiss.	1862	611	Himal.
kansuensis	Prokh.	1926		Tibet, Kansu
karoi	Freynd.	1896	637-A	Sibir.
karroensis	N.E.Br.	1915	272-A	
karwinski	Boiss.	1860	44	
kaschgarica	Regel.	1879		Turkestan
kassneri	Pax	1904	257-A	Afr.trop.
katjarensis	Gage	1914	62-A	Bombay
kazerouni	Parsa	1948		Persia
keithii	R.A.Dyer	1951	331-CC	Swaziland
kelleri	Pax		323-C	Afr.austr.
kemulariae	Ter-Chatschat	1963		Transcauc.
kernerii	Huter			Europ.austr.
kerrii	Craib.	1911	281-A	Siam
kerstingii	Pax		154-A	Afr.trop.
keyensis	(Small)Jabl.	(1928)	20-J	Florida
khandallensis	Blatter & Hallb.	1921		Bombay
khasyana	Boiss.	1862	470	Himal.
kibwezensis	N.E.Br.	1912	323-C	Afr.Brit.or.
kilimandscharica	Pax	1892	615	Afr.trop.or.
kilwana	N.E.Br.	1911	154-B	Afr.trop.or.
kischenensis	Vierh.	1907	80-A	Socotra
klotzschiana	Wiq.	1851	54-A	
knobelii	Letty	1934	315-A	Transvaal.
knuthii	Pax	1905	323-14	Afr.austr.
komarowiana	Prokh.	1949	446-A	Sibir.or.

kopetdagensis	Korovin ex Prokh.	1933	659-A	Asia Med.
kopetdaghi	Prokh.	1933	658-A	Asia Med.
korovini	Pavlov.	1933		Turkestan
kotschyana	Fenzl.		678	As.min.
kovandensis	Beille ex Cheval.	1920		Dahomey
kozlovi	Prokh.	1926		Mongol., Kansu
kralickii	Coss.	1889		Afr. bor.
kraussiana	Bernh.	1845	453-A	
kudrjashevii	(Pazij) Prokh.	1949	491-A	
kunzei	Boiss. & Hausok.	1879	610-A	
kuriensis	Vierh.	1905	157-B	Socotra
kurioica	Bornm.	1939	434-A	
kuwaleana	Dagmer & Sherff.	1959	3-D	Hawaii
kwebensis	N.E.Br.	1909	255-A	Afr. trop.
labbei	Léveillé	1913	43-K	China
lacei	Craib	1911	302-A	Burma
lacera	Boiss.	1860	180	Mexico
lactea	Haw.	1812	308	Ind. or.
lactea	Roxb.			Ins. Molucc.
lactiflua	Philippi		364	Chili
laeta	Ait.		427	
laeta	Heyne		620	
laevigata	Lam.	1788	695	Brasil
laevigata	Vahl.		7	
laevis	vide levis			
lagascae	Spreng.	1861	457	Sardinia, Hispan.
lagascae	Sprun.		457	Graecia
lagunillarum	Croiz.	1967	236-B	Venezuala
lamarckii	Sweet		365	
lambi	Svent.	1960	431-B	Ins. Canar.
lamprocarpa	Prokh.	1933	454	
lanata	Sieber	1826	390	Syria, Persia
lanata	Glaziou	1912-3	41-A	Brazil (Goyaz)
lanceolaria	Herb. Heyne		620-A	
lanceolata	T. Liou	1931		China
lanceolata	Spreng.		551-A	
lanceolata	Rottler	1826	551	
lanceolata	Phil.	1895	396-X	Chili
lanceolata	Larranaga	1923		Uruguay
lancifolia	Schlecht.	1832	207-A	Mexico
lanifera	Haw.		179	Mexico
lansingii	(Millsp.)	(1913)	43-H	Illinois
lanuginosa	Lam.	1788	456	France
lanuginosa	Thuill.		525	
laredana	Millsp.	1890-4	144-C	Texas

larica	Boiss.	1860	376	Persia
laro	Drake	1899	373-A	Madag.
lasiocarpa	Kl.	1843	53	Mexico
lasiocarpa	C.Koch	1848	460	Ind.occ.
lasiocaula	Boiss.	1866	474-A	
lata	Engelm.	1859	32	Texas
latazi	H.B.K.	1817	412	N.Granat.
latericolor	Brandege	1913	247	Mexico
lateriflora	Jaub.& Spach.	1845	417	
lateriflora	Schum.& Thonn.		372	Afr.trop.
lathyris	Georgi		445	
lathyris	Linn.		384	Aurop.austr.
latifolia	Güldenst.ex Ledeb.		633-A	Rossia
latifolia	(Hohen)Boiss.	1860	645-A	
latifolia	C.A.Mey.	1830	638	Siber.
latifolia	Salzm.ex Boiss.		569	
latimammillaris	Croiz.	1932-3	334-B	Afr.austr.
laurentii	DeWild.	1908	296	Afr.trop.
laurifolia	Lam.	1788	415	Peru
laxiflora	Kuntze	1898	344	Afr.austr.
leandriana	Boiteau	1942	290-B	Madag.
lecheoides	Millsp.	1906	20-D	India occ.
ledebourii	Boiss.	1860	565	Tauria
ledermanniana	P. & H.	1910	433-C	Afr.trop.
ledienii	A.Berg.	1907	339-A	Afr.austr.
lehmanniana	Pax	1899	619-A	Colombia
lehmbachii	Pax	1901	616-B	Afr.trop.
leiococca	Norton	1900	533-D	Amer.bor.
leiosperma	Boiss.	1860	9-A	
leiosperma	Sibth.& Sm.		625	
lemaireana	Boiss.	1862	303-A	Afr.trop.
leonardii	(Burch)	(1966)	143-C	Haiti
leonensis	N.E.Br.	1911	296-B	Sierra Leona
lepidocarpa	Pax	(1905?)	323-12	Afr.trop.
leptalea	Schauer	1847	184	Mexico
leptocaula	Boiss.	1862	630	Rossia
leptocera	Engelm.	1857	564	Am.bor.occ.
leptoclada	Balf.	1884	169-E	Ins.Socotra
leptomysura	Baillon	1912		Madag.
leptophylla	Vill.		633	
leshumensis	N.E.Br.	1911	97-A	Rhodesia
leucantha	Boiss.	1862	135	Mexico,Cuba,Fla.
leucocephala	Lotsy	1895	219-A	Guatem.
leucodendron	Drake	1903	373-B	Madag.
leucochlamis	Chiov.	1929	323-26	Somaliland
leucoloma	Rafin.	1833	227	
leuconeura	Boiss.	1862	287	Madag.
leucophylla	Benth.	1844	164	Calif.
leucotricha	Boiss.		530	
leviana	Croiz.	1934	335-A	
levis	Poir.		7	

libassi	Lojacono	1907	101-A	Sicil.
lignosa	Marloth	1909	271-A	Afr.austr.
ligularia	Roxb.	1801	292-C	
ligulata	Chaub.		673	
ligustrina	Boiss.	1860	220	Hispan.
liliputana	Wright	1866	149-A	Cuba
linaria	Link		625	
linarioides	Poir.		519	
lindeniana	A.Rich	1850	166	
lindheimeriana	Engelm.ex Boiss.		562	
linearifolia	Roth.		94	Ind.or.
linearifolia	Willd.Lam.	1788	519	
linearifolia	(Millsp.)	(1913)	416-A	Cuba
linearis	Heyne ex.Roth		94	
linearis	Heyne		94	
linearis	Retz.	1783	21	Ind.occ.
linearis	Schrank	1820	433-A	
lineata	S.Wats.	1886	47-A	Mexico
lingiana	Shih.	1963		China
linguiformis	McVaugh	1961	124-A	Mexico
lingulata	Heuff.	1858	495	
linifolia	Burm.		664-B	Afr.austr.
linifolia	Herb.Russ.		623-A	
linifolia	Jacq.		519	
linifolia	Tenore		575	
linifolia	Vahl		269	
linifolia	Wall.		624	
lipskyi	Prokh.	1938	497-B	
literata	Jacq.		525	
litoralis	H.B.K.	1817	20	
litoralis	Noe		575	Reg.Medit.
litoralis	Sesse & Moc.	1894	575-A	Porto Rico
litorea	Miq.ex Boiss.	1862	396	
litwinowii	Prokh.	1932	612	
liukuensis	Hayata	1920		Formosa
livida	C.A.Mey.	1862	16	Afr.austr.
lividiflora	Leach	1964	379-A	Mozambique
loandensis	N.E.Br.	1911	158-A	Angola
lockharti	Steud.		262	
lohaensis	Baill.	1887		Madag.
loiseleuria	Rouy	1910	658-A	Gallia
lombardensis	Nel.	1933		Cape Prov.
longecorniculata	Kitamura	1958	601-B	Afgan.
longecornuta	Pax	1892	316-A	Afr.trop.
longecornuta	S.Wats.	1890		Mexico
longeramosa	S.Wats.	1890		Mexico
longetuberculata	Boiss.	1866	325-A	
longetuberculosa	Hochst.		324	Abyss.
longebracteata	D.C.fl.Fr.		573	
longepetiolata	M.E.Jones	1933-5	633-A	Mexico
longeradiata	Lapeyr.		708	

longibracteata	Pax	1893	325-A	Afr.austr.
longicruris	Scheele	1849	562	Texas
longifolia	Baill.ex Boiss.	1862	289	
longifolia	D.Don.		469	Reg.Himal.
longifolia	Güldenst.		630	
longifolia	Lam.	1788	419	
longipetiolata	P + H	1910	619-B	Afr.trop.
longifolia	Rusby	1907	223-B	Bolivia
longiradiata	Lapeyr.		708	Mont.Pyren.
longispina	Chiov.	1929	302	Somaliland
longistyla	Boiss.	1860	39	Ind.or.
lophogona	Lam.	1788	288	Madag.
lorentii	Hochst.		657	
lorentzii	Müll.Arg.	1874	139-A	Reg.Argent.
loreyei	Jard.		637	
loricata	Lam.	1788	347	Afr.north
lorifolia	Hillebr.	1888	2-C	Hawaii
louisii	J.Thieb.	1948		Syria
lucida	Auct.ex.Boiss.	1862	643	
lucida	Waldst.& Kit.	1802	646	Moravia
lucidissima	Léveillé & Vaniot	1906		China
lucismithii	Robinson & Greenm.	1896	164-C	Mexico
lucorum	Rupr.in Maxim	1859	473	Reg.Amur.
ludoviciana	Rafin.		81	
lugubris	Chabert.	1900		Europ.
luisensis	(Millsp.)	(1916)	90-A	
ludelliana	Croiz.	1943	410-A	Mexico(Chiapos)
lunulata	Bunge		641	China
lupatensis	N.E.Br.	1911	98-B	Afr.,Lusit.or.
lupulina	Boiss.	1860	235	N.Grant.
lurida	Engelm.in Ives	1860	395	Calif.
lusitanica	Steud.		709	Lusitan.
lutea	Alam.ex Boiss.	1862	259	
luteola	Cass.& Durr.	1862	594	Algeria
lutescens	C.A.Mey.		489	Sibir.
luticola	Hand.Mazz.	1931		China
lutulenta	(Croiz.)	(1946)	120-A	Uruguay
lutzenbergiana	Croiz.	1967	236-A	Venez.Cult.
luzoniensis	Merrill	1920		Luzon
lycia	Boiss.	1862	684	Lycia
lycioides	Boiss.	1860	233	Brasil
lyciopsis	Pax	1895	382-D	Afr.trop.or.
lyndenburgensis	Schweickerdt	1933	316-A	Transvaal.
lyttoniana	Dexter	1935		Hort.

"M"

maackii	Meinshaus	1884		Sibir.
macella	N.E.Br.	1915	271-B	Cape
machrisiae	Steyerm.	1958		Goyaz.
macgillivrayi	Boixx.	1862	66	Australia
macinensis	Prodan	1953	658-A	Rumania
macowani	N.E.Br.	1915	325-G	Hope
macra	Hiern.		255-B	Afr.trop.
macraulonia	Phil.	1895	396-C	Chili
macrocarpa	Boixx.& Buhse	1860	491	Persia
macroceras	Fisch.& Mey.	1837	676	Reg.Caucas.
macroclada	Boiss.	1844	657	
macroglypha	Lem.	1857	307	
macrophylla	Pax	1894	467-C	Afr.trop.
macropodoides	Robins & Greenm.	1895		Maxico
macropus	Boiss.	1862	176	Mexico
macrorhiza	C.A.Mey.	1830	487	Sibir.
macrorhiza	Pall ex Ledeb.		445	
macrorrhiza	Glaziou	1912	174-A	Goyaz.
macrostegia	Boiss.	1862	679	
maculata	Linn.	1753	156	U.S.
maculata	Linn.Mantissa	1771	156	
maculata	Anders.	1853	25	
madagascariensis	Comm.& Lam.	1788	288	
maddenii	Boiss.	1862	555	Reg.Hamil.
magdalенаe	Benth.	1844	114	Calif.
maglicensis	Rohlena	1912		Montenegro
magnidens	Haw.		310	
magnimamma	Haw.		179	Mexico
mahafalensis	Denis	1921	290-C	Madag.
mainiana	H.Poisson	1912		Madag.
mainty	(Poisson) Denis	1935	373-D	Madag.
mairei	Leveille	1913	637-H	China, Yunnan
makinoi	Hayata	1911		Formosa
malaca	(Small)	(1903)	156-E	Ind., Tenn., La., Texas
malacitana	Pau	1941		Hispan.
malacophylla	Clarke		390	
maleolens	Phillips	1932	326-G	Transvaal.
malevola	Leach	1964		Zambia, Rhodesia
malleata	Boiss.	1862	603	Persia
malurensis	Rech.f.	1963	604-C	Afghan.
malvana	Mairy	1940		Marocc.
mamillosa	Lem.		297	Hab.?
mamillaris	Linn.	1753	334	Afr.austr.
mammillaris	Tremant			
mananarensis	Leandri	1945	288-A	Madag.
manca	Nels.	1909	564-B	
mancinella	Baill.	1886	283-A	Madag.
mandoniana	Boiss.	1866	223-A	Bolivia
mandriavioky	Leandri	1958	323-67	

mandshurica	Maxim.	1883	646-A	Songar.Mandshur.
mangleti	Urb.Fedde	1930	80-G	Cuba
mangoryensis	Leandri	1945	290-D	Madag.
mareskii	Knoche	1922	614-A	Isl.Balsares
marginata	H.B.K.	1817	228	
marginata	Pursh	1814	227	Amer.bor.
marienthali	Dinter	1921	326-A	
marilandica	Green	1898	239-A	Amer.bor.
mariolensis	Rouy	1889	500-A	Hispan.
maritima	S.F.Gray		71-A	
maritima	Willd.ex Boiss.	1867	73	
marlothii	Pax	1889	325-A	Afr.austr.
marlothiana	N.E.Br.	1915	326-C	occ.extratrop.
marschalliana	Boiss.	1846	691	As.min.,Persia
marschalliana	Kotschy ex Boiss.	1862	686	
marshii	(Small)	(1903)	73-A	Florida
martini	Rouy	1900	680-A	
martiusiana	Steud.		457	
masafuerae	Phil.	1856	696	
massiliensis	DC.		101-B	
matabelensis	A.Zahlbr.	1900	379-B	Afr.austr.
mathewsii	(Small)	(1933)	143-A	Florida
matritensis	Boiss.	1860	590	Hispan.
mauritiana	(Comm.)	(1921)	366	
mauritanica	Lam.	1788	365	
mauritanica	Linn.	1753	366-B	Afr.austr.
mauritanica	Webb		434	
mayana	Millsp.	1896		Yucatan
maysillesii	McVaugh	1961	246	Mexico
mayuranathanii	Croiz.	1940	302-A	Madras (India)
mazicum	Emberger & Maire	1930		Marocc.
media	N.E.Br.	1911	290-F	Afr.trop.or.
medicaginea	Boiss.	1940	569	Reg.Medit.occ.
medusae	Thunb.		326	Afr.austr.
megalalantica	Ball	1875	616-A	Marocc.
megalantha	Boiss.	1846	434	Persia
megalocarpa	Rech.f.	1963	450-A	Afghan.
megistopoda	Diels	1912	443-A	Yunnan
mehadiensis	Kit.in Rochel	1863	179	
melanacantha	Drake	1903		Madag.
melanadenia	Torr.	1857	89	Calif.,Ariz.,Tex.
melanocarpa	Boiss.	1862	132	Ecuador
melanohydrata	Nel.	1935	325-A	Little Namaq.
melanosticta	E.Mey.	1862	368	Afr.austr.
melapetala	Gasparr.	1830	683	Sicil.
melillensis	Sennen & Maur.	1933		Marocc.
melitensis	Parl.		519-A	
mellifera	Ait.	1789	419	Ind.Madera
mellifera	Steub.		420	
meloformis	Ait.		332-A	Afr.austr.
meloniformis	Lem.	1854	332	

membranacea	Pax	1895	467-B	Afr.trop.or.
memoralis	Dyer	1952	323-55	Rhodesia
mendax	Maire & Wilczek	1936		Marocc.
mendezii	Boiss.	1860	133	Mexico
menelikii	Pax	1907	318-C	Abyss.
mercurialina	Michx.	1803	244	Amer.bor.
merenskiana	Dinter	1938	325-B	
meridensis	Pittier	1929	73-E	Venez.
merkeri	N.E.Br.	1911	290-D	Afr.trop.or.
mesembrianthemifolia	Jacq.	1760	20	Cartagena
mesopotamica	Khan	1963	595-A	Iraq, Syria
messeniaca	Heldr.ex Halacsy	1904	581-A	
meuleniana	O.Schwartz		433-H	Arabia
meulenii	Schwartz		433-H	
mexiae	Standley	1929	210-A	Mexico, Jalisco
mexicana	(Engelm.) Norton	1900	553-X	Am.sept.
meyeniana	Kl.	1843	135	Bolivia
meyeri	Boiss.	1860	578	Afr.austr.
meyeri	Steud.		446	
meyeri	Nel.	1933	325-C	Little Namaq.
micans	Scheele	1843	673	
micracantha	Boiss.	1860	298	Afr.austr.
micractina	Boiss.	1862	502	Reg.Himal.
micradenia	Boiss.	1862	68	Austral.
micrantha	Steph.ex Willd.		526	
microappendiculata	Lotsy	1895	186-A	Quatem.
microcarpa	Prokh.	1933	637-A	
microcephala	Boiss.	1866	44-A	Bolivia
microclada	Urb.	1924	149-B	Cuba
micromera	Boiss.	1861	145	Calif., N.Mex., Arizona, Ind.or.
microphylla	Heyne		80	
microphylla	Lam.	1788	157	
microsciadia	Boiss.	1846	605	
microsperma	(Murb.Maly)	1949	494-A	
microsphaera	Boiss.	1846	463	Mesopot.
migiurtinorum	Chiovenda	1929	317-A	Somaliland
mili	Desmoul	1826	290	Madag.
milloti	Ursch.& Leandri	1955	288-E	Cult.
minbuensis	Gage	1914	98-A	Burma
minima	Hort.		557	
minuta	Loac.& Pard.		651	
minuta	Phil.	1891	141-C	Chili
minutiflora	N.E.Br.	1913	80	Rhodesia
minutifolia	Boiss.	1860	107-A	Austral.
minutula	Boiss.	1866	149-F	Cuba
miqueroana	Urb.Fedde	1930		
miricornis	Maire & Wilczek	1934		Marocc.
misella	S.Wats.	1891		Mexico
misera	Benth.	1844		Calif.

missouriensis	Small			Amer.bor.
missurica	Rafin.	1832	77-C	Centre Amer.bor.
mitchelliana	Boiss.	1862	61	Austral.
mitis	Pax	1905	323-16	Afr.trop.
mitsimbinensis	Ursch.& Leandri		290-B	Cult.
mixta	N.E.Br.		275	
modesta	Boiss.	1860	625	
moenchiana	Steud.		710	Hab.?
moeringioides	Pax	1899	53-A	N.Granat.
mohammerensis	Boiss.	1862	(463)	
mollis	C.C.Gmel.		454	
mollis	Engelm.	1887		
monantha	Wright			Cuba
mongolica	Prokh.	1930	446-C	Far East
mongolyensis	Denis	1922	290	Madag.
monocyathium	Prokh.	1930	446-B	As.cent.
monostyla	Prokh.	1949	691-A	Transcauc.
montana	Engelm.	1859	584	N.Mex.
montana	Rafin.			Sicily
monteiri	Hook.f.	1926	325-A	Afr.trop.
monteiroi	Hook.f.	1865	326-A	Angola,Afr.
montenegrina	(Bold)K.Maly	1912	492-A	Jugoslavia
montereyana	Millsp.	1889	245	Mexico
montevicensis	Casar ex Boiss.	1862	130	
montevicensis	Kl.ex Boiss.	1862	408	
monticola	Boiss.	1846	612	
monticola	Hochst.ex Rich		616	Abyss.
morinii	Berger	1907	336-A	
morisoniana	Kl.	1856	262-C	Mexico
morisoniana	Kl.	1856	264	
mosana	Lejeune	1811	637-B	Angers
mosieri	(Small)	1932	81-E	Florida
mozambicensis	Boiss.	1862	105	Afr.trop.
mucronata	Clarke		711	As.Min.
mucronata	Lam.	1788	552	Europ.austr.
mucronata	Lapeyr.		587	
mucronulata	Prokh.	1930	491-A	
muelleri	Boiss.	1862	69	Austral.
muirii	N.E.Br.	1915	326-D	Cape
mulemae	Rendle	1875	433-H	Afr.trop.
multicaulis	Engelm.	1859	534	Mexico,Sonora
multicaulis	Thuill.		655	
multiceps	A.Berger	1905	325-A	Cape
multiclava	Bally & S.Carter	1964	323-27	Somaliland
multicorymbosa	Sweet		712	Hab.?
multifida	N.E.Br.	1915	433-B	Natal?
multiflora	Willd.	1860	166-A	
multifoliola	M.E.Jones	1933-5	166-E	Mexico,Jalisco
multiformis	Gaudich	1832	3	Ins.Sandvic.
multiformis	Schur.	1853	454-A	
multifurcata	Rech.f.	1951	434-A	Baluchistan

multinodis	Urb.	1899	143-A	Ind.occ.
multiradiata	P + H	1910	467	Afr.trop.
multiramosa	Nel.	1935		Namaq.
multiseta	Benth.	1940	201	Mexico
mundi	N.E.Br.	1915	271-A	
muraltoides	N.E.Br.	1915	664-A	Cape
muricata	Bieb.		490	
muricata	Sm.		465	
muricata	Thunb.		270-A	
hurieli	N.E.Br.	1912	318-B	Sudan Brill.
murrayana	J.M.Black	1932		S.Austral.
musciicola	Fern.	1901	180-A	Mexico
muscosa	Tenore			Ital.
musili	Velen.	1911		Arab.
myrsinites	Brot.		655	
myrsinites	Linn.sp.	1753	686	Eur.austr.or.
myrsinites	Pall.		691	
myrtifolia	Hook.& Arn.		5	
myrtifolia	Lam.			
myrtifolia	Linn.Sp.ed.2		116	
myrtifolia	E.Mey.		670	
myrtillifolia	Linn.	1753	116	Jamaica
myrtilloides	Schlecht.	1860	20	
myrtoides	Boiss.	1862	19	Austral.
nagleri	Boiss.	1862	67	Java
nakaiana	Léveillé		350-D	
namaquensis	N.E.Br.	1915	326-C	Namaq.
namibensis	Marloth	1909	326-F	Afr.austr.
nana	Kl.ex Boiss.	1860	175	
nana	Royle		363-A	
napoides	Oax	1897	324-A	Amer.trop.
nashii	(Small)	(1903)	73-B	Florida
natalensis	Bernh.	1845	672	Afr.austr.
ndurumensis	Bally	1965	323-15	Kenya
mealleyi	Coult.& Fisher	1892		Texas
neapolitana	Tenore		625	
nebrownii	Merrill	1938	382	
neglecta	N.E.Br.	1912	318-B	Afr.trop.,austr.
negromontana	N.E.Br.	1911	271-X	Angola
nelii	A.White	1941	325-C	
nelsii	Pax	1898	154-A	Afr.austr.
nelsonii	Millsp.	1898		Amer.bor.
nematocypha	Hand.-Maz.	1926		China, Yunnan
memoralis	Darlington		466	
memoralis	Salisb.		673-A	
memoralis	Kit. in Rochel		179	Europ.

nenensis	Hiern.		255-B	Afr.trop.
neocaledonica	Boiss.	1866	109-A	N.Caled.
neomexicana	Greene	1886	141-B	N.Mexico
neopolycnemoides	Pax & K.Hoffm.	1910	155-A	Afr.austr.
neovolkensis	Pax	1905	318-B	Afr.trop.
nepalensis	Boiss.	1862	624	
nephelioides	Radkofer	1915		Philipp., Brasil.
nephradenia	Barneby	1966	177-A	
neriidum	Janandiez & Maire	1923		Morocc.
neriifolia	Roxby.	1801	293-A	Mss.
neriifolia	Linn.	1753	292	Ind.or., Malaya
nervosa	Kit.	1863	179-A	
nesemannii	R.A.Dyer	1934	334-A	Afr.austr.
nesiotica	Robinson	1902	30-A	Ins.Galop.
neutra	A.Berger	1907	318-A	Hab.?
nevadensis	Boiss. & Reut.	1852	649	Hispan.
nicaeensis	All.Ped		655	Reg.Medit.
nicaeënsis	Coss.ex Willk.	1860	590	Spain
nicaeënsis	St.Am.Fl.Agen		655	
nicaeënsis	Sebast. & Maur.		656	
niciciana	Borb.	1893	638	
nigrispina	N.E.Br.	1913	323-20	Somaliland
nigropurpurea	Jones	1929	267-A	
nilaghrica	Miquel		103	
nilagrica	Hochst.		103	
nipensis	Carabia	1946	373	Cuba
niqueroana	Urb.	1930	118-B	Cuba
nirurioides	(Millsp.)	(1914)	54-A	
nitens	Trevir.	1816	647	
nivulia	Buch.-Ham.	1825	293-B	Ind.or.
nodiflora	Steud.		43	
nodosa	N.E.Br.	1911	382	Angola
nodosa	Houtt.	1777		India or.
noëana	Boiss.	1862	657	
norfolkiana	Boiss.	1862	429	Ins.Norfolk
normanni	Schmalh.	1891		Reg.Cauc.
nortoniana	A.Nelson	1909	564-A	Calif.
notadenia	Boiss.ex Hohen.	1853	478	
notata	Engelm.	1862	141	
notoptera	Boiss.	1862	64	Ind.or.
novomexicana	(Kl.&Gke.)	1936	166-M	
noxia	Pax	1894	433-G	Reg.Somal.
nuda				
nudicaulis	Perr.	1825	242	Malaya
nudiflora	Jacq.	1793	216	Jamaica
nudiflora	Lam.		184	
nummularia	Hook.f.	1851	23	Ins.Galop.
nummulariaefolia	Willd.		589	
nutans	(Small)	(1903)	52-B	
nutans	(Millsp.)	(1911)	52-A	
nuttallii	Small	1897	77	
nuttallii	(Small)Jabl.	(1903)	77	
nyaradiana	Proden	1957		Rumania

nyaradiana	Prodan	1957		Rumania
nyassae	Pax	1921	323-7	Nyasaland
nyikae	Pax	1894	318-B	Afr.trop.or.
oahuensis	Skotsb.	1935	3	
oatesli	Rolfe	1889	257-B	Afr.trop.
oaxacana	Robinson	1896	164-D	Mexico
obconica	Bojer		179	Afr.ecc.
obcordata	Balf.f.	1884	378-F	Ins.Socotr.
obcordata	Denis	1921	285-A	Madag.
obesa	Hook.f.	1903	332-C	Afr.austr.
oblanceolata	Balf.f.	1884	378-G	Ins.Socotr.
obliqua	Emdl.		9	Ins.Norfolk
obliquata	Forsk.		625	
obliquifolia	Kunze ex Boiss.	1860	139	
obliterata	Jacq.	1760	43-A	
oblongata	Griseb.		496	Byzant.
oblongata	C.Koch		526	
oblongicaulis	Baker	1895	324-C	
oblongifolia	C.Koch	1848	673	
obovalifolia	A.Rich.		295-A	Abyss.
obovata	Decne.	1834	608	Arab.
obscura	Lang ex Reichb.		634	
obscura	Loisel	1809	552	
obtusata	Pursh.	1814	528	Amer.bor.
obtusifolia	Lam.	1788	625	
obtusifolia	Poir.		365	Ins.Teneriff.
obtusifolia	Schur.	1853	454-B	Transylv.
occidentalis	Drew	1889	43-X	Calif.
occulta	Kl.	1856	251	
ocellata	Durand ex Hilg.	1855	74	Calif.
octogona	Hort ex Steud.		179	Hab.?
ocoradiata	Leveillé & Vaniot	1908	43-D	Corea
ocymoides	Linn.	1753	198	Mexico
ocymoides	Hook. & Arn.		166	
odontadenia	Boiss.	1862	585	N.Mexico
odontophylla	Boiss.	1859	437	
odontophylla	Willd.		335	
oerstediana	Boiss.	1862	209	Amer.Centr.
officinalis	Forsk.		318	
officinalis	Jackson		320-B	
officinarum	Boiss.	1862	318	
officinarum	Hochst ex Boiss.	1862	375	
officinarum	Linn.	1753	320	Afr.bor.
ohiotica	Steud. & Hochst.	1862	561	
oidorhiza	Pojark.	1951	447-C	Transkasp.
oleaeifolia	Gouan		655	

oleaefolia	Noé ex Nym.		646-A	
oleracea	Pers.		556	
oligantha	Boiss.	1862	34	
olivacea	Small	1898		Mississippi
olowaluana	Sherff.	1936	2-A	Hawaii
onoclada	Drake	1903	372-C	Madag.
onoei	Franch & Sav.			Japan
opaca	Lang ex Reichb.		634	
ophthalmica	Pers.		43-I	
opuntioides	Welw.ex Hiern.	1900	318-0	Afr.trop.
orabensis	Dinter	1914	326-14	Afr.austr.occ.
oranensis	(Mills.)	(1943)	45-C	Parag.
oraria	F.Müll.ex Boiss.	1862	6	
orbiculata	H.B.K.	1817	86	N.Granat.,SantaFe
orbiculata	Miq.		80	
oreophila	Miq.		621	
orientalis	Bertol.		475-A	
orientalis	Linn.	1753	478	Armen.Persia
origanoides	Bert.ex Boiss.	1862	45	
origanoides	Linn.	1753	18	Ins.Adscensc.
orizabae	Boiss.	1862	581	Mexico
orjeni	B.Reck.	1920		Dalmat.
ornata	Stapf.	1886	593	As.occ.
ornitopus	Jacq.		329	Afr.austr.
orphanidis	Boiss.	1859	654	Graecia
orthoclada	Baker	1887	282-H	Madag.
oryctis	Dinter	1931	272-C	Afr.austr.occ.
orygis	Dinter	1930		Afr.austr.occ.
osyridea	Boiss.	1846	417	Persia
osyridiformis	Parsa	1948	658-A	Persia
ovalifolia	Engelm.	1860	139-A	Chili,Argent.
ovalleana	Phil.	1895	396-A	Chili
ovata	E.May	1835	661	Afr.austr.
ovata	Larranaga	1923		Uruguay
oxycoccoides	Boiss.	1860	106	Madag.
oxyodonta	Boiss.	1879	540-A	Syria,Mesop.
oxyphylla	Boiss.	1866	686-A	Hispan.
oxystegia	Boiss.	1860	345	Afr.austr.
pachyceras	Coss.	1928	616-B	
pachypoda	Urban	1924	149-C	Cuba
pachypodoides	Boiteau	1942		Madag.
pachyrrhiza	Kar.& Kir.	1841	486	Soongaria
pachysantha	Baill.	1886	282-A	Madag.
padifolia	Brandegge	1914	213-A	Mexico
paganorum	A.Cheval.	1933		Sudan Gall.
palatina	Zimmerman	1914	592-A	Germany

pallasii	Turcz.	1854	445	Dahuria
pallens	Dillw.		8	
pallida	Pierre	1894	642	Cochin
pallida	Willd.		642	
pallida	Willd.		646	
palmeri	Engelm.ex Wats.	1880	586	Calif.
palmyrena	Mouterde	1963	657-A	Jordan
paludicola	McVaugh	1961	43-G	Mexico
paludosa	Glaziou	1912	405-A	Goyaz
paludosa	Rouy	1910	637-C	Gallia
palustris	Linn.	1753	476	Europ.
pamirica	Prokh.	1933	635-A	Asia centr.
pampeana	Speg.	1893	396-B	Reg.Argent.
panacea	Webb.& Berth.		625	
pancheri	Baill.	1861-2	68-2	N.Caled.
panchganiensis	Blatter & McCann	1931		India or.(Bombay)
panicii	G.Beck	1920		Bosnia
paniculata	Benth.	1843		Pyren.
paniculata	Desf.		515	
paniculata	Ell.		239	
paniculata	Loisel		454	
paniculata	Tenore		525-A	
panjutinii	Grossheim	1950	595-B	Caucas.
pannonica	Host.		656	
pantomalaca	Standley & Steyerm.	1944	129-B	Guatemala
papillaris	Jan.		516	
papilligera	Boiss.	1860	41	
papillosa	St.Hil.		408	Rio Gr.do Sul
papillosa	Pouzolz		508	
paradoxa	Schur.		637-A	
paradoxa	Podpera	1928	637-B	Czechoslov.
paraguayensis	Parodi	1881		Paraguay
paralias	Linn.	1753	660	Europ.occ., Reg.Medit.
paranensis	Dusen	1910	258-A	Bras.Sta Catar.
parannaquensis	Blanco		526-A	
parasitica	Pav ex Boiss.	1862		
parciflora	Urb.	1919	52-B	Haiti
parcircumulosa	Schweinf.	1899	319-C	Arab.
paredonensis	(Millsp.)	(1914)	43-K	Cuba
parryi	Engelm.	1875	77-B	Amer.bor.occ.
parifolia	N.E.Br.	1913	323	Angola
parishii	Greene	1886	74-A	Calif.
parva	N.E.Br.	1911	155-D	Angola
parviflora	Lam.	1788	168	Calif.
parviflora	Linn.		41	
parvifolia	E.Mey.	1862	103-E	Afr.austr.
parvimumma	Boiss.	1862	327	Afr.austr.

parvula	Delile		548	Aegypt
parvula	C.Koch	1848	567	
passa	N.E.Br.	1915	354	Natal
patagonica	Hieron.	1879	396-A	Patag.
patellifera	Howell	1938		Calif.
patens	Kit.	1863		Europ.
patula	Mill.		328	
pauciflora	Dufour	1860	651	Hispan.
pauciflora	Hill			Ind.or.
pauciflora	Nutt.			Hawaii
paucifolia	Klotzsch.	1861	693	Austr.
paucifolia	Urb.	1908		
paucipila	Urb.	1908	118-C	Cuba
pauciradiata	Blatter	1933		Waziristan
pauliani	Ursch. & Leandri	1955	288-C	Cuba
paxiana	Dinter	1921	366-D	Afr.austr.occ.
pearsonii	N.E.Br.	1913	381-E	Angola
pectinata	Alboff	1894	688-A	Reg.Transcauc.
pedicellata	Linn.ex Jackson	1912		
pediculifera	Engelm.	1859	160-A	Mexico, Ariz., Calif.
pedilanthoides	Denis	1921	290-B	Madag.
pedunculata	Kl.	1856	267	
pedunculosa	A.Rich.	1846	184	Cuba
peganoides	Boiss.	1860	221	Mexico
peisonis	Rechinger	1925	350-A	Germany
pekinensis	Rupr.		474	China
pellegrini	Leandri	1947	323-65	Madag.
peltata	Roxb.		542	Ind.or.
peltata	Sesse & Moc.	1894		Mexico
peltigera	E.Mey., Boiss.	1862	350	Afr.austr.
pendula	Link., Boiss.	1862	278	Hab.?
penduliflora	Kraenzl.			Afr.trop.
penduliflora	Ind.Kew	1908		
penicillata	(Millsp.)	1949	401-A	Peru
peninsularis	I.M.Johnston	1922	164-E	Baja Calif.
pentadactyla	Griseb.	1879	261-B	Reg.Argent.
pentagona	Blanco		242-A	
pentagona	Haw.	1827	339	Afr.austr.
pentagona	Noronha	1790	292-A	
pentagona	Royle		313	
pentlandi	Boiss.	1862	252	Bolivia
pentlops	Marloth ex White	1941	325-H	Afr.austr.
peperomioides	Boiss.	1860	258	Brasil
peplidion	Engelm.	1859	559	Texas
peplis	Linn.	1753	71	Europ.occ., Reg.Medit.
peplodes	Gouan	1765	557	Europ.Afr.bor.
peplodes	Griseb.		556	
peplodes	E.Mey.		238	
peplodes	Nutt.	1837	562	

peplus	Linn.	1753	556	Europ.,As.bor.
peplus minor	Willd.		557	
perangusta	Dyer	1938	315-B	Transvaal.
perbracteata	Gage	1914	551-B	Ind.or.
perennans	(Shinners)	1960		Texas
pereskiaefolia	Houillet	1869-71	700	Afr.trop.
perforata	Guss.		158	
perforata	Tin.ex Lojac.	1907	80-E	Sicil.
pergamena	Small	1898	166-A	Isle of Pines, Cuba
perieri	Drake	1899	289-B	Madag.
perlignea	McVaugh	1961	54-E	Mexico
pepera	N.E.Br.	1915	270-B	Little Namag.
perrottetii	Jaub.& Spach.		379	
persepolitana	Boiss.	1846	605	
persica	C.A.Mey.ex Boiss.	1862	434	
pergracilis	P.G.May.	1966	103-F	G.S.W.Afr.
persica	Stev. ex Boiss.	1862	634-A	Afr.Lusit.or.
persistens	Dyer	1938	223-B	
persistentifolia	Leach	1965		Rhodesia,Zamb.
peruviana	Wheeler	1939	169	Peru
pervilleana	Baill.	1860-1	722	Hab.?,Madag.?
pestalozzae	Boiss.	1853	596	Lycra
petala	Ewart & L.R.Kerr.	1926		Austral.,N.Terr.
petaloidea	Engelm.	1859	77-D	Amer.bor.
petiolaris	Sims		212	Ins.S.Thomas
petiolata	Banks & Soland.	1794	390	Syria
petitiana	A.Rich		577	
petrina	S.Wats.	1889	144-H	Baja Calif.
petrophila	C.A.Mey.	1855	595	Tauria
petterssoni	Svent.	1949	422-A	Ins.Canar.
pfeiffii	Pax	1897	389	Afr.trop.
phagriformis	Graessn.	1937		Hab.?
phanerophlebias	Baker ex Denis	1921	283-B	
philippiana	Boiss.	1862	157	Chili
philippina	J.Gay ex Boiss.	1862	157	
phillipsiae	N.E.Br.	1903	323-27	Somaliland
philora	(Cockerall)	1935		
phlomos	Candargy		686-A	Lesbos
phosphorea	Martius	1820	324-A	Brasil,Bahia
phyllanthoides	Boiss.	1860	90	
phylloclada	Boiss.	1862	238	Afr.austr.
phymatoclada	Boiss.	1860	370	Afr.austr.
phymatosperma	Boiss.& Geitl.	1859	544	Syria
physalifolia	Boiss.	1860	195	Mexico
physocaulos	Mouterde	1853	658-X	Syria
physoclada	Boiss.	1860	284	Madag.
picachensis	Brandegge	1915	166-H	Mexico
picta	Jacq.		184	
pileoides	Millsp.	1900	80-E	Porto Rico
pillansii	N.E.Br.	1913	341-B	Hope

<i>pilosa</i>	Brot.	1791	330	
<i>pilosa</i>	Chaub.		496	
<i>pilosa</i>	D.Don.		476	
<i>pilosa</i>	Linn.	1753	454	Europ.,As.bor.
<i>pilosa</i>	Oursh.		466	
<i>pilosa</i>	Vill.		510	
<i>pilosula</i>	Engelm.ex Boiss.	1862	123	Mexico
<i>pilulifera</i>	Linn.ex Boiss.	1862	41	Ceylon,Java
<i>pilulifera</i>	Linn.	1758	51	Amer.trop.
<i>pimeleodendron</i>	Pax	1911	379-P	Afr.trop.or.
<i>pinariona</i>	Urb.	1930	20-C	Cuba
<i>pindicola</i>	Hauskn.			Europ.
<i>pineae</i>	Linn.Syst.		575	Reg.Medit.
<i>pineae</i>	Texid.		575-A	
<i>pinetorum</i>	(Small)	(1905)	118-D	Florida
<i>pinifolia</i>	Lam.	1788	637	
<i>pinifolia</i>	Willd.		547	
<i>pinnulos a</i>	LqJacobq	1907	80-D	Sicil.
<i>pinus</i>	Leveille	1913	432-A	China,Kaveichau
<i>pirahazo</i>	Jumelle	1905	282-B	Madag.
<i>pirottae</i>	Terrac.	1894	324-C	Afr.trop.or.
<i>piscatoria</i>	Ait.	1804	423	Ins.Madar.
<i>piscatoria</i>	Hub.-Mor.& Kahn	1964	423	Turcia
<i>pisidica</i>	Hub.-Mor.& Kahn		596-A	
<i>pistiaefolia</i>	Boiss.	1862	359	Afr.austr.
<i>pitcairnensis</i>	Forest Brown	1935	43-4	Tuamotu
<i>pithusa</i>	Linn.	1753	587	Reg.Medit.
<i>plagiantha</i>	Drake	1903	300-C	Madag.
<i>planiceps</i>	A.White DS	1941	330-D	Afr.austr.
<i>platicarpa</i>	Pritz.		525	Sphalm.
<i>platyacantha</i>	Drake	1903		Madag.
<i>platyacantha</i>	Pax	1904	323-18	Afr.trop.
<i>platycephala</i>	Pax	1894	467-A	Afr.trop.
<i>platylepis</i>	Decne		36	
<i>platymammillaris</i>	Croiz.	1932	334	Afr.austr.
<i>platyphylla</i>	Linn.	1753	525	Europ.,Afr.bor.
<i>platypoda</i>	Pax	1911	389-P	Afr.trop.or.
<i>platysperma</i>	Engelm.ex S.Wats.	1880	72-A	S.Calif.
<i>plebeia</i>	Boiss.	1846	606	Persia austr.
<i>plicata</i>	S.Wats.	1886		Mexico
<i>plumerioioides</i>	Teijem.& Hassk.		431	Java
<i>plummerae</i>	S.Wats.	1893	176-B	Arizona
<i>podadenia</i>	Boiss.	1862	128	Mexico
<i>podagrica</i>	I.M.Johnston	1922	161-E	Nevada
<i>podocarpifolia</i>	Urb.	1924	413-C	
<i>podperae</i>	Croiz.	1947	637-A	Moravia
<i>poecilophylla</i>	Prokh.	1933	638-B	
<i>poepigii</i>	Boiss.	1862	196	Peru
<i>poggei</i>	Pax	1894	155-C	Congo
<i>poinsettiana</i>	Buist.ex R.Grah.	1936	259	
<i>poissoni</i>	Pax	1902	324-D	Afr.trop.

poliosperma	Urb.	1930	170-C	Cuba
polyacantha	Boiss.	1860	317	Abyss.
polyantha	Benth.	1844	146	Calif.
polycarpa	Benth.	1844	146-C	
polycaula	Boiss.& Hohen.	1853	599	
polycephala	Marloth	1931	330-A	Afr.austr.
polychroma	Kern.	1875	494-A	Hungary
polyclada	Boiss.	1860	78	Texas
polycnemoides	Hochst.ex Boiss.	1862	155	Abyss.
polygalaefolia	Boiss.& Reut.	1860	500	Hispan.
polygonata	Loddiq		335	
polygona	Harv.	1806	336	Cape
polygonifolia	Linn.	1753	72	Eastern U.S.
polygonisperma	Gren.& Godr.		82	
polyphylla	Engelm.	1892	246-A	Florida
polytimetica	Prokh.	1933	611-A	
pomiformis	Thunb.	1915	332	
pondii	Millsp.	1890	161-B	Baja Calif.
pontica	Prokh.	1949	686-B	Armen.Turk.
popayanensis	Pax	1899	188-A	Colombia
popovii	Rotsch.	1961		Asia centr.
porphyrantha	Phil.	1895	396-Y	Chili
porphyrastra	Hand.-Mazz.	1925		Yunnan
porteriana	(Small)Jabl.	(1903)	20-A	Florida
portlandica	Linn.	1753	574	Europ.occ.
portlandica	Salisb.	1834	575	Reg.Medit.
portlandica	Jacq.	1804	625	Reg.Medit.
portoricensis	Urb.	1899	158-C	Ind.occ.
portoricensis	Urb.			Ind.occ.
portucasadiana	(Croiz.) Jabl.	(1943)	45-C	Paraguay
portulacoides	Linn.herb.	1862	391	Amer.bor.
portulacoides	Phil.	1753	396	Chili,Argent.
portulana	S.Wats.	1889	144-F	Mexico
postii	Boiss.	1879	245-A	Syria
potanini	Prokh.	1926		Mongol.
potentilloides	Boiss.	1860	174	Goyaz
potosina	Fern.	1901	52-B	Mexico
praecox	Fisch.	1812	630	
pratensis	Gromow	1884		Ross.
preslii	Guss.	1827	52	Amer.bor.
preslii	Sprun.	1842	571-A	
preussii	Pax	1894	619-A	Kamer.
prieuriana	Baill.	1861	154-A	
primulaefolia	Baker	1881	363-A	Madag.
procera	Bleb.		454	
procopiana	Savul.& Rayssin	1926	647-X	Bassarabia
procumbens	DC.		43	
procumbens	Hort.ex Boiss.	1862	138	
procumbens	Meerburg		300	
procumbens	Mill.		354	Afr.austr.
prokhanovii	Popov.	1939	446-E	Thian Shan

prolifera	Buch.-Ham.	624	Reg.Himal.
prolifera	Ehrenb.ex Boiss.	1862 608	
promecocarpa	Davis	1947 614-B	Syria
propinqua	R.Br. in Salt.	179	Abyss.
propinqua	R.Br.	1911 166-A	
prorepens	Popov.	1936	Turkestan
prostrata	Ait.	1789 158	Fla.,Tex.,Mexico
prostrata	Burchell	101-A	
prostrata	Hort.	138	
prostrata	J.Grah.	102-A	
proteifolia	Boiss.	1862 356	Afr.austr.
provincialis	Noe	658-B	
provincialis	Wills.	625	
prunifolia	Jacq.	261	
przewalskii	Prokh.	1926	Tibet Kansu
psammophila	Ule.	1908	Brasil
pseudagraria	P.Smirn.	1940 645-A	Rossia austr.or.
pseudoapios	Maire & Weiller	1939	Cyrenaica
pseudobrachiata	Dinter	1923 272-B	Afr.austr.occ.
pseudocactus	Berger	1907 316-B	Hab.?
pseudochamaesyce	Fisch.& Mey.	1842 82	Yunnan
pseudocyparissias	Jord.	637	
pseudodendroides	H.Lindb.	1932	Marocc.
pseudoduseimata	A.White,D.B	1941 326-E	Afr.austr.occ.
pseudoengleri	Pax	1909 467-E	Afr.trop.
pseudoesula	Schur.	1853 636-A	
pseudoaecata	Chiov.	552-A	
pseudoglareosa	Klokov	1955	Ukrain.
pseudoglobosa	Marloth	1929 330-B	Cape Prov.
pseudograntii	Pax	433-11	Afr.trop.
pseudoholstii	Pax	1904 381-D	Afr.trop.
pseudohypogaea	Dinter	1921 342-X	Afr.austr.occ.
pseudolucida	Schur.	1852 646	
pseudonutans	Thell.	1917	
pseudopeplus	Speg.	1902 556-A	Patag.
pseudoserphyllifolia	Greene	1890 74-C	Arizona
pseudosororia	Prokh.	1930 436-A	
pseudotuberosa	Pax	1908 433-B	Afr.austr.
pseudovillosa	Prodan	1953 454-A	Transylv.
pseudovillosa	Krokov	1855	Ukraina
pseudovirgata	(Schur)Soo	1930 634-A	
pterococca	Brot.	538	Reg.Medit.
pteroneura	Berger	1907 333-B	Mexico
pubentissima	Mich.	1803 243	Amer.bor.
pubera	Blume	49	
puberula	Fern.	1901 43-A	Mex.,Chiap.,Oaxa.
pubescens	Vahl.	1791 530	Reg.Medit.
pubicaulis	S.Moore	1926	Austral.
pubigera	Fn'w.ex Boiss.	1862 499	
pubiglans	N.E.Br.	1915 342-A	Hope
publensis	Brandegge	1917 31-A	Mexico

pugniformis	Boiss.	1862	354	
pulchella	Brouss. in DC.		589	
pulchella	Hort.		589-A	
pulchella	H.B.K.	1817	54	
pulchella	Lag. & Rodr.	1802	54-B	Hab.?
pulchella	Sesse & Moc.	1887	54-A	Mexico
pulcherrima	Willd. ex Kl.	1834	259	Mexico
pulerulenta	Kit. ex Reichb.		656	
pulvinata	Marloth	1909	336-B	Afr. austr.
pumila	Pall.		590-A	
pumila	Sibth. & Sm.		614	
punctata	Delile		567	Afr. bor.
punctata	Krock.		567-A	Europ.
punctulata	Anderss.	1853	30	Ins. Galopag.
pugens	Lam.	1788	519	
pungens	E. Mey.		671	
pungens	(Saland. in) Rus			Cilicia
punicea	Swartz		410	Jamaica
purisimana	Millsp.	1889	128-A	Lower Calif.
purpurascens	Salzm.	1878	625-A	
purpurascens	Schousb.		713	Marocc.
purpurascens	Schum. & Thonn.		49	
purpurascens	Deysson	1908	552-A	
purpurata	Thuill.		503	
purpurea	(Rafin.) Fernald	1932		
pusilla	Lag.	1816	714	Hispan.
pusillima	Post	1895		Syria
pycnanthema	Engelm.	1859	47	Mexico
pycnophylla	C. Koch	1847	614	
pycnostegia	Boiss.	1850	34	Ind. or.
pygmaea	Fisch. & Mey.	1839	385	Persia, Soongar.
pygmaea	Ledeb.		565	
pygmaea	Phil.	1857-8	458	
pyrenaica	Jord.	1846	523	
pyrifolia	Lam.	1817	282	Ins. Mauriti
pyriformis	N.E. Br.	1915	332-B	
pythiusa	Friw.		587	Afr. austr.
pythiusa	Linn.	1753	587	
quarad	Deflers		317-A	Arab.
quadrangularis	Pax	1894	317-A	Afr. trop. or.
quadrata	Nel.	1935		Little Namaq.
quadrialata	Pax	1904	318-X	Afr. trop.
quartziticola	Leandri	1946	323-54	Madag.
quinquecostata	Volkens	1890	315-13	Afr. trop.
quinqueradiata	Kitamura	1958	612-B	Afgan.
quintasil	Pax	1892	433-J	Ins. S. Thom.
quitensis	Boiss.	1862	140	Ecuador

racemosa	E.Mey.	1862	276	Afr.austr.
racemosa	Tausch	637		
radians	Benth.	1839	268	Mexico
radiata	E.Mey.	1862	346	Afr.austr.
radiata	Thunb.		300	
radicans	Moric.	1860	80-B	
radioloides	Boiss.	1862	148	Mexico
rafinesquii	Greene	1897	52-A	Amer.bor.
ragusana	Reichenb.		575	
ramanensis	Baurm.	1963	518-A	Jordan
ramiglans	N.E.Br.		355-B	Little Namaq.
ramipressa	Croiz.	1934	300-A	Madag.
ramosa	Seaton	1893	158-E	Mexico
ramosissima	Hook. & Arn.		14	Ins.Pacif.
ramosissima	Loisel.	1827	625	
rangeana	Dinter	1914	326-P	Afr.austr.occ.
rangovalensis	Leandri	1945	288-D	Madag.
raphanorrhiza	(Millsp.)	(1925)	402-B	
rapulum	Kan. & Kir.	1842	448	Soongaria
rattani	S.Wats.	1885	146-B	Calif.
razafinjohanii	Ursch. & Leandri	1955	88-H	Cult.
reboudiana	Coss.	1889		Alberia
rechingeri	Greuter	1965		Creta
recta	Kl.	1856	218	Mexico
rectirama	N.E.Br.	1915	275-A	Orange Free St.
recurva	Hook.f.	1847	24	Galopag.
rediviva	Svent.	1954	421-B	
reflexa	Spreng.		715	Hab.?
reflexa	Formanek	1895		Europ.or.
refracta	Lowe	1838	52	
refugii	Croiz.	1946	402-B	Texas
regina	Léveillé	1914	350-B	Yunnan
regis-jubae	Webb. & Berth.		424	Ins.Teneriff.
reichenbachiana	Willk.	1852	454	
reichenbachiana	Lojac.	1907	656-A	Sicil.
reineckei	Pax		615-A	Ins.Samoa
reinhardtii	Volkens	1899	318-R	Afr.trop.
reinwardtiana	Steud.		58	
remyi	A.Gray ex Boiss.	1862	1-A	Hawaii
reniformis	Blume	1925	42	Java
renouardi	Pax	1902	296-A	Afr.trop.
repanda	Sweet		716	Ind.or.
repens	C.Koch	1848	626-A	Oriens
repetita	Hochst.		618	Abyss.
resinifera	Berg	1863	320-B	Marocc.
restiacea	Benth.	1844	269	Mexico
restituta	N.E.Br.	1915	342	Little Namaq.
restricta	Dyer	1951	323-YY	Transvaal.
retroscabra	S.Wats.	1887	176-C	Mexico
retusa	Bieb.		549	

retusa	Cav.		553	
retusa	Lam.	1788	433	
reuteriana	Boiss.		572	Syria
revoluta	Engelm.	1859	152	S.W. U.S., Mex.
rhabdodes	Boiss.	1860	407	Brasil
rhipsaloides	Lem.	1857	373-X	
rhipsaloides	Glaziou	1912	373-A	Mina Geraes
rhombea	Willd.		525	
rhombifolia	Boiss.	1860	276	Afr.austr.
rhytidisperma	Boiss.& Bal.		536	Cilicia
rhytidisperma	Engelm.	1860	142	Chili
riae	Pax + H	1922	434-A	E.Tibet
richardiana	Baill.	1860-1	318	
ridleyi	Croiz.	1937	282-A	Malag.Penins.
riebeckii	Pax		176-A	Arab.
riedeliana	Boiss.	1860	406	Brasil
rigens	Sweet		519	
rigida	Bieb.	1808	619-A	
rigida	Loisel	1827	690	
rigidula	Steud.		519	
rigoi	Boiss.ex Freyn.			Ins.Cyprus
rimarum	Coss.& Bal.	1873	614-A	Marocc.
rinconis	M.E.Jones	1908		Amer.bor.
riparia	Jord.		637	
rivae	Pax	1898	103-A	Afr.trop.
rivasii	Palau Ferrer	1853		Ins.Balear.
robbiae	Turrill			
robecchii	Pax		295-B	Afr.trop.
robusta	Small	1897	584-B	Amer.Bor.
rochebruni	Franch & Sav.			Japan
rochaansis	(Croiz.)	(1945)	45-G	Uruguay
rockii	C.N.Forbes	1909	1-C	Hawaii
rogeri	N.E.Brown	1911	382-F	Senegal
roemeriana	Scheele	1849	563	Texas
roeseri	Orph.ex Boiss.	1862	685	
rohleanae	Velen.	1911		Arab.
rosea	Retz.	1779-91	168	India or.
rosea	Rottb.	1803	658-A	
rosea	Roxb.		101-A	
rosei	(Millsp.)	(1916)	46-C	Mexico
rossiana	Pax	1910	251-A	Mexico
rossica	Smirn.	1929	350-C	Russia
rosulans	A.Theod.	1941	446-F	Turkestan
rothiana	Miq.		623	
rothiana	Sprengr.		620	Ind.or.
rothiana	Wight.		621	
rothrockii	(Millsp.)Jabl.	(1916)		Mex., Arizona
rotundata	Hochst.		688	
rotundifolia	Hook.& Arn.		84	Chili
rotundifolia	Loisel.	1809	557	
rotundifolia	Phil.	1860	139-A	

rowlandii	Dyer	1958	323-A	Transvaal.
rosulans	A.Theod.	1941	446-F	Turkestan
rubella	Pax	1903	324-B	Afr.trop.
rubens	Vill.	1786		Gallia
rubescens	Link in Buch.		71	
rubicunda	Blume		157-X	Mexico
rubida	Greenm.	1903	52-D	Mexico
rubra	Cav.		552	
rubra	DC.		549	
rubra	Pall.			Tauria
rubricaulis	Regel	1856	517	
rubriflora	N.E.Br.	1911	103-K	Rhodesa
rubriflora	Leveillé Fedde	1913	43-D	China, Yunnan
rubrosperma	Lotsy	1895	73-A	Guatem.
rubrostriata	Drake	1903		Madag.
ruđerallis	Dum.	1843	567-A	Europ.
ruđeralis	Scheele	1843	567	
rudis	N.E.Br.	1915	326-M	Gr.Namaq.
rudolfii	N.E.Br.		271-C	Cape
ruegeliana	Shuttlew	1862	340	
rugosa	Kit.		179	Banat
rugosissima	Pau & Tont Guer	1929		Marocc.
rugulosa	(Rydb.) Jabl.	(1906)	141-A	
rugulosa	Greene	1894	141-A	
ruiziana	Boiss.	1862	87	Peru
ruiziana	(Kl. & Gke.) Boiss.	(1859)	87	
rumicifolia	Boiss.	1860	677	As.min.
rupestris	Friwald	1862	652	
rupestris	C.A.Mey.ex Iib.	1830	446	Sibir.
rupestris	Larranaga	1923		Urug.
rupicola	Boiss.		517	Reg.Medit.occ.
rupicola	Scheele	1849	120	
rusbyi	Greene	1886	77-E	Arizona
ruscifolia	N.E.Br.	1915	670-A	
ruscinonensis	Boiss.	1860	511	Mont.Pyren.
ruspolii	Chiov.	1916		Somaliland
rutilis	(Millsp.)	(1914)	160-F	Honduras, Guatem.
sabulicola	Boiss.	1860	150	Brasil
saccharata	Boiss.	1860	224	Mexico
sacchii	Chiov.			Somaliland
sagittaria	Marloth	1930		Cape Prov.
sagraeana	A.Rich.ex Boiss.	1862	409	
sahendi	Bornm.	1910	589-A	Persia
salicetorum	Jord.		643	
salicifolia	DC.		642	
salicifolia	Host.	1797	642	Europ.

salinia	Willd.ex Boiss.	1862	20	
salota	Leandri	1947	323-69	Madag.
saltonensis	(Millsp.)Jabl.	(1914)		Salton Sea
sampsoni	Hance	1866	474-A	
sanasunitensis	Hand.-Mazz.	1912		Kurdistan
sancta	Pax	1907	313-A	Abyss.
sanguinea	Hochst.& Steud.	1862	141-C	Arab.Afr.
sanguinea	Hort.	1860	179-A	Hab.?
sanmartensis	Rusby	1920	73-G	
sansalvador	Hort.	1933	320-C	Colombia
santapani	A.N.Henry	1965	632-B	India
sapiifolia	Baill.	1886		Madag.
sapini	DeWild.	1908	723-A	Afr.trop.
sarati	Ardoino	1879	655-A	Europ.austr.
sarawschanica	Regel			Turkestan
sarcodes	Boiss.	1860	232	Brasil
sarcostemmatoides	Dinter	1921	386-G	Afr.austr.occ.
sareptana	Becker	1858	631	Rossia
sarmentosa	Welw.ex Pax	1891.	381-B	Angola
satureioides	Lam.		168	
saulliana	Boreau ex Boiss.	1866	476-A	Lydia
savaryi	Kiss.	1921	627-A	Sibir.or.
saxatilis	Biels.		595	
saxatilis	Georgi			Rossia
saxatilis	Jacq.		650	Austria
saxatilis	Loisel		658	
saxicola	Velen.	1971	658-A	Siam
scandens	H.B.K.		226	Mexico
scabrella	Boiss.	1862	192	Mexico
scabrifolia	Kurz	1873		Burma
scepiformis	Buek.			
schaeferi	Dinter	1921	349-A	Afr.austr.occ.
scheffleri	Pax	1909	379-B	Afr.trop.
schickendantzii	Hieron	1881	396-C	Reg.Argent.
schimperi	Presl.		375	Arab.
schimperi	Scheele	1843	665	Arab.
schimperiana	Hochst.ex A.Rich.		615	Abyss.
schinzii	Pax	1898	323-12	Afr.austr.
schizacantha	Pax		323-C	Afr.trop.
schizadenia	Boiss.& Hohen.	1853	601	
schizoceras	Boiss.	1844	657	
schizoclada	Baillon	1912	299-B	Madag.
schizolepis	F.Müll.ex Boiss.	1862	40	Austral.
schizoloba	Engelm.	1862	586	
schlechtendalii	Boiss.	1860	213	Mexico
schlechteri	Pax	1901	49-A	Afr.trop.
schleintzii	Engl.	1890		Austral.
schoenlandii	Pax	1904	318-X	Afr.austr.
schottiana	Boiss.	1859	522	Cilicia
schubei	Pax	1905	325-A	Afr.trop.
schugnanica	B.Fedtsch.	1916	539-C	Turkestan

schukuniensis	Dyer	1940	310-A	
schultzii	Benth.			Austral.
schurii	Simonk.	1886		Transsil.
schweinfurthii	Balf.	1885	80-A	Ins.Socotr.
sciadophila	Boiss.	1862	199	Brasil
sclerocyathium	Korovin & Popov	1927	376-A	Transcasp.
sclerophylla	Boiss.	1860	670	Afr.austr.
scolopendria	Donn		299	
scoparia	N.E.Br.	1911	373-Y	Erythraca, Abyss.
scoparia	(Smalia)	(1913)	20-I	Florida
scopiformis	Boiss.	1866	275	Afr.austr.
scopoliana	Steud.		333	Cilicia
scopulorum	Brandegee	1911	163-B	Mexico
scordifolia	Jacq.		110	Afr.trop.
scordioides	Defr.ex Blatter	1923		Arab.?
scotanum	Schlecht.	1847	211	Mexico
scottsbergii	Sherff.	1936	3-C	Hawaii
scripta	Somm.& Levier	1892	490-A	Reg.Cauc.
sechuanica	Pax + Hoffm.	1922	658	E.Tibet
seclusa	N.E.Br.	1911	80-C	Erythraea
seemanni	Klotzsch.	1856	579-B	
segetalis	J.Grah.		655	
segetalis	Linn.	1753	573	Europ.
segetalis	Pall.		637	
segetalis	Pall.		647	
segetalis	Raul		625-A	
segoviensis	Boiss.	1862	204	Mexico
seguieri	Nym.		655	
seguieriana	Neck.	1770	658	
seguierii	All.		658	
selilimoemosos	Dyer	1940		Transvaal.
seleri	Donn.-Smith	1899	169-D	Amer.cent.
selloi	Boiss.	1860	404	Brasil
selloi	Kl.ex Boiss.	1862	170-B	Brasil
semiperfoliata	Viv.		674	Sardin.
semiverticillata	Halacsy	1904	581-B	Graecia
semivillosa	Prokx.	1933	454-A	Centr.Asia
sendaica	Makino	1910		Japan
senguptae	Balakr.& Subram.	1960	39-A	India or., Madras.
senilis	Standl.& Steyerl.	1944	147-D	Guatem.
sennii	Chiov.	1932	382-E	Somal.
sepium	N.E.Br.	1911		Senegambia, N.Nig.
septemsulcata	Vierh.	1904	516-B	Socotra.
seracomans	Bubani	1843		Mont Pyren.
serawschanica	RG.L.	1882	446-B	Asia Centr.
serbica	Form.			Europ.
sereti	DeWild.	1908	318-B	Afr.trop.
serotina	Host.		655	
serpens	Baill.	1861-2	80-C	
serpens	Balb.ex Boiss.	1860	117-R	Ins.Bahia
serpens	H.B.K.	1817	80	Bahia
serpentini	Novak	1924		Servia

serpicula	Hiern.		155-C	Afr.trop.
serpiformis	Boiss.	1862	275	
serpyllifolia	Babl.ex Boiss.		166	Ins.Galega
serpyllifolia	Pers.	1806	141	W.Amer.bor.
serpyllum	(Small)	(1913)	158-K	Florida
serrata	S.G.Gmel.		454-A	
serrata	Linn.		432	Lusitania
serrula	Engelm.	1859	96	N.Mex.,Texas
serrulata	Reinw.ex Blume		58	Malaya,China
serrulata	Vell.	1825	54	
serrulata	Thuill.		526	
sessiliflora	Boiss.& Sprun.	1844	496	
sessiliflora	E.Mey.	1860	378	
sessiliflora	Roxb.		281	Burma
sessilifolia	Kl.ex Boiss.	1862	231	Brasil
seticornis	Poir.		625	
setigera	E.Mey.	1845	103-E	
setiloba	Engelm.	1857	144	S.Calif.,N.Mex.
setosa	Müll.Arg.	1874	170-A	Brasil
sewerzowii	Herd.ex Prokh.	1933	646-B	
sexangularis	Henckel		428	
shaferi	(Millsp.)	(1913)	416-B	Cuba
sharkoënsis	Baill.	1866	40-A	
shetoënsis	Pax & K.Hoffm.	1922	444-A	E.Tibet
shirensis	Baker	1894	467	Afr.trop.
shouanensis	H.Keng	1951		Formosa
sibirica	Fisch.ex.Boiss.	1862	483	
sibthorpii	Boiss.	1860	682-A	Graecia
sieboldiana	Morr.& Decne	1836	627-A	Japan
siguatepequensis	Standley	1929	166-D	
sikkimensis	Boiss.	1862	441	Reg.Himal.
silenifolia	Sweet		300	
silicicola	Dinter	1914	352-B	Afr.austr.occ.
similis	A.Berger	1907	331-A	Afr.austr.?Natal
simplex	C.Koch	1848	573-A	Domugled
simplex	Dinter	1931	326-D	Afr.austr.occ.
simulans	(Wheeler)Warnock	1960	146-A	
sinaica	Hochst.ex Boiss.	1862	558	
sinaloënsis	Brandegee	1905	180-A	Mexico
sinclairiana	Bengh.	1844	416	Ins.Gorgon.
sinensis	Jesson & Turrill	1914	474-A	China bor.occ.
sintensisii	Boiss.ex Freyn.			Europ.
sipolisii	N.E.Br.	1893	333-A	Brasil
sloanei	Wheeler	1939	204-B	Mexico
soanieranensis	Ursch.& Leandri	1955	290-A	Cult.
socialis	Zoll.	1844	621	
socotrana	Balf.	1884		Socotra
sogdiana	Popov.	1923	658-B	Bokhara
sojaki				
soliflora	Vis.ex Boiss.	1862	524	
solisequa	Reichb.		503	

solkinii	(not in print)	a name in N.Y.B.G. Herb.		
somalensis	Pax		323-B	Somaliland, Afr.trop.
soobyi	McVaugh	1961	202-A	Mexico
sooi	T.Simon in Borb.	1949		Hungary
soongarica	Boiss.	1860	477	Sibir.
sonorae	Rose	1895	200-D	Mexico
sordida	Kl.ex Boiss.	1862	45	
sororia	Schrenk	1845	387	Persia
soulieli	Sennen	1931		Hispan.
sparrmanni	Boiss.	1860	14	Austral.
sparsiflora	A.A.Heller		3-B	Hawaii
spartaria	N.E.Br.	1911	273-A	Afr.austr.occ.
spartioides	Hernem.	1822		Hab.?
spartioides	Jacq.	1804	588	Cape
spathulaefolia	G.Don in Sweet		717	Ind.or.
spathulata	Lam.	1788	535	Brasil
sphaerococca	Salzm.		465	
sphaerorhiza	Benth.	1839	245	Mexico
sphaerosperma	Shuttlew	1862	302	Florida
spicata	E.Mey.	1862	377	Afr.austr.
spinea	N.E.Br.	1915	372-B	Cape
spinescens	Pax	1894	379-B	Afr.trop.or.
spinidens	Prokh.	1933	683-A	Asia centr.
spinosa	Linn.	1753	519	Europ.austr.
spinosa	Sibth.& Smith		520	
spinosa	Viv.		516	
spiralis	Balf.	1884	318-Y	Ins.Socotra
splendens	Boj.ex Hook.var.	1829	290-A	Madag.
spongiosa	Ledeb.ex Schrank	1824	384	
spruceana	Boiss.	1862	182	Peruv.
squamigera	Loisel		517	
squamosa	Willd.	1799	490	
squarrosa	Haw.	1827	301	
standleyi	(Millsp.)Jabl.	(1916)	157-A	Mexico
stanfieldii	(Small)Cory	1936	147-A	
stapelioides	Boiss.	1860	352	Afr.austr.
stapfii	A.Berger	1907	320-A	Uganda
stellaespina	Haw.	1826	341	Afr.austr.
stegmatica	Nel.	1936		Little Namaq.
stellata	Willd.		300	Afr.austr.
stellulata	Salzm.	1827	538	
stellulata	Salem	1821	532	
stenoclada	Baill.	1887	282-C	Madag.
stenomeres	S.F.Blake	1922	54-H	Guatem.
stenophylla	Boiss.	1862	403	Brasil
stenophylla	Schur		636-A	Transylv.
stepposa	Zoz	1949	658-A	Ukraina
stevenii	P.M.Bailey	1910		Australia
stevensii	Stewart	1911	30-B	Galopag.
steyermarkii	Standley	1944	585-A	Guatem.

stictospora	Engelm.	1859	131	S.W.cent.U.S.
stillingeoides				Bolivia
sturii	Holuby ex Velen.	1891	658-B	
stygiانا	N.C.Wats.	1844	420	Ins.Azor.
suareziana	Croiz.	1934	290-B	Madag.
subamplexicaulis	Kar.& Kir.	1841	488	soongaria
subapoda	Baill.	1887		Madag.
subcaerulea	Robinson	1896	124-B	Mexico
subciliata	Pers.		525	
subcordata	C.A.Mey.	1830	639	Soongaria
subcordata	Schur		454-C	
subfalcata	Hiern.		433-A	Afr.trop.
subhastata	Vis.& Panc.	1861	647-A	
submamillaris	A.Berger	1902	334-A	
subpeltata	S.Wats.	1891		Mexico
subprostata		1880	53-B	
subpubens	Engelm.	1880	395-B	
subreniformis	S.Wats.	1886	205-B	Mexico
subsalsa	Hiern.	1900	323-18	Afr.trop.
subserrata	Engelm.ex Boiss.	1862	141	
subterminalis	N.E.Br.	1913	103-C	Angola
subtilis	Prokh.	1941	637-X	
subtuberculata	C.A.Mey.ex Boiss.	1862	462	Persia
subtrifoliata	Rusby	1920	208-A	Colombia
subulatifolia	Hurusawa	1940		Corea
subumbellata	Steud.ex Boiss.	1862	398	
succedanea	Wheeler	1939		Mexico
sudanica	A.Cheval.	1932	321-A	Sudan
suffruticosa	Forsk		718	Ins.Rhodos.
suffruticulosa	Lecoq.& Lamotte		510	
sulcata	DeLens ex Loisel		553	Algeria
sulcata	Lem.ex Boiss.	1862	700	
sulfurea	(Millsp.)	(1916)	74-B	Calif.
sumbawensis	Boiss.	1862	63	Ins.Sumbawa
superans	Nel.apud Herre	1950		Afr.austr.
supina	Rafin.ex Boiss.	1862	156-F	U.S.,Hawaii
surinamensis	Lanj.	1931	206-A	Guiana Bat.
susannai	Marloth	1929	332-A	Afr.austr.
sventenii	Marcet	1945		Hispan.
swatensis	Kitamura	1963		Pakistan
sylvatica	Jacq.		673-A	
sylvatica	Linn.		1753	673
symmetrica	A.White, D.S.	1941	332-D	As.Min.;Afr.aust.
synadenia	Baill.	1862-3	307	
synadenium	Ridley	1912		Penins.Malaya
syphilitica	Hort.	1907		Hab.?
syriaca	Spreng.		390	
syriensis	Kit.ex Boiss.	1862	179	Banat
sypirensis	C.Koch	1848	657	
systyla	Edgew.	1847	381-C	Arab.

systyloides	Pax	1894	381-A	Zanzib.
szechuanica	Pax & K.Hoffm.	1922	638-A	E.Tibet
szovitsii	Fisch.& Mey.	1833	566	As.Min.;Persia
taboraënsis	A.Hässler	1931		Tanganyika
tacnensis	Phil.	1891	188-B	Peru,Chili
taitensis	Boiss.	1860	12	Taiti
taitensis	Pax	1904	323-15	Afr.trop.
takouensis	Leveillé & Vaniot	1908	43-G	Corea
talastavica	Prokh.	1933	486-A	
talyschensis	Boiss.& Buhse	1860	490-C	Persia,Talysch.
tamanduana	Boiss.	1860	174	Brasil
tamaulipasana	(Millsp.)Jabl.	(1916)	129-A	
tanaënsis	Bally	1964	323-16	Kenya
tanaicensis	Guss.		588	Sicilia
tanaitica	Paczoski	1891		Rossia
tannensis	Hort.ex Boiss.	1862	525	Europ.
tannensis	Spreng.		698	Ins.Tanna
tangutica	Prokh.	1926		Tibet,Kansu,Szec.
tanquahuete	Sesse & Moc.	1894		Mexico
taurinensis	Battand,& Trab.	1918		Marocc.
taqueti	Leveillé & Vaniot		43-F	Corea
tarapacana	Phil.	1891	188-A	Chili
tardieuana	Leandri	1946	323-58	Madag.
tarokoënsis	Hayata	1918		Formosa
tashiroi	Hayata	1920		Formosa
tatarica	Jacq.	1862	444	Himal.
tatianaë	Theodorov	1954		Transcasp.
taurica	Bess.ex Link		573	Europ.austr.
tauricola	Prokh.	1949	109-B	Crimea
taurinensis	All.		570	Europ.austr.
taxifolia	Burm.		664-B	Afr.austr.
teheranica	Boiss.	1860	609	Persia
teke	Schweinf.ex Pax;Croiz.	1938	296-A	Afr.trop.
telephioides	Chapm.	1860	394	Florida
tellieri	A.Chev.	1933		Sudan,Gall.
tenar	Burch	275-C		
tenebrosa	N.E.Br.	1912	318-5	Afr.trop.
tenella	H.B.K.	1817	158	
tenella	Pax & H.B.K.	1817	255-B	Afr.austr.
tenera	S.Wats.	1882-3		Mexico
tenuicaulis	Dinge ex Range	1938	373-B	Namaq.
tenuifolia	Bieb.	1808	630	
tenuifolia	Lam.	1788	633	Gallia
tenuirama	Schweinf.	1907	311-A	Arab.
tenuis	Buch.Ham.		719	Nepal
tenuissima	M.E.Jones	1933	124-C	Mexico

terraccina	Griseb.		571	
terraccina	Lag.	1816	457	
terraccina	Linn.	1753	625	Reg.Medit.
terraccina	Reichenb.		570	
tesselata	Haw.	1896	326	Cape
tessmanii	Mansf.	1929	213-C	Peru, Orient
tetracanthoides	Pax		323-7	Afr.trop.
tetraceras	Lange	1865	574-A	
tetraceras	Szowits		657	Persia
tetradenia	Brandegee	1914		
tetragona	Baker	1860	298	Afr.austr.
tetragona	Haw.	1826	316	Afr.austr.
tetragona	Hochst.		317	
tetrapora	Engelm.	1859	560	Texas
tetraptera	Baker	1885	286-A	Madag.
tettensis	Klotzsch.,Boiss.	1862	167	Afr.trop.
tetuanensis	Pau	1929		Marocc.
texana	Boiss.	1860	541	Texas
thamnoides	Boiss.	1860	518	As.Min.,Syria
theodosia	Sennen	1936		Marocc.
theriaca	Wheeler	1941	161-D	Texas
thetesperma	Hochst.ex Boiss.	1862	380	
thessala	(Forman)	1897	652-A	
thi	Schweinf.	1868	316-A	Afr.trop.
thinophila	Phil.	1873	396-Z	Chili
thompsonii	Holmboe	1914		Cyprus
thomsoniana	Boiss.	1862	440	Reg.Himal.
thouarsiana	Baill.	1860-1	285	Madag.
thymifolia	Linn.	1753	102	Tropics
thyrsoiflora	Griseb.		647	
thyrsoidea	Boiss.	1862	648	Reg.Himal.
tianshanica	Prokh.	1930	446-D	Asia centr.
tibetica	Boiss.	1862	444	Reg.Himal.
tigridis	Boiss.	1862	100	
tinctoria	Boiss.	1862	657	Persia
tinianensis	Hosokawa	1935		Ins.Marian.
tirucalli	Forsk.		375	
tirucalli	Linn.	1753	373	Afr.or.,Ind.or.
tirucalli	Thunb.		272	
tisserantii	A.Cheval.	1951		Afr.,Gall.cent.
tithymaloides	Linn.	1753		
togakusensis	Hayata			Japan
togoensis	Pax	1909	372	Afr.trop.
tollmena				
tomentella	Engelm.ex Boiss.	1862	90	Mexico
tomentella	Zipp.	1841	179	Ins.Timor
tomentosa	Pers.		110	
tomentulosa	S.Wats.	1887	43-M	L.Calif.
tommasiniana	Bertol.	1888	634-B	S.E.,E.C.Europ.
tonsita	(Millsp.)Jabl.	(1916)		
torralbasii	Urb.	1899	80-L	Cuba

torrida	DC.	1841	228	Mexico
torta	Pax & K.Hoffm.	1910	323-12	Tangan.Terr.
tortilis	Rottl.	1911	304	Ind.or.
tortirama	Dyer	1937	323-44	Transvaal.
tortistyla	N.E.Br.	1911	323-9	Rhodesia
tovarensis	Boiss.	1860	208	Venez.
toxicaria	Afzel		296	
toxicaria	Noisette			Hab.?
tozzii	Chiov.	1932		Somal.,Ital.
trachyphylla	A.Rich.		262	
trachysperma	Engelm.	1859	95	Arizona,Mexico
tracyi	(Small)	(1903)	156	U.S.
transoxana	Prokh.	1930	491-B	Asia centr.
transsilvanica	Schur.	1852	647	
trancapatae	(Croiz.)	(1946)	43-L	Peru
transtagana	Boiss.	1860	591	Lusitania
transvaalensis	Schlechter.	1896	483-C	Transvaal.
triaculeata	Forsk.		322	Arab.
triangularis	Desf.	1808	323-X	Cape,coast reg., East London.
tribuloides	Lam.	1788	614	
trichadenia	Pax	1894	433-A	Angola
trichocardia	L.B.Smith	1936		Mexico
trichogona	Bertol.		158	
trichophylla	Baker	1883	110-A	Madag.
trichotoma	H.B.K.	1817	409	Florida,Cuba
tricolor	Greenm.	1898	210	Mexico
tricuspidata	Lapeyr.		549	
tridentata	Lam.	1788	328-A	
triflora	Schott		653	Dalmatia
triflora	Sesse & Moc.	1887-90		Mexico
trigona	Haw.		305	Ind.or.,Malaya
trigona	Mill.		348	
trigona	Roxb.	395	Ins.Molucc.	
trigonocarpa	Fisch.		454	
triloba	Sesse & Moc.	1887-90		Mexico
trinervia	Boiss.		592	
trinervia	Schumm & Thonn		17	Afr.trop.
trinervis	Bertol.		52	
triodonta	Prokh.	1930	387-B	
triphylla	Willd.	1859	192	
tristis	Bess.	1811	637	
triumfetti	Bertol.		637	
troodii	Post			Europ.
troyana	Urb.	1908	410-A	Jamaica
truncata	N.E.Br.	1915	353-B	Transvaal.,Natal
tshuiensis	(Prokh.)	1880	639-A	
tsukampotoi	Honda	1934		Japan
tsimbaxazae	Leandri	1946	290-A	Madag.
tuberculata	Jacq.	1804	325-E	Afr.austr.
tuberculatoides	N.E.Br.		325-E	

tuberosa	Linn.	1753	358	Afr.austr.
tuberosa	N.E.Rose	1891	358	Mexico
tubiglans	Marloth	1934	323-X	Afr.austr.
tuckeyana	Steud.		426	Ins.Cap.Vard.
tugelensis	N.E.Br.	1915	344-A	
tumbaensis	DeWild.	1908	433-L	Afr.trop.
tumistyla	(Burch)A.R.Smith(1966)		158-G	Haiti
tunetana	Vierh.	1927	516-A	Afr.bor.
turbiniformis	Chiov.	1929		Somaliland
turcomanica	Boiss.	1860	100	Turcoman.
turczaninowi	Kar.& Kit.	1842	388	Turkest.
turkestanica	Franch.	1884	552-A	Turkest.
turkestanica	Regel	1882	639-A	Turkest.
turpini	Boiss.	1860	118	S.Domingo
tyraica	Klokov & Artemcz	1955		Ukraina
ucrainica	Andrz.ex Trautv.	1884		Ukraina
ugandensis	Pax & K.Hoffm.	1910	619-A	Afr.trop.
uhehensis	Pax		467-A	Afr.trop.
uhligiana	Pax	1909	323-C	Afr.trop.
uliginosa	Lange	1865	510-A	
uliginosa	Welw.ex Boiss.	1862	501	Lusitan.
umbellulata	Engelm.ex Boiss.	1862	126	
umbratilis	Lindh.			Texas
umbrosa	Bert.ex Spreng.		189	S.Domingo
uncinata	DC.		299	Afr.austr.
undulata	Bieb.	1808	632	Reg.Casp.Sibir.
undulata	Schweigg.		642-A	
undulata	Willd.		530	
undulatifolia	Janse	1953		Ind.or.
unicornis	Dyer	1951	323-ZZZ	Afr.Lusit.or.
uniflora	Dalz.& Sibs		157-A	
uniflora	G.Don			Amer.austr.
uniflora	Rafin.	1808	720	Amer.bor.
uniflora	Roxb.		720	Ind.or.
uniglandulosa	S.Wats.	1887		Mexico
unilateralis	Blakelock	1948	463-A	Iraq.,As.Min., Palest.
unispina	N.E.Br.	1911	723-B	Togo,Nigeria
uralensis	Fisch.ex Link	1822	634-D	S.E.C. Europ.
urbani	(Millsp.)	(1916)		
urceolophora	Parodi	1881		Reg.Argent.
usambarica	Pax	1894	467-B	Afr.trop.or.
ussanguensis	N.E.Br.	1912	323-23	Afr.trop.or.

vaccaria	Baillon	1866	103-B	
vachellii	Hook. & Arn.	1825	58	
vaginulata	Griseb.	1864	22	Bahamas, Turkist.
vahlil	Willd.	1860		
valdevillosocarpa	Arvat. & Nyár	1935	454-A	Bessarab.
valentina	Jacq.	1804	625	Hispan.
valeriana	Pers.		464	
valerianaefolia	Lam.	1788	464-A	
valerii	Standley	1927		Costa Rica
valida	N.E.Br.	1915	341-C	Cape
valliniana	Belli.	1903	651-A	Ital., S.W. Alger.
vallismortae	(Millsp.)	(1916)	80-A	Calif.
vandermerwei	Dyer	1937	323-12	Transvaal
variabilis	Cesati	1838	629	Reg. Medit.
varians	Haw.		293	
variegata	Heyne		36	
variegata	Deflers	1883		Yemen
variegata	Sims		227	
vaseyi	Coult.	1890	250-A	Texas
vauthieriana	Boiss.	1860	151	Brasil
vedica	Ter-Chatschat	1965		Transcaucas
velenovskyi	Bornm.	1933	450-B	Bulvaria
velleriflora	Boiss.	1862	129	Mexico
velleriflora	(Millsp.)	(1916)	129	
velligera	Schauer	1847	127	Mexico
velutina	K. Schum.	1889		N. Guin.
velutina	Greene	1886	141-E	L. Calif.
velutina	Pax	1895	615	Afr. trop. or.
vellitschii	Boiss. & Reut.	1862	290	Afr. trop.
venenata	Schlecht.	1847	211	
venenata	Marloth	1930	323-2	Gt. Namaq.
veneris	Khan	1963		Cyprus
veneta	Tenore		680-A	
veneta	Willd.		681	
vepretorum	Drake	1903		Madag.
verapazensis	Standl. & Steyerem.	1944	213-A	Guatem.
verdickii	DeWild	1906	257-BB	Afr. trop.
vermiculata	Raf.	1817	52-C	Eastern U.S.
vermiformis	M.E. Jones	1930	160-B	Arizona
verna	Salzm.	1878	625-A	
verna	Phil.	1895	141-B	Chili
verrucosa	Bertol.		465	
verrucosa	Desf.		512	
verrucosa	Georgi		510	
verrucosa	Guss.		493	
verrucosa	Lam.		509	Europ.
verrucosa	Linn. Mant.		464	
verrucosa	Linn.	1753	530	
verrucosa	Pall.		454-A	
verruculosa	N.E.Br.	1925	352-A	Gt. Namaq.
versicolor	Greene	1881	144-B	Amer. bor.

verticillata	Fisch.	1812	445	
verticillata	Glaziou	1912	174-C	Goyaz
verticillata	Orph.ex Boiss.		685	
verticillata	Poir.		212	
verticillata	Vell.		43	
verticillata	Pax		43	Afr.austr.
vestita	Boiss.	1860	65	Mexico
vezorum	Leandri	1947	323-63	Madag.
viatilis	Ule	1908	158-A	Peru
viellardi	Baill.	1861-2	551-A	N.Caled.
vigueri	Denis	1921	288-A	Madag.
villifera	Scheele	1849	147	Texas, Yucatan, Guatem.
villosa	Friwald		494	
villosa	Waldst.& Kit.	1802	454	
villosulae	Urb.	1899		S.Domingo
villosior	(Millsp.) Jabl.	(1916)		
villosissima	Kl.ex Boiss. in	1862	170-C	
villosula	Pax	1894	118-A	Afr.trop.or
viminalis	Burm.		272	
viminalis	Linn.	1753		
viminalis	Mill.		373	
viminea	Hook.f.	1851	27	Ins.Galop.
vinyalsi	Sennen	1931		Hispan.
violacea	Greenm.	1898	181	Mexico
viperina	A.Berger	1902	326-B	Afr.austr.
virgata	Desf.		365	
virgata	Noe ex Nym.	1933	643-A	Moravia
virgata	Waldst.& Kit.	1805	634	Europ.
virgultosa	Klovov.	1955		Ukraina
viridiflora	Waldst.& Kit.		503	
viridis	Ruiz	1860	223	Peru
virosa	Willd.	1799	315-A	Cape
viscoides	Boiss.	1860	171	Brasil, Goyaz.
vitellina	Losc.& Park		449-A	
volgensis	Kryshtof	1929	656-B	Rossia
volkensii	Pax	1895	381-A	Afr.trop.or.
volkensii	Werth	1901	318-B	Afr.trop.
vollii	Rech.f.	1963	604-D	Afgan.
volkmanae	Dinter	1928	318-Y	Afr.austr.occ.
wagneri	Soó	1924		Hungary
wahlbergia	Boiss.	1862	668	Afr.austr.
wakefieldii	N.E.Br.	1912	323-20	Afr.Bril.or.
wallichiana	Boiss.	1862	80	
wallichii	Hook.f.	1887	439-A	Reg.Himal.
watanabei	Makino	1920		Japan

waterbergensis	Dyer	1951	316-B	Transvaal.
watsonii	Millsp.	1890		L. Calif.
weberaueri	Mansf.	1931	697-A	Peru
wellbyi	N.E.Br.	1912	615-B	Abyss.
welwitschii	Boiss. & Reut.	1862	513	Lusitan.
whalii	Willd. ex Kl. & Gke.	1860	433-B	Egypt
wheeleri	Baill.	1866	51-A	Austral.
whitei	Wheeler	1939	205-A	Mexico
whitesioaneana	Manaa	1942		Cult.
whyteana	Baker f.	1894	256-A	Afr. trop.
wightiana	Boiss.	1860	621	
wightiana	Hook. f.	1887	6-A	Deccan.
wilmanae	Marloth	1931	330-C	Afr. austr.
wilsonii	(Millsp.) Jabl.	(1909)	20-F	Bahamas
wimmeriana	J. Wagn.	1922		Hungary
winkleri	Pax		318-C	Afr. trop.
wittmanni	Boiss.	1860	451	Reg. Cauc.
woodii	N.E.Br.	1915	354-F	Natal.
woronowii	Grossheim	1916	686-C	Transcauc.
wrightii	Torr. & Gray	1860	246	Headw. Colorado
wilfeni	Held. ex Nym.			
wulfenii	Hoppe	1829	681	Dalmatia
xalapensis	H.B.K.	1817	181	Mexico
xanthadenia	Denis	1912	323-X	Madag.
xanti	Engelm.	1862	222	Calif.
xbacensis	Millsp.	1898		Mexico
xeropoda	Brandegee	1917	31-B	Mexico
xylocantha	Pax		323-2	Afr. trop.
xylophylloides	Brongn.	1857	699	Madag.
xylopoda	Greenm.	1898	260-A	Oaxaca
yamashitae	Kitamura	1958	605-B	Afghan.
yaqiana	Tidestr.	1935		
yayalesia	Urb.	1930	20-G	Cuba
yemenica	Boiss.	1860	619	Arab.
yucatanensis	(Millsp.)	(1916)		Mexico
yungasensis	Rusby	1885		Bolivia

zahnii	Heldr.ex Halacsy	1904	682-C	Graecia
zakamenae	Leandri	1845	288-B	Madag.
zambesiana	Benth.	1888	174-A	Afr.trop.
zanaharensis	Ursch.& Leandri	1955	290-F	Cult.
zenkeri	Pax		433-K	Afr.trop.
zeylana	N.E.Br.	1913	110	Somaliland
zhigulensis	Prokh.	1941	634-B	
zierioides	boiss.	1862	203	Mexico
zinniiflora	(Small) Jabl.	(1898)		Georgia
zinniifolia	(Small) Jabl.	(1898)		Georgia
zonosperma	Muell.Arg.	1874	262-A	Brasil
zornioides	Boiss.	1862	35	Ind.or.
zoutpansbergensis	Dyer	1938	331-C	Transvaal.
zygophylloides	Boiss.	1960	77	Texas

COMBRETUM LAXUM JACQ. VAR. EPIPHYTICUM (COMBRETACEAE)

A CASE OF SELECTION FOR WATER DISPERSAL

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Combretum laxum Jacq. is an extremely variable species ranging from Mexico to Argentina and the West Indies. In Mexico and upper Central America it flowers from February to September but mostly in April and May, whereas in South America it flowers July-November, especially during September and October. Fruit morphology in both Central and South America is quite variable, ranging from broadly to narrowly 4-winged. Perhaps due to the influences of the phenologically different races in North America and South America two distinct types of plants have evolved in Panama. The typical plants of Combretum laxum in Panama differ very little from plants of the species in Central and South America. Other plants represented by the name Combretum epiphyticum Pittier are both morphologically and ecologically distinct. Combretum epiphyticum Pittier was described from the Canal Zone but was later included in synonymy by Exell in the Flora of Panama. Although the broad view taken by Exell (1958) is quite appropriate for so complex a species as Combretum laxum, there is also a need for the recognition of the large and consistent differences which occur in Panama. I am therefore proposing to elevate Combretum epiphyticum Pittier to a varietal level of C. laxum Jacq.

Though some of the morphological and phenological features of var. epiphyticum are exhibited in var. laxum elsewhere in Central America, notably the predominantly April-May flowering period and the tendency toward a thicker, narrowly-winged fruit, these features are not correlated in any way except in Panama.

The following key and descriptions are provided to separate the two varieties of Combretum laxum in Panama. An exsiccatae is also provided since the two taxa were considered as one in the Flora of Panama treatment.

*The author is indebted to Mr. Phillip Busey who, while an employee on the Flora of Barro Colorado Island Project, pointed out the differences between the two taxa involved in this study.

Key to varieties of Combretum laxum in Panama

Plants flowering March-April; fruits maturing August-September; young stems, axes of inflorescence and petioles densely ferruginous-tomentose; lower surface of blade conspicuously pubescent; fruit merely 4-angled or if 4-winged, sulcate less than halfway to center of fruit.

var. epiphyticum

Plants flowering mostly October-November (some flowers persisting longer on old inflorescences); fruits maturing January-March; young stems, axes of inflorescence and petioles glabrous or puberulent, never densely ferruginous-tomentose; lower blade surface glabrous or nearly so; fruit prominently winged, sulcate well over halfway to center of fruit.

var. laxum

COMBRETUM LAXUM Jacq. var. EPIPHYTICUM (Pittier) comb. novo
Combretum epiphyticum Pittier, Contr. U.S. Natl. Herb.
18: 247. 1917

Shrub or low, sprawling liana usually to 8 m tall. Leaves opposite; petioles 2-7 mm long, densely ferruginous-tomentose; blades ovate-elliptic to oblong-elliptic to obovate, gradually to abruptly acuminate at apex, rounded at base and inconspicuously subcordate (the sinus 2-4 mm deep), 6-16 cm long, 2.5-7 cm wide, lateral veins 10-14 pair, the secondary lateral veins usually continuous between primary laterals, upper surface sparsely short-pilose throughout, somewhat denser on midrib, deciduous in age except along midrib, lower surface similarly pubescent but denser, the trichomes persisting in age. Panicles terminal or upper axillary; branches opposite or in whorls of three, the lower subtended by small leaves, the upper by lanceolate, caducous bracts ca 4 mm long; rachises, peduncles and ovary very densely ferruginous-tomentose; flowers sessile, closely aggregated, subtended by a subulate, caducous bracteole to 1.5 mm long; lower receptacle ovoid, ca 1 mm long; upper receptacle cup-shaped, 1.2-1.5 mm long, including the 4 triangular calyx lobes; petals 4, broadly obovate, white, ca 1 mm diam., glabrous; stamens 8, ca 4 mm long, glabrous; anthers reddish-brown, broader than long, ca .5 mm broad. Fruits ovoid in outline, acute at apex, obtuse at base, 1.7-2.2 cm long, prominently 4-ridged, the ridges sharp, wing-like, the grooves extending less than halfway to center of fruit.

Plants flower in March and April; fruits mature during August and September. The variety is known only from tropical moist forest in the vicinity of the Isthmus of Panama and from tropical wet forest on the Pacific coast in Veraguas Province.

The supposed epiphytic nature of the plant, as suggested by the name and data from the type collection described as "growing on dead tree in lake," is quite uncertain. No subsequent collection has indicated an epiphytic plant. It is quite likely that the species is very tolerant of water and that it may be rooted beneath water, as it true of many other species of trees or lianas.

While light, narrowly-winged fruits tend to be the rule in the genus Combretum, a few such as C. cacoucia Exell and E. laxum var. epiphyticum (Pittier) Croat, have heavier-bodied fruits which are only ridged or with a very narrow wing probably functionless in anemochory. As might be expected, all collections of var. epiphyticum have been made in close association with bodies of water. Fruits are very bouyant and are no doubt largely water-dispersed. Combretum cacoucia also usually grows in association with water and has bouyant fruits. The fact that isolated species of Combretum, belonging to different sections of the genus, have become adapted to hydrochory, strongly indicates that wingless, hydrochorous species have been derived from winged species (Exell, 1958). Since the typical variety is widespread, the implication is that var. epiphyticum has been derived from var. laxum. The alternative of a now extinct ancestor with an unknown fruit type is of course also possible.

CANAL ZONE: Barro Colorado Island; western side of Gross Point Peninsula, Croat 5090 (MO); Coco Solo, U.S. Army Tropic Test Center, Mine Impacement Center, Dwyer & Duke 7879 (MO); Cano Quebrada, growing on dead tree in lake (Gatun Lake), Pittier 6819 (holotype, US), 6668 (US); Gatun in swamps, Hayes 7 (MO); Summit Garden, cultivated? C. Callen 376 (MO).

VERAGUAS: Bahia Honda, near Pueblo Nuevo, Barclay 2831 (MO) (This collection was made in 1839).

COMBRETUM LAXUM Jacq. var. LAXUM, Enum. Pl. Carib. 19. 1760

For a complete synonymy see Exell (1958), Flora of Panama

Liana. Leaves opposite or subopposite, + glabrous; petioles 2-7 mm long; blades lanceolate to oblong-elliptic or ovate-elliptic, acuminate at apex, obtuse to rounded and

inconspicuously subcordate at base (sinus 1-2 mm deep), 10-17 cm long, 3-6 cm wide, subcoriaceous, prominently arched along midrib, drying dark, glabrous to inconspicuously puberulous on lower surface and often pubescent in axils of lower surface, often inconspicuously punctate below. Panicles terminal or upper axillary; flowers sessile, white or yellowish, very fragrant, 4-parted; lower receptacle ovate-oblong, densely dark-strigose in lower 2/3, sparsely so above and on upper receptacle, the latter cup-shaped, ca 1.5 mm long including lobes; calyx lobes broadly triangular; petals rounded, ca 1 mm wide, white, spreading, ± clawed at base; stamens 9, ca 4 mm long, exserted; style to 4 mm long. Fruit ovoid to sub-orbicular, emarginate at apex, cordate at base, 1.5-2 cm long, 1.5-1.7 cm wide, yellowish-brown, 4-winged, the wings to 7 mm wide, the body of fruit to 4 mm wide.

Flowers mostly October and November but with flowers persisting sometimes until February. Fruits mature January to March. Ranges from Mexico to Northern Argentina.

The type of Combretum laxum is from Santo Domingo. West Indian material of the species is close to that of upper Central America. Leaf blades are usually glabrous, except for axillary tufts. They are not at all or only moderately punctate. Plants in Panama and South America are usually glabrous or sometimes only with inconspicuous axillary tufts. Most South American specimens are conspicuously punctate and also often have lepidote scales.

CANAL ZONE: Barro Colorado Island: Aviles 18 (F, MO); Shoreline south of Colorado Point, Croat 7883 (MO); Cove south southeast of Pena Blanca Pt., Croat 8405 (MO); First cove south of Barbour Point, Foster 1327 (DUKE, F, MO, PMA); East shore of Pena Blanca, Foster 1412 (DUKE, MO, PMA); Pearson Inlet, Shattuck 685 (F, MO); Drowned forests along Rio Chagres between junction with Rio Pequeni and Rio Indio, alt. 66 m, Steyermark & Allen 16774 (MO).

DARIEN: Rio Sabana, 0-4 mi from Santa Fe, Duke 4125 (MO); Rio Tuirra, between R. Penusa and R. Mangle, Duke 14631 (MO).

PANAMA: Vicinity of El Llano, Duke 5804 (MO); Woods along Pan-Am Highway ca half way between El Llano and Rio Mamoni, Duke 5608A (MO); Drowned forests of Quebrada Tranquilla and its branches, 70-80 m., Dodge & Allen 17501 (MO).

NOTES ON NEW AND NOTEWORTHY PLANTS. LXVII

Harold N. Moldenke

ALOYSIA TERNIFOLIA f. *OPPOSITIFOLIA* Moldenke, f. nov.

Haec forma a forma typica speciei foliis oppositis 3.8--6 cm. longis usque ad 2.3 cm. latis marginibus versus apicem perspicue serratis recedit.

This form differs from the typical form of the species in having its leaves decussate-opposite, with the blades 3.8--6 cm. long, to 2.3 cm. wide, and distinctly sharp-serrate from the middle or below the middle to the apex.

The type of the form was collected by Gert Hatschbach (no. 26516) at the edge of Rio Bonito, in the Municipality of Pitanga, Paraná, Brazil, on February 25, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as a shrub, to 2 m. tall, with white flowers.

ERIOCAULON DALZELLII var. *GLABRATUM* Moldenke, var. nov.

Haec varietas a forma typica speciei capitulis glabris vel subglabris atrogriseo-nigris recedit.

This variety differs from the typical form of the species in its flowering heads being much smaller, glabrous or subglabrate throughout as viewed from outside under a hand lens, and dark ashy-gray to black in overall appearance.

The type of the variety was collected by V. N. Naih in the Western Ghats of India on September 7, 1971, and is deposited in the Herbarium Jutlandicum at Aarhus University. The collector describes the plant as rhizomatous and herbaceous, growing in streambeds.

LIPPIA PETIOLATA Moldenke, sp. nov.

Herba perenna, xylopodio crasso lignoso subterraneo; caulibus paucis erectis 30--45 cm. altis gracilibus in statu juvenile dense pubescentibus; foliis ternatis perspicue petiolatis; petiolis 3--5 mm. longis adpresse pubescentibus; laminae foliorum crasse coriaceis subovalibus-ellipticis 2--4.5 cm. longis 1--2.3 cm. latis obtusis regulariter dentato-serratis; inflorescentiis axillaribus terminalibusque densissime capitato-spicatis.

Perennial herb, growing from a heavy woody underground xylopodium; stems several (usually 2 or 3) per plant, erect or ascending, the younger parts densely short-pubescent with brownish hairs, subglabrescent in age; principal internodes elongate to 7 cm. on older stems, more abbreviated on younger parts; leaves ternate, distinctly short-petiolate; petioles slender, 3--5 mm. long, appressed-pubescent; leaf-blades firmly coriaceous, stiff, rather grayish-green on both surfaces, elliptic or almost oval-elliptic, 2--4.5 cm. long, 1--2.3 cm. wide, obtuse at the apex, mostly acute at the base, regularly dentate-serrate with uniform

rather bluntish or subacute teeth along the margins from almost the base to the apex, subbullate and roughish to touch above, regularly short-strigillose with stiff whitish hairs above, rather densely short-pubescent beneath; midrib and the 4-6 irregularly placed pairs of secondaries impressed above and very prominent beneath; veinlet reticulation also more or less impressed above and prominent beneath; inflorescence axillary in the several uppermost leaf-axils and terminal, capitate-spicate, 1.5-2 cm. long, densely many-flowered; bractlets lanceolate, ca. 5 mm. long, 2 mm. wide at the base, gradually attenuate to the apex, several striate, rather sparsely short-pubescent on the outer surface with subappressed hairs and also glandular-granular; corolla hypocrateriform, lavender-purple, its tube about 5 mm. long, at first yellow, eventually red-violet.

The type of this species was collected by H. S. Irwin, H. Maxwell, and D. C. Wasshausen (no. 20509) on campo and in gallery forest margins, in the Serra do Cipó, Minas Gerais, at km. 135 (about 150 km. north of Belo Horizonte), at an altitude of 1250 meters, Brazil, on February 19, 1968, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is obviously closely related to *L. lacunosa* Mart. & Schau., but is easily distinguished by its petiolate acute-based leaves.

PAEPALANTHUS SESSILIFLORUS var. *VENEZUELENSIS* Moldenke, var. nov.

Haec varietas a forma typica speciei recedit sepalibus masculis ad apicem acutis non truncatis nec erosis, bracteolis involucribus ad apicem obtuse non argute cuspidatis pergradatim attenuatis, et staminibus subexsertis.

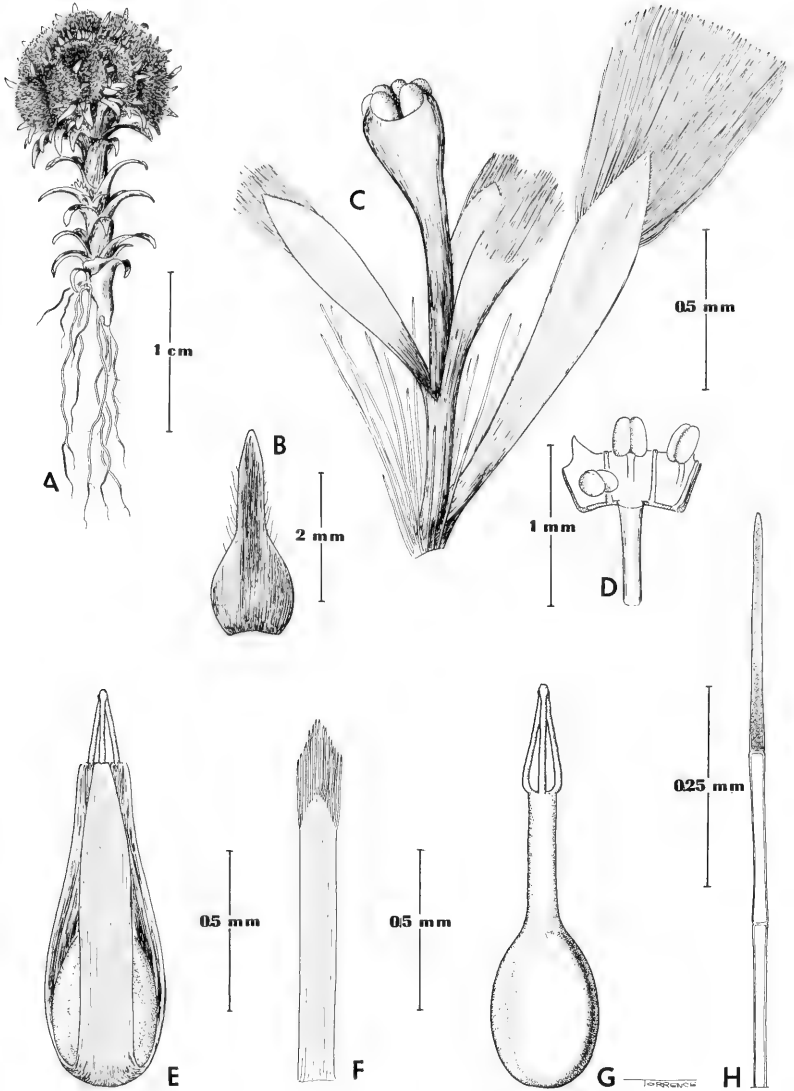
This variety differs from the typical form of the species in having the sepals of the staminate florets acute (not truncate nor erose) at the apex, the involucrel bractlets obtusely (not sharply) cuspidate and more gradually attenuate, and the stamens barely exserted.

The type of the variety was collected by Julian A. Steyermark, Cora Steyermark, John Wurdack, Marie Wurdack, and Hans Wiehler (no. 106609) in open dry sand on the plateau above Kamá-merú, Carretera El Dorado to Santa Elena de Uairen, 198 km. south of El Dorado, at 1200--1400 meters altitude, Bolívar, Venezuela, between December 7 and 10, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. I am deeply indebted to Dr. Steyermark for making the careful floral dissections and supervising the making of the accompanying illustrations.

Explanation of plate: A - Habit, B - Involucrel bractlet, C - Staminate floret, D - Staminate perianth opened to show the interior with three stamens, E - Pistillate floret, F - Inner perianth segment (petal) of pistillate floret, G - Pistil, H - Upper portion of hair.

STACHYTARPHETA GESNERIOIDES var. *SIMPLEX* (Hayek) Moldenke, stat. nov.

Stachytarpheta simplex Hayek in Fedde, Repert. Sp. Nov. 3: 273. 1907.



VERBENA CABRERAE var. ANGUSTILOBATA Moldenke, var. nov.

Haec varietas a forma typica speciei lobis foliorum uniforme linearibus lineari-oblongisve anguste oblongisve recedit.

This variety differs from the typical form of the species in having the divisions of its leaf-blades uniformly linear (on the uppermost leaves), linear-oblong (on intermediate leaves), or narrowly oblong (on lower leaves), of uniform diameter throughout.

The type of the variety was collected by Gert Hatschbach (no. 23852) in the cerrado at Col. Paxixi, in the Municipality of Aquidauana, Mato Grosso, Brazil, on February 20, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as erect, 40 cm. tall, with violet-colored flowers.

ADDITIONAL NOTES ON THE GENUS VERBENA. XX

Harold N. Moldenke

VERBENA [Dorst.] L.

Additional bibliography: Gaines & Swan, Weeds East. Wash. 230, 231, & 349. 1972; Anon., Sat. Review World Hov. 20: 33. 1973; Frohne & Jensen, System. Pflanzenr. 203, 261, & 305. 1973; A. Hansen, Cuat. Bot. Canar. 18-19: 13. 1973; Hocking, Excerpt. Bot. A.21: 116 & 117. 1973; Jackson & Perkins, Seedbook 1972-1973: 18. 1973; Rickett, Wild Fls. U. S. 6 (3): 542-546 & 783, pl. 195 & 196. 1973; Rogerson, Bull. Torrey Bot. Club 100: 192. 1973; W. A. Burpee, Burpee Seeds 1974: 54. 1974; Lasser, Braun, & Steyerl., Act. Bot. Venez. 9: 36. 1974; Moldenke, Phytologia 28: 104-120. 1974.

A Verbena perfume is offered for sale by Caswell-Massey Company, Ltd., of New York.

VERBENA ABRAMSI Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.21: 117. 1973; Moldenke, Phytologia 28: 109-110. 1974.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Rickett, Wild Fls. U. S. 6 (3): 544, [545], & 783, pl. 196. 1973; Moldenke, Phytologia 28: 110-111. 1974.

Illustrations: Rickett, Wild Fls. U. S. 6 (3): [545], pl. 196 (in color). 1973.

VERBENA BIPINNATIFIDA Nutt.

Additional bibliography: Rickett, Wild Fls. U. S. 6 (3): [543], 544, & 783, pl. 195. 1973; Moldenke, Phytologia 28: 112-114. 1974.

Additional illustrations: Rickett, Wild Fls. U. S. 6 (3): [543], pl. 195 (in color). 1973.

The Abedin 2643, Boulos s.n. [July 1952], Drar & Mahdi 2525, Hassib s.n. [7/3/1929] & s.n. [22/4/1941], Hellendoorn s.n. [18/7/1965], Herb. Univ. Kahir. s.n., Sisi s.n. [30/5/1973], G. Täckholm s.n. [October 1925], and V. Täckholm s.n. [2/11/1959], distributed as V. bipinnatifida, are actually all V. tenuisecta Briq.

VERBENA BONARIENSIS L.

Additional bibliography: A. Hansen, Cuad. Bot. Canar. 18-19: 13. 1973; Lasser, Braun, & Steyerl., Act. Bot. Venez. 9: 36. 1974; Moldenke, Phytologia 28: 114--117. 1974.

Lasser, Braun, & Steyerl. (1974) record this species as cultivated in Venezuela. The H. N. Moldenke 8551, distributed and previously cited by me as V. bonariensis, is actually var. conglomerata Briq., while Balakrishnan NBK.413 is V. rigida Spreng.

Additional citations: PAKISTAN: Northwest Provinces: S. Khan 508 (Kh).

VERBENA BONARIENSIS var. CONGLOMERATA Briq.

Additional bibliography: Moldenke, Phytologia 28: 116--117. 1974.

Additional citations: CULTIVATED: New York: H. N. Moldenke 8551 (N).

VERBENA BRACTEATA Lag. & Rodr.

Additional bibliography: Moss, Fl. Alberta, pr. 1, 397 & 545 (1959), pr. 2, 397 & 545 (1964), and pr. 3, 397 & 545. 1967; Gaines & Swan, Weeds East. Wash. 230, 231, & 349. 1972; Rickett, Wild Fls. U. S. 6 (3): [543], 544, & 783, pl. 195. 1973; Moldenke, Phytologia 28: 117--119. 1974.

Additional illustrations: Gaines & Swan, Weeds East. Wash. 231 (in color). 1973; Rickett, Wild Fls. U. S. 6 (3): [543], pl. 195 (in color). 1973.

Halse (1973) cites Burgess 748, Halse 154, 231, & 286, and Ranzoni 169 from Canyon de Chelly. Blewitt (1926) describes the species as "rare" in waste ground in New Haven County, Connecticut, where it is said to be "Adventive from the West" and blooms in July and August. Fell (1955) has this to say about the plant as it occurs in Winnebago County, Illinois: "A decumbent weed that is common on railroads, roads and in waste places. A hybrid on the C. & N. W. Ry. tracks near U. S. Rt. No. 51 tends to be more upright, the bracts are short, and the leaves less divided (X perriana). X deamii Moldenke, stout and semidecumbent, resembling V. stricta but having bracted flowers, is uncommon on roadsides."

VERBENA BRASILIENSIS Vell.

Additional bibliography: Rickett, Wild Fls. U. S. 6 (3): 546 & 783. 1973; Moldenke, Phytologia 28: 116 & 119--120. 1974.

VERBENA CABRERAE var. ANGUSTILOBATA Moldenke

Bibliography: Moldenke, Phytologia 28: 195. 1974.Citations: BRAZIL: Mato Grosso: Hatschbach 23852 (Z—type).

VERBENA CALIFORNICA Moldenke

Additional bibliography: Moldenke, Phytologia 24: 217. 1972.Additional citations: CALIFORNIA: Tuolumne County: Moldenke & Moldenke 25758 (Gz, Kh).

VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, Phytologia 28: 120. 1974.Hatschbach describes this plant as repent and found it growing in wet sandy campos. The corollas on Hatschbach & Guimarães 25509 are described as having been "lilac" in color when fresh.Additional citations: BRAZIL: Paraná: Hatschbach & Guimarães 25509 (Ld).

VERBENA CANADENSIS (L.) Britton

Additional synonymy: Glandvlaria caroliniensis Raeusch., Nom. Bot., ed. 3, 172. 1797. Verbena aubletia L. f. ex Desf., Tabl. Écol. Bot., ed. 2, 66. 1815. Verbena aubletia drummondii Paxt., Pock. Bot. Dict., ed. 1, 328. 1840.Additional & emended bibliography: Raeusch., Nom. Bot., ed. 3, 3 & 172. 1797; Desf., Tabl. Écol. Bot., ed. 1, 54. 1804; Willd., Enum. Pl. Hort. Berol. 2: 634. 1809; Desf., Tabl. Écol. Bot., ed. 2, 66. 1815; S. Ell., Sketch, pr. 1 & 2, 2: 96--97 (1821) and 2: 742. 1824; Mohl, Ann. Sci. Nat., ser. 2, 3: 319. 1835; Paxt., Pock. Bot. Dict., ed. 1, 328. 1840; Schau., Linnaea 20: 478. 1847; Paxt., Pock. Bot. Dict., ed. 2, 328. 1849; Dupuis, Nouv. Fl. Usuel. & Méd. 2: 80. 1860; T. H. Everett, Gard. Chron., ser. 3, 87: 144. 1930; Rydb., Fl. Prairies & Plains, pr. 1, 677, 678, & 967. 1932; Wangerin in Just, Bot. Jahresber. 58 (1): 845 [275]. 1938; Fedde in Just, Bot. Jahresber. 58 (2): 668. 1939; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 573. 1941; Evers, Ill. Nat. Hist. Surv. Bull. 26: 421 & 436. 1955; Foley, Ground Covers, pr. 1, 134--135. 1961; Solbrig in Heywood, Mod. Meth. Pl. Tax. 87--89. 1968; El-Gazzar & Wats., New Phytol. 69: 463, 483, & 485, fig. 30. 1970; S. Ell., Sketch, pr. 3, 2: 96--97 & 742. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 2: 677, 678, & 967. 1971; Amaral Franco in Tutin & al., Fl. Eur. 3: 122. 1972; Encke & Buchheim in Zander, Handwörterb. Pflanzennam., ed. 10. 1972; Foley, Ground Covers, pr. 2, 134--135. 1972; Skinner, Ornament. Pl. Coastal Northw. 75. 1972; Tutin in Tutin & al., Fl. Eur. 3: 369. 1972; Moldenke, Phytologia 23: 367--368, 414, 428, 431, & 434--437 (1972), 24: 237 & 253 (1972), and 25: 240 & 244. 1973; Anon., Biol. Abstr. 55 (9): B.A.S.I.C. S.272. 1973; Rickett, Wild Fls. U. S. 6 (3): [543], 544, & 783, pl. 195. 1973; Sperka, Garden. Guide 187--188. 1973; Moldenke, Phytologia 28: 110. 1974.Additional illustrations: T. H. Everett, Gard. Chron., ser. 3, 87: 144. 1930; El-Gazzar & Wats., New Phytol. 69: 463, fig. 30. 1970; Sperka, Gardn. Guide 187. 1973; Rickett, Wild Fls. U. S. 6

(3): [543], pl. 195 (in color). 1973.

The type of Buchnera canadensis L., on which this taxon is based, was collected in Virginia [not Canada] according to Linnaeus (1767), who says for it merely "Habitat in Virginia".

Recent collectors have found Verbena canadensis growing in low grassy ground by roadsides, in cedar glades, on dry ledges on bluffs, in sand along roadsides near oak woodlands, in sandy soil on open sunny slopes, on open southerly hillslopes, among limestone rocks in rather open woods, and on sand dunes on bluffs adjoining the ocean. My wife and I found it in open sunny dry woodlands composed of deciduous trees and shrubs. The stems are described as rooting at the nodes and the petals as shallowly cleft and somewhat crenate. The corolla is described as "rose-purple" on Dress 2318, "lavender" on Glausen & Clausen 5753 and I. Collins s.n. [July 29, 1946], "purple" on G. H. M. Lawrence 193, "soft pale blue-violet" on Dress, Lawrence, & Moore 672, "purple, with reddish eye" on Lundell & Lundell 11004, "lavender, with reddish eye" on Lundell & Lundell 10945, "magenta, with deeper ring at mouth of tube" on H. E. Moore 636, and "RHS [Royal Horticultural Society] Bishops Violet 34 to 34/2" on Peele 651.

Evers (1955) found the plant "common on rocky bluffs" and records it from Monroe and Union Counties, Illinois. French vernacular names recorded for it are "verveine de Miquelon", "verveine à bouquets", and "verveine de Drummond".

Jacquin, in Hort. Bot. Vindob. 2: 82 (1772), says "Sub Aubletiae nomine a Dickio semina habui, quae genuina Verbenae tetrandrae species est, ut ab hac nequeat ulla nota avelli. In Peruvia & in Florida sponte crescere, illustris Linnaeus mihi autor est." A photograph of this original description of V. aubletia and of the illustration accompanying it, is in the L. H. Bailey Hortorium herbarium at Ithaca, New York. Paxton (1849) states that the species was introduced into cultivation in England soon after or in 1774.

Solbrig (1968) informs us that the normal pollen fertility rate is 98 percent in V. canadensis.

Sperka (1973) calls the species "rose verbena" and speaks of it as a garden subject as follows: "2 to 3 feet long. A trailing vine-type of plant, spreading to make a circle. Clusters of rose-colored flowers are held above deeply toothed, ovate, medium-green leaves that are hairy. Where the soil is moist, the reclining branches root at the nodes as they spread. This verbena is found in sunny, rocky prairies where the soil is lean and sandy. It is native in the more southern and western parts of Wisconsin than mine" [I have not seen any material at all of this species from Wisconsin nor any other record before this of its being "native" there] "but I have found it hardy with a cover of mulch in winter." She asserts that it blooms from "Late May until heavy frosts. Pick the spent flowers to encourage bloom." As to its soil preferences, she says to use "Poor, sandy soils or a fertile, sandy loam with good drainage. Add sand to very fertile, heavy

soil. This plant does best on a lean diet.. ..[it] must be planted in full sun for abundant bloom. I⁺ is best suited for the prairie, a sunny garden, or groundcover on a sunny bank....In areas where the temperatures dip far below zero it is best to plant in spring. In warmer climates, fall planting is practical. ...Very coarse, fibrous roots become wiry with age. The nodes along the trailing branches aboveground send down new roots wherever they touch the damp soil.....Space 3 feet apart. For a dense groundcover, space only 2 feet apart. Set the crowns at soil level. Mulch in cold areas during the winter months. When plants become too crowded, remove some of the older ones. Merely clip the branch and dig up the unwanted plants.....Pot-grown nursery stock or stock grown in the field for one season have vigorous young root systems. Select only the younger plants for division. Stem cuttings in July are the easiest method of propagation. Seeds are often slow to germinate, and seedlings bloom the second year. The plant self-sows." She further comments that this species "makes a fine groundcover for a rocky, sandy area that seems to grow little except weeds."

The Dress 2876, distributed as V. canadensis, is actually V. bipinnatifida Nutt., while Hopkins, MacDowell, & Copeland 6390 is V. pumila Rydb.

Additional citations: GEORGIA: Baldwin Co.: Moldenke & Moldenke 26974 (Ac, Ba, Id, Ps—1338, Ws). Sumter Co.: Dress, Lawrence, & Moore 672 (Ba). FLORIDA: Duval Co.: G. H. M. Lawrence 193 (Ba). ALABAMA: Madison Co.: R. M. Harper 3958 (Ba). Tuscaloosa Co.: Clausen & Clausen 5753 (Ba). OHIO: Clermont Co.: E. L. Braun s.n. [V-4-12] (W-2712372). Hamilton Co.: E. L. Braun s.n. [IV-23-05] (W-2712371). KANSAS: Woodson Co.: Lathrop 876 (Bl—118820). MISSOURI: Saint Francois Co.: Dress 2318 (Ba). Taney Co.: E. L. Braun s.n. [July 9, 1938] (W-2712370). ARKANSAS: Hot Spring Co.: Demaree 18880 (Ba). LOUISIANA: Ouachita Par.: R. D. Thomas 6516 (Bl—244452). OKLAHOMA: Ottawa Co.: G. W. Stevens 2340 (Ba-photo). TEXAS: Brazos Co.: Fryxell 1265 (N). Dallas Co.: J. Reverchon 2533 (Ba--photo). Freestone Co.: Lundell & Lundell 11004 (Mi, Mi). Harris Co.: Tharp & Barkley 17030 (Bl—91491). Jasper Co.: Cory 52864 (Bl--90471). Smith Co.: H. E. Moore 636 (Ba). Tyler Co.: Lundell & Lundell 10945 (Mi). CULTIVATED: New Jersey: I. Collins s.n. [July 29, 1941] (Ba). New York: H. M. Fox s.n. [1941] (Ba); Herb. Bailey Hort. s.n. [1948] (Ba--photo). Pennsylvania: Peele 651 (Ba). LOCALITY OF COLLECTION UNDETERMINED: Herb. Linnaeus G.790, S.7 [Habitat in Virginia] (Ba--photo of type); Rugel s.n. [Ad vias et margines agrorum, per Georgiam infer. et Floridam med., Mart. 1843] (Bl—97105). MOUNTED ILLUSTRATIONS: Jacq., Hort. Bot. Vindob. 1: pl. 176 & 2: 82. 1772 (Ba-photo).

VERBENA CANADENSIS (L.) Britton x V. AMBROSIFOLIA Rydb.

Synonymy: "Glandularia canadensis x G. ambrosifolia" Solbrig

in Heywood, Mod. Meth. Pl. Tax. 88. 1968. "Verbena ambrosifolia Rydb. x V. canadensis (L.) Britton" ex Moldenke, Phytologia 26: 376, in syn. 1973.

Bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968; Moldenke, Phytologia 26: 373 & 376. 1973.

VERBENA CANADENSIS (L.) Britton x V. ELEGANS H.B.K.

Synonymy: Glandularia canadensis x elegans Solbrig in Heywood, Mod. Meth. Pl. Tax. 87. 1968. "Glandularia canadensis x G. elegans" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968. "Verbena elegans H.B.K. x V. canadensis (L.) Britton" ex Moldenke, Phytologia 26: 373 & 376, in syn. 1973.

Bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87 & 88. 1968; Moldenke, Phytologia 26: 373 & 376. 1973.

Solbrig (1968) reports the pollen fertility in this as yet unnamed hybrid is actually 98 percent!

VERBENA CANADENSIS (L.) Britton x V. MARITIMA Small

Synonymy: Glandularia canadensis x maritima Solbrig in Heywood, Mod. Meth. Pl. Tax. 87. 1968. "Glandularia canadensis x G. maritima" Solbrig ex Moldenke, Phytologia 26: 373, in syn. 1973. "Verbena maritima Small x V. canadensis (L.) Britton" ex Moldenke, Phytologia 26: 376, in syn. 1973.

Bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87. 1968; Moldenke, Phytologia 26: 373 & 376. 1973.

Solbrig (1968) reports the pollen fertility in this as yet unnamed hybrid as 61 percent. Since these two species overlap in their natural ranges in at least five counties of Florida, this hybrid may be expected in the wild and deserves nomenclatural recognition.

VERBENA CANADENSIS (L.) Britton x V. PERUVIANA (L.) Britton

Synonymy: "Glandularia canadensis x G. peruviana" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968. "Verbena peruviana (L.) Britton x V. canadensis (L.) Britton" ex Moldenke, Phytologia 26: 377, in syn. 1973.

Bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968; Moldenke, Phytologia 26: 373 & 376. 1973.

VERBENA CANADENSIS (L.) Britton & V. TAMPENSIS Nash

Synonymy: "Glandularia canadensis x G. tampensis" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968. "Verbena tampensis Nash x V. canadensis (L.) Britton" ex Moldenke, Phytologia 26: 377, in syn. 1973.

The natural ranges of these two species overlap in at least 4 counties of Florida, so the hybrid may be expected in the field and deserves nomenclatural recognition.

VERBENA CANESCENS H.B.K.

Additional synonymy: Verbena canescens H.B.K. ex Sanchez

Sanchez, Fl. Val. Mex., ed. 1, 327, sphalm. 1969.

Additional & emended bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328. 1840; Schau., Linnaea 20: 477. 1847; Paxt., Pock. Bot. Dict., ed. 2, 328. 1849; Gibert, Enum. Pl. Montevid. 43. 1873; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 327-328, fig. 262-A. 1969; El-Gazzar & Wats., New Phytol. 69: 458, 483, & 485, fig. 7. 1970; Rzedowski & McVaugh, Anal. Esc. Nac. Cienc. Biol. 19: 35 & 41. 1972; Moldenke, Phytologia 24: 21, 45, & 54 (1972) and 25: 234. 1973; Rickett, Wild Fls. U. S. 6 (3): 544 & 783. 1973.

Additional illustrations: Sanchez Sanchez, Fl. Val. Mex., ed. 1, fig. 262-A. 1969.

Recent collectors have found this plant growing in Abies woods, in "matorral" of Cordia boissieri, in trailside thickets, among vegetation of cacti, shrubs, and small trees, and on highly overgrazed dry roadsides adjacent to thorn-scrub woodlands with Opuntia and legumes. Cruz Cisneros found it in "abanico aluvial con pastizal alterado de Hilaria cenchroides, Bouteloua hirsuta y Erioseuron avenaceus." They have encountered it at altitudes of 300 to 2700 meters. Sanchez Sanchez (1969) informs us that it is "Abunda en los Remedios y la Sierra de Guadalupe" in the Valley of Mexico, flowering there from August to October.

The corollas are described as "lavender" on H. E. Moore 2746, "blue" on J. Rzedowski 24811, and "purple" on Roe & Rose 2418 and J. Rzedowski 24834. Paxton (1840) reports that the species was introduced into cultivation in England in 1824.

Gibert (1873) reduces V. canescens to synonymy under V. intermedia Gill. & Hook., a completely untenable disposition!

The Ifaguez 74, cited below, is a mixture with V. ciliata Benth., while Hidalgo & Anda s.n. [25/VI/1967] is a mixture with V. elegans H.B.K.

Additional citations: TEXAS: Bandera Co.: Johnson & Webster 566 (Bl-32870). MEXICO: Hidalgo: Hidalgo & Anda s.n. [25/VI/1967] (Ba); H. E. Moore 2746 (Ba). México: Cruz Cisneros 959 (Ws); Ifaguez 74, in part (Ws). Oaxaca: Messer 207a (Mi). San Luis Potosí: J. Rzedowski 24811 (Ws), 24834 (Ba). Tamaulipas: Roe & Rose 2418 (Ws).

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 24: 21 & 45. 1972.

The corollas are described as "purple" on C. L. Lundell 10956 & 10986, "purplish" on C. L. Lundell 10774, and "lavender with whitish eye" on C. L. Lundell 10972.

Additional citations: TEXAS: Brown Co.: J. Reverchon s.n. [Curtiss 1961] (Mi). Cameron Co.: C. L. Lundell 10774 (Mi). Kinney Co.: Strother 264 (Bl-198049). Medina Co.: C. L. Lundell 10986 (Mi). Sutton Co.: Rohrbaugh 385 (Bl-174977). Uvalde Co.: C. L.

Lundell 10956 (Mi), 10972 (Mi).

VERBENA CANIUENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 220. 1972.

Additional citations: BRAZIL: Paraná: Hatschbach 22284 (Ba).

VERBENA CAROLINA L.

Emended synonymy: Verbena caroliniana L. apud Desf., *Tabl. Écol. Bot.*, ed. 1, 54. 1804.

Additional bibliography: Raesch., *Nom. Bot.*, ed. 3, 2. 1797; Desf., *Tabl. Écol. Bot.*, ed. 1, 54. 1804; Willd., *Enum. Pl. Hort. Berol.* 2: 634. 1809; Desf., *Tabl. Écol. Bot.*, ed. 2, 66. 1815; Paxton, *Pock. Bot. Dict.*, ed. 1, 328. 1840; Schau., *Linnaea* 20: [476]—477. 1847; Paxton, *Pock. Bot. Dict.*, ed. 2, 328. 1849; Greene & Blomquist, *Fls. South* 109. 1953; Sanchez Sanchez, *Fl. Val. Mex.*, ed. 1, 327, fig. 262-B. 1969; Moldenke, *Biol. Abstr.* 56: 6374. 1972; Moldenke, *Phytologia* 23: 220, 222, 225, 268, 292, 293, & 302 (1972) and 24: 40, 126, & 141. 1972; Hocking, *Excerpt. Bot.* A.21: 117. 1973.

Additional illustrations: Sanchez Sanchez, *Fl. Val. Mex.*, ed. 1, fig. 262-B. 1969.

The "Verbena carolina L." of Lowe (1921) is actually Stylodon carneus (Medic.) Moldenke, as is also the "Verbena caroliniana" of Greene & Blomquist (1953). Neither has anything to do with the true V. carolina of Linnaeus. Raeschel (1797) says that V. carolina L. is from "Carolin.", but actually it is a Mexican and Central American species, coming north in the United States to Arizona and Nevada. The French vernacular name, "verveine de Caroline" is, therefore, misleading. Paxton (1840) states that it was introduced into cultivation in England in 1820 (the so-called V. veronicaefolia H.B.K. in 1825) but was to be regarded as "worthless".

Recent collectors have found V. carolina growing at the edge of cultivated fields, on roadsides and dry open roadsides, in pinelands, on riverbanks, in secondary vegetation and in oak woods, while Proctor refers to it as a "dooryard weed". Salinas M. encountered it at "orilla del panteón" and Martinez Calderón found it in soil "con grava volcanicas". It has been found in fruit in March (in addition to the months previously reported by me). González Tamayo says of it: "uso horchata para la bilis" and found it to be scarce in Jalisco. Sanchez Sanchez (1969) refers to the plant as "Es una maleza mexicana, florece los meses de junio y julio" and reports it from the pedregal in the Valley of Mexico.

The corollas are said to have been "blue" on Contreras 10972, S. López 89, C. L. Lundell 12209, and M. Nee 217, "clear-blue" on González Tamayo 168, "pale-blue" on Lundell & Lundell 12355, "white, tinged blue" on Lundell & Lundell 12391, "violet" on González Tamayo 376, and "purple" on Harker & Mellowes 35.

The Marcks & Marcks 794, distributed as V. carolina, is actual-

ly V. litoralis H.B.K., Schultes & Reko 237 is a mixture with V. litoralis, while H. H. Rusby 780 is V. macdougalii Heller.

Additional citations: MEXICO: Durango: Weber & Charette 11773 (Bl—176170). Federal District: S. López 89 (Ws); M. Nee 217 (Ws). Hidalgo: Lundell & Lundell 12391 (Mi). Jalisco: González Tamayo 168 (Mi), 376 (Mi); Harker & Mellowes 35 (Ws). México: C. L. Lundell 12209 (Mi); Lundell & Lundell 12355 (Mi); Salinas M. 85 (Ws). Oaxaca: Schultes & Reko 237, in part (Oa). Veracruz: Martínez Calderón 1765 [Rec. Inf. D005182] (Mi). GUATEMALA: Baja Veracoaz: Contreras 10972 (Ld, Ld). El Quiché: G. R. Proctor 25004 (Ld, Ld).

VERBENA CAROLINA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 185—186. 1972.

Recent collectors describe this as a "scarce annual herb" or "plant woody, 2 ft. tall", with white flowers, and have found it growing in secondary vegetation and in oak woods, at altitudes of 5 to 1600 meters. González Tamayo refers to it as abundant in Jalisco.

Additional citations: MEXICO: Jalisco: González Tamayo 304 (Mi). Oaxaca: Vilas 342 (Ws). Veracruz: Martínez Calderón 1352 [Rec. Inf. D000805] (Mi).

VERBENA CATHARINAE Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 186. 1972.

Recent collectors have found this plant growing on rocky campos. The corollas are said to have been "violet" in color on Hatschbach, Smith, & Klein 28313.

Additional citations: BRAZIL: Santa Catarina: Hatschbach, Smith, & Klein 28313 (Ld).

VERBENA CILIATA Benth.

Additional synonymy: Glandularia ciliata Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 89. 1968.

Additional bibliography: Schau., *Linnaea* 20: 477. 1847; Fedde & Schust. in Just, *Bot. Jahresber.* 60 (2): 575. 1941; Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 89. 1968; Sanchez Sanchez, *Fl. Val. Mex.*, ed. 1, 328, fig. 262-C. 1969; Moldenke, *Phytologia* 24: 21, 51, 54, & 242 (1972) and 28: 113. 1974.

Additional illustrations: Sanchez Sanchez, *Fl. Val. Mex.*, ed. 1, fig. 262-C. 1969.

Recent collectors describe this plant as 12.5—30 cm. tall or procumbent, spreading, forming clumps to 4 feet in diameter. They have encountered it in xerophilous "matorral" with Opuntia and Agave on volcanic slopes, on "campo labrado", in abandoned cultivated ground, and in wet loam of arroyos. It is referred to as "scarce" in the state of México by Rebolledo Vélez and in Jalisco by González Tamayo. Padilla found it on "ladera andesítica", while Roe, Roe, & Mori collected it on grazed roadsides and in

drainage ditches with Yucca, Bouvardia, and cacti in an area of mesquite-grassland now becoming desert. The Marcks encountered it in open pine forests coated with epiphytic lichens on thin black soils of a shallow former lake bed, the understory being composed of tufted grasses and dwarfed alpine herbs with bulbous underground storage organs. Sanchez Sanchez (1969) describes the plant as a "Maleza mexicana, que florece de julio a octubre", the corollas a violet when fresh, and inhabiting the "Desierto" areas in the Valley of Mexico.

The corollas are described as "lavender" on Roe, Roe, & Mori 23, "violet" on González Tamayo 146 & 250, "blue-violet" on Rebolledo Vélez s.n. [20.VIII.1967], "blue-purple" on Stuessy 959, "purple" on Genelle & Fleming 824, Lyonnet 2972, and Vilas 325, and "clear-violet" on González Tamayo 193.

The Iñiguez 74 collection is a mixture with V. canescens H.B.K. The Spellenberg & Spellenberg 3062 and W. A. Weber 3303, distributed as V. ciliata, are actually V. ambrosifolia Rydb., Marcks & Marcks 1231 is V. ciliata var. longidentata Perry, while Chilton s.n. [3/25/48] and Lehto, Brown, Nash, & Pinkava 10646 are V. gooddingii Briq., C. L. Hitchcock 25540 is V. gooddingii var. nepetifolia Tidestr., and Reverchon s.n. [Curtiss 1963**] and Ruth 110 are V. pumila Rydb.

Additional citations: ARIZONA: Gila Co.: Moldenke & Moldenke 27916 (Ac, Ld). Pinal Co.: Thorner s.n. [Oracle, May 28, 1905] (N). MEXICO: Chihuahua: Stuessy 959 (Bl—236250, Ws), 965 (Bl—236233). Coahuila: Roe, Roe, & Mori 23 (Ws). Durango: Matuda 38528 (Ac); Marcks & Marcks 1231 (Mi). Federal District: Lyonnet 2972 (W—2636373). Guanajuato: Genelle & Fleming 824 (N). Hidalgo: García Saucedo 2607 (Ws). Jalisco: González Tamayo 146 (Mi), 193 (Mi), 250 (Mi). México: E. R. García 60 (Ws); Iñiguez 74, in part (Ws); Padilla 117 (Ws); Rebolledo Vélez s.n. [20.VIII.1967] (Ws). Oaxaca: Vilas 325 (Ws). Puebla: Guerra 16 (Ws). Zacatecas: Rinehart 7346 (Mi).

VERBENA CILIATA var. LONGIDENTATA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 23: 188—190 & 192 (1972), 24: 51 (1972), and 28: 113. 1974.

Recent collectors have found this plant growing in sandy-loam soil of oak-pine associations and in an open pine forest coated with epiphytic lichens and on thin black soils of a former shallow lake bed, the understory consisting of tufted grasses and dwarfed alpine herbs with bulbous underground storage organs, at 2700 feet altitude. Fosberg describes the plant as prostrate, "common locally on flat open roadside, almost bare soil". The corollas are said to have been "purple" on F. R. Fosberg 44661.

Additional citations: TEXAS: Cameron Co.: C. L. Lundell 10656

(MI). Grimes Co.: L. C. Higgins 3951 (MI). San Patricio Co.: F. R. Fosberg 44661 (W-2677406). Zapata Co.: Novoa & Cantu 18a (Bl-210100). MEXICO: Durango: Marcks & Marcks 1231 (Ws).

VERBENA CILIATA var. PUBERA (Greene) Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 23: 188 & 190 (1972) and 24: 51. 1972.

Additional citations: NEW MEXICO: Catron Co.: Weber & Salamun 12771 (Bl-201253).

VERBENA CLAVATA Ruiz & Pav.

Additional & emended synonymy: Verbena clvaata Ruiz & Pav. ex Pers., Syn. Pl. 3: 346, sphalm. 1819. Verbena clvaara Ruiz & Pav. ex Moldenke, Fifth Summ. 2: 663, in syn. 1971.

Additional bibliography: Moldenke, Phytologia 23: 190-191 & 240 (1972) and 25: 244. 1973.

VERBENA CLOVERAE Moldenke

Additional bibliography: Moldenke, Phytologia 23: 220, 221, 242, & 376 (1972) and 24: 44, 45, & 139. 1972.

The corollas are said to have been "lavender" on C. L. Lundell 10823 and on Lundell & Lundell 10843.

Additional citations: TEXAS: Brooks Co.: C. L. Lundell 10823 (MI). Kenedy Co.: Lundell & Lundell 10843 (MI). Starr Co.: Clover 1618 (Tu-98742-isotype). Zapata Co.: Barrera 5 (Bl-197941); M. Gonzalez 5 (Bl-209416); Gonzalez & Gutierrez 33 (Bl-197938).

VERBENA COCHABAMBENSIS Moldenke

Additional bibliography: R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; Moldenke, Phytologia 23: 193. 1972.

VERBENA CORYMBOSA Ruiz & Pav.

Additional bibliography: Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 754 [372] & 823. 1941; Moldenke, Phytologia 23: 260. 1972; F. Perry, Fls. World 303 & 320. 1972.

Hatschbach encountered this plant growing in "brejo". The corolla is described as having been "violet" in color on Hatschbach 28316.

Additional citations: BRAZIL: Paraná: Hatschbach 28316 (Ld, N).

VERBENA CRITHMIFOLIA Gill. & Hook.

Additional bibliography: Moldenke, Phytologia 24: 21 & 30. 1972.

The corollas are said to have been "violet" in color on Krapovickas, Cristóbal, Mroginski, & Fernandez 22321 and the leaves are narrower than is usual for this species.

Additional citations: ARGENTINA: La Pampa: Krapovickas, Cristóbal, Mroginski, & Fernandez 22321 (Ld), 22598 (Ld). Río Negro: Krapovickas, Cristóbal, Mroginski, & Fernandez 22447 (Ld).

xVERBENA CROOKSHANKSI Moldenke

Additional bibliography: Rydb., Fl. Prairies & Plains, pr. 1, 678 (1932) and pr. 2, 2: 678. 1971; Moldenke, Phytologia 23: 195 & 435. 1972.

xVERBENA DEAMII Moldenke

Additional bibliography: Rydb., Fl. Prairies & Plains, pr. 1, 678. 1932; Fell, Fl. Winnebago Co. 122. 1955; Rydb., Fl. Prairies & Plains, pr. 2, 2: 678. 1971; Moldenke, Phytologia 23: 196. 1972.

Fell (1955) comments that "*X deamii* Moldenke, stout and semi-decumbent, resembling *V. stricta* but having bracted flowers, is uncommon on roadsides" [in Winnebago County, Illinois].

VERBENA DELTICOIA Small

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Biol. Abstr. 54: 1194. 1972; Moldenke, Phytologia 23: 221-222, 226, 237, & 278 (1972) and 24: 224. 1972.

The *J. Rzedowski* 27859, distributed as *V. delticola*, is actually *V. elegans* var. *asperata* Perry.

Additional citations: TEXAS: Cameron Co.: *M. C. Johnston* 54150 (Bl-91999); *C. L. Lundell* 10680 (Mi). MEXICO: *Nuevo León*: *Pringle* 11843 (Bl-149849).

VERBENA DISSECTA Willd.

Additional & emended bibliography: *Gibert*, Enum. Pl. Montevid. 43. 1873; *Rambo*, An. Bot. Herb. Barb. Rodr. 1: 123. 1949; *R. C. Foster*, Contrib. Gray Herb. 184: 170. 1958; *Cain*, Man. Veg. Anal., pr. 1, 229. 1959; *Solbrig* in *Heywood*, Mod. Meth. Pl. Tax. 89. 1968; *Angely*, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 838 & xix. 1971; *Cain*, Man. Veg. Anal., pr. 2, 229. 1971; *Moldenke*, Phytologia 24: 217 & 233. 1972.

Recent collectors have encountered this plant "among grass and weeds....flowers with strong but not unpleasant perfume." The corollas are said to have been "purple" on *Eyerdam & Beetle* 22317 and "purple-pink" on *Eyerdam & Beetle* 23039. The *Morong* 219, distributed as *V. dissecta*, is actually *V. tenuisecta* Briq. The Herb. Humboldt specimen cited below is deposited at Berlin.

Additional citations: CHILE: Province undetermined: *Née s.n.* [Herb. Humboldt] (Ba-photo of isotype). ARGENTINA: Buenos Aires: *Eyerdam & Beetle* 23039 (Ba). Catamarca: *Brizuela* 546 (Bl-105030), 1037 (Bl-105029). Córdoba: *Cuezzo* 901 (Bl-105031). Jujuy: *Eyerdam & Beetle* 22317 (Ba). Santa Fé: *Kuntze s.n.* [Ceres, Oct. 1892] (Ba-photo).

VERBENA DOMINGENSIS Urb.

Additional bibliography: *Moldenke*, Phytologia 23: 260. 1972.

Curtis collected this plant in open pine forests.

Additional citations: HISPANIOLA: Haiti: *J. T. Curtis s.n.* [July 27, 1944] (Ws).

VERBENA DUSENII Moldenke

Additional bibliography: Moldenke, Phytologia 23: 224—225. 1972.

Hatschbach describes this plant as procumbent or as an erect herb, 50 cm. tall. He found it growing in "brejo", flowering in September and November. The corollas on Hatschbach 27058 are said to have been "lilac" and on 25322 as "dark-lilac" in color when fresh.

Additional citations: BRAZIL: Paraná: Hatschbach 25322 (Ld), 27058 (Ld, N).

VERBENA EHREBERGIANA Schau., Linnaea 20: 477. 1847.

Additional bibliography: Schau., Linnaea 20: 477. 1847; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [thesis]. 1951; Moldenke, Phytologia 23: 225 & 293 (1972) and 24: 250. 1972.

It is worthy of note that this binomial was first validly published by Schauer in the volume of Linnaea cited above, part 4 (pp. 385—512) of which was published in August of 1847, while DeCandolle's "Prodromus", volume 11, to which the binomial is usually credited (even by the original "Index Kewensis"), was not published until November 26 of that year.

Recent collectors have found the plant growing on steep wet slopes in Quercus-Liquidambar woods. The corollas are said to have been "white" on H. E. Moore 3962. Kelly reports the vernacular name "alfombrilla cimarrona" and states that the plant is used medicinally by the Totonac Amerinds "para dolor del estomago".

Additional citations: MEXICO: Hidalgo: H. E. Moore 3962 (Ba). Veracruz: I. Kelly 182 (Ba), 310 (Ba).

VERBENA ELEGANS H.B.K.

Additional synonymy: Glandularia elegans (L.) Small ex Solbrig in Heywood, Mod. Meth. Pl. Tax. 82. 1968.

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328. 1840; Schau., Linnaea 20: 478. 1847; Paxt., Pock. Bot. Dict., ed. 2, 328. 1849; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Solbrig in Heywood, Mod. Meth. Pl. Tax. 82 & 87—89. 1968; Moldenke, Phytologia 23: 220, 225—229, 286, 414, 426, & 431 (1972), 24: 36, 37, 47, 48, 148, & 254 (1972), 25: 234 (1973), and 28: 113. 1974.

Recent collectors have found this plant growing in conifer woods, on roadside bankings, in the shade of oaks near streams, and in open meadows in fir woods, describing the stems as erect from rooting nodes, flowering in June (in addition to the months previously reported by me in this series of notes). The corollas are said to have been "bright-rose" in color on H. E. Moore 3123 and "reddish-purple" on H. E. Moore 3555. Paxton (1840) reports that the species was introduced into cultivation in England in 1840. The Hidalgo & Anda s.n. [25/VI/1967], cited below, is a mixture with V. canescens H.B.K.

Solbrig (1968) reports the pollen fertility of this species is

97 percent.

The H. E. Moore 1304, distributed as typical V. elegans, is actually V. elegans var. asperata Perry.

Additional citations: ARIZONA: Pima Co.: Gould & Haskell 3253a (B1--58404). MEXICO: Hidalgo: Anduaga A. 3 (Mi, Ws); Diáz B. s.n. [28.VIII.1966] (Ws); Hidalgo & Anda s.n. [25/VI/1967] (Ba, Ws); H. E. Moore 3123 (Ba), 3555 (Ba).

VERBENA ELEGANS H.B.K. x V. PERUVIANA (L.) Britton

Additional synonymy: "Glandularia elegans x G. peruviana" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87 & 88. 1968; Moldenke, Phytologia 23: 227, 426, & 431 (1972) and 24: 37--38. 1972.

Solbrig (1968) reports that the pollen fertility in this hybrid is only 9 percent!

VERBENA ELEGANS H.B.K. x V. PULCHELLA Sweet

Additional synonymy: "Glandularia elegans x G. pulchella" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87 & 88. 1968; Moldenke, Phytologia 23: 227 & 431 (1972) and 24: 47--48. 1972.

Solbrig (1968) reports the pollen fertility of this hybrid as only 24 percent.

VERBENA ELEGANS H.B.K. x V. STELIARIOIDES Cham.

Additional synonymy: "Glandularia elegans (L.) Small x G. stellaroides (Cham.) Schnack & Covas" ex Solbrig in Heywood, Mod. Meth. Pl. Tax. 82. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 82. 1968; Moldenke, Phytologia 23: 227--228 & 431. 1972.

VERBENA ELEGANS var. ASPERATA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 23: 226, 228--229, 286, & 414 (1972) and 24: 254. 1972.

Recent collectors describe this plant as an upright or rambling herb, 1 1/2 feet tall, the inflorescence elongating in fruit, and found it growing on the rocky walls and floor of a barranca and on "ladera pizarrosa con vegetación encinar". They record the additional vernacular name "alfombria". The corollas are said to have been "blue" on MacDougall H.519, "reddish-purple" on Lundell & Lundell 12392, "red-purple" on H. E. Moore 1304, "opening red RHS 52/A with darker eye, fading to pink RHS 55/C with darker eye" on Huttleston 2267, and "corolla-lobes opening purple-lavender RHS Fa 2 Red-Purple 67/B, fading lighter" on J. W. Peterson J.2007.

D. G. Huttleston, in a letter to me dated November 2, 1973, says that this plant, which he took to be xV. teasii Moldenke, "is a very

showy ornamental up until a severe freeze and is hardy [in Pennsylvania] when winters are mild. Its fruiting racemes never get to be much more than 3 inches long, but in other characteristics it seems to fit [xV. teasii]." Seeds were obtained from Conard-Pyle Company.

Additional citations: MEXICO: Hidalgo: Lundell & Lundell 12392 (Mi); H. E. Moore 1304 (Ba). Oaxaca: MacDougall H.519 (N). Querétaro: J. Rzedowski 27859 (Mi). CULTIVATED: Mexico: Philbrick 802 (Ba). Pennsylvania: Huttleston 2267 [Longw. Gard. 69514] (Ba); J. W. Peterson J.2007 (Ld).

xVERBENA ENGELMANNII Moldenke

Additional bibliography: Rydb., Fl. Prairies & Plains, pr. 1, 677. 1932; Fell, Fl. Winnebago Co. 123. 1955; Rydb., Fl. Prairies & Plains, pr. 2, 2: 677. 1971; Wherry, Bartonica 41: 79. 1971; Moldenke, Phytologia 23: 229--230, 265, & 436 (1972) and 24: 250. 1972.

Wherry (1971) records this hybrid from Montgomery County, Pennsylvania. The Hotchkiss 1561, cited below, is in beginning anthesis, but exhibits rather few flowers per spike and these rather widely separated, the spikes rather weak and very slender. It seems most probable to me, therefore, that it represents this hybrid.

Additional citations: DISTRICT OF COLUMBIA: Hotchkiss 1561 (W-1769203).

VERBENA EPHEDROIDES Cham.

Emended synonymy: Verbena sphenoides Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: xix, sphalm. 1971.

Additional & emended bibliography: Gibert, Enum. Pl. Montevid. 43. 1873; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839 & xix, map 1392. 1971; Moldenke, Phytologia 23: 260 & 437. 1972; A. L. Moldenke, Phytologia 23: 318. 1972.

Hatschbach refers to this plant as a shrub, 1.5 m. tall, and found it growing in "brejo", flowering and fruiting in April. The corollas are said to have been "lilac" in color on Hatschbach 24137 while fresh.

Additional citations: BRAZIL: Paraná: Hatschbach 24137 (N).

xVERBENA FERAX Moldenke

Additional synonymy: "Glandularia canadensis x G. racemosa" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968; Moldenke, Phytologia 23: 231. 1972.

VERBENA FILICAULIS Schau.

Additional & emended bibliography: Braga, Fl. Nordest., ed. 2, 476. 1960; Reitz, Sellowia 22: 145. 1970; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839 & xix, map 1392. 1971; Moldenke, Phytologia 23: 260. 1972.

Recent collectors refer to this plant as "erect", "decumbent", or "procumbent", and have found it growing in "brejo". Hatschbach encountered it "do campo limpo levemente úmido", flowering in March. The corollas are described as having been "violet" in color on Hatschbach 26549, Hatschbach, Smith, & Klein 28264, and "lilac" on Hatschbach 26225.

Additional citations: BRAZIL: Paraná: Hatschbach 20082 (Ba), 26225 (Ld), 26549 (Ld); Hatschbach, Smith, & Klein 28264 (Ld, Ld).

VERBENA GLABRATA H.B.K.

Additional bibliography: Moldenke, *Phytologia* 23: 222, 232—233, & 293 (1972) and 24: 30. 1972.

Soejarto describes this plant as a "small shrub; fragrant smell; used as remedy for colds" in Colombia. Recent collectors have encountered it in wet meadows, while Fosberg reports it "common in grassy places on top of low hills grazed by goats". My wife and I found it growing abundantly on grassy roadsides and along fencerows in Ecuador. The flowers are described on F. R. Fosberg 27646 as having the "corollas pale-lavender, calyces maroon". Material has been misidentified and distributed in some herbaria under the designation Lippia nodiflora L.

Additional citations: COLOMBIA: Nariffo: Soejarto 1010 (Oa). EC-UADOR: Chimborazo: F. R. Fosberg 27646 (W—2638259). Cotopaxi: Holm-Nielsen & Jeppesen 1147 (Ld). Pichincha: Asplund 16030 (W—2652459).

VERBENA GLUTINOSA Kuntze

Additional & emended bibliography: Schnack & Covas, *Darwiniana* 7: 72, 74, & 75, pl. 2 E. 1945; Moldenke, *Phytologia* 23: 234, 419, & 426. 1972.

VERBENA GOODINGII Briq.

Additional synonymy: Verbena goodingii Briq. ex Fedde & Schust. in *Just, Bot. Jahresber.* 54 (2): 747. 1934.

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 54 (2): 747 (1934) and 59 (2): 417. 1939; Moldenke, *Phytologia* 23: 368, 374, & 436 (1972) and 24: 45. 1972; Rickett, *Wild Fls. U. S.* 6 (3): 544 & 783. 1973; Moldenke, *Phytologia* 28: 111 & 113. 1974.

Recent collectors have come upon this plant in gravelly soil pockets on rock cliff faces, in flat desert country, along permanent streams in oak-Sonoran Desert zone, and in the Upper Sonoran life-zone with pinyons and junipers in sunny rocky washes. Wolf reports it as "common" and Holmgren says "locally common on basalt rocky slope". Lehto and his associates report that the plant is grazed in Pima County, Arizona. The corollas are described as having been "lavender" on Moran 17739, "lavender-blue" on C. B. Wolf 7021, "pale-violet" on Dress 2902, "pale-lilac" on Dress 3257, and "corolla-tube pale-yellow, lobes blue" on N. H. Holmgren 3308.

The McClintock 52-148, distributed as V. gooddingii, is actually var. nepetifolia Tidestr.

Additional citations: UTAH: Washington Co.: Gould 1730 (Bl--58352). NEVADA: Clark Co.: Train 1458 (Bl--23720). NEW MEXICO: Sandoval Co.: Plowman & Kilham AP.18 (Oa). ARIZONA: Cochise Co.: Vogel s.n. [9 June 1962] (Bl--172217). Coconino Co.: Dress 2902 (Ba). Maricopa Co.: Chilton s.n. [3/25/48] (Bl--130088). Mohave Co.: Gottam 13080 (Bl--100093); Dress 3257 (Ba); C. L. Hitchcock 25614 (Bl--215646); Hollister 509 (Bl--57766); N. H. Holmgren 3308 (W--2648317). Pima Co.: Lehto, Brown, Nash, & Pinkava 10646 (N). CALIFORNIA: San Bernardino Co.: C. B. Wolf 7021 (Ba). MEXICO: Baja California: Moran 17739 (Ld).

VERBENA GOODDINGII var. NEPETIFOLIA Tidestr.

Additional synonymy: Verbena gooddingii var. nepetifolia Tidestr. ex Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 747. 1934.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 747 (1934) and 59 (2): 417. 1939; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [typescr.]. 1951; Moldenke, Phytologia 23: 235--237 & 436 (1972) and 28: 111. 1974.

Recent collectors describe this plant as a repent herb, with slightly fragrant flowers. "occasional along arroyos" or "locally common in disturbed areas". Denham refers to it as "common and widespread in semi-desert" parts of Arizona. The corollas are said to have been "rose" colored on Moran 7893 or "corolla-lobes between RHS Mineral Violet 635/2 and 635/2, proximally greenish-white".

Material of this variety has been misidentified and distributed in some herbaria as V. ambrosifolia f. eglandulosa Perry.

Additional citations: ARIZONA: Cochise Co.: Denham 2055 (Bl--244703). Pima Co.: C. L. Hitchcock 25540 (Bl--215694). Yuma Co.: McClintock 52-148 (Bl--22614). MEXICO: Baja California: Bell & Newcomb 1356 (Bl--73739); Moran 7893 (Ba, Bl--200798); Moran, Witham, & Hommersand 16541 (Ba, Bl--240186). CULTIVATED: Pennsylvania: Peele 1041 [Longw. Gard. 63221] (Ba).

VERBENA GRACILESCENS (Cham.) Herter

Emended synonymy: Verbena offinalis var. graciliscens Cham. ex Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839, sphalm. 1971.

Additional & emended bibliography: Gibert, Enum. Pl. Montevid. 43. 1873; R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839. 1971; Moldenke, Phytologia 24: 217 (1972) and 25: 244. 1973.

The corollas are described as having been "blue" on Ruiz Huidobro 3182 & 3216 and on Rosengurt Gallinal 5803.

Additional citations: BOLIVIA: Santa Cruz: Peredo 423 (N). URUGUAY: Rosengurt Gallinal 5803 (Ba). ARGENTINA: Santa Fé: Ruiz Huidobro 3182 (Bl--104421), 3216 (Bl). Tucumán: Herrera 321 (N).

VERBENA GRACILIS Desf.

Additional bibliography: Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [typescr.]. 1951; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 328, fig. 263-A. 1969; Moldenke, Phytologia 23: 238-239, 242, & 374. 1972.

Additional illustrations: Sanchez Sanchez, Fl. Val. Mex., ed. 1, fig. 263-A. 1969.

Detling encountered this plant growing in a woodland of Pinus cembroides and Quercus toumeyii on a rolling plateau in Durango. Sanchez Sanchez found it (1969) in the pedregal of the Valley of Mexico, blooming there in July.

The Roe & Roe 2418, distributed as V. gracilis, is actually V. canescens H.B.K., while H. E. Moore 1625 is V. menthaefolia Benth. The Lemmon 2858, cited below, is probably an isotype of V. arizonica A. Gray. The label on the specimen reads "Tanner's Cañon, Huachuca Mts. July 1882. J. G. Lemmon 2858". The original description by Gray (1883) gives the locality of collection as "S. Arizona, in cañons near Fort Huachuca, Lemmon", with no collector's number nor date of collection indicated.

Additional citations: ARIZONA: Cochise Co.: Lemmon 2858 (Tu-163803). MEXICO: Durango: Detling 8411 (W-2669337).

VERBENA GUARANITICA (Troncoso) Moldenke

Additional bibliography: "S. K. J.", Biol. Abstr. 54: 2319. 1972; Anon., Biol. Abstr. 54 (4): B.A.S.I.C. S.276 (1972) and 54 (5): B.A.S.I.C. S.106 & S.272. 1972; Moldenke, Biol. Abstr. 54: 1725. 1972; Cabrera, Bol. Soc. Argent. Bot. 14: 258. 1972; Moldenke, Phytologia 23: 239-240, 301, 418, & 419 (1972) and 25: 240. 1973.

VERBENA HALEI Small

Additional bibliography: Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [typescr.]. 1951; Mahler, Keys Vasc. Pl. Black Gap, ed. 3, 70. 1971; Hyland, U. S. Dept. Agr. Pl. Invent. 178: 28 & 284. 1972; Moldenke, Phytologia 23: 219, 237, 240-244, & 302 (1972) and 24: 224 & 257. 1972; Rickett, Wild Fls. U. S. 6 (3): 544 & 783. 1973.

Recent collectors have encountered this plant in fields and along roadsides, in moist bottomland pastures, in oak-pine associations, and "on rocky hills with thin gravelly soil and oak-pine grassland". The corollas are described as "lavender" on Lundell & Lundell 10847 & 12107, "purple" on C. L. Lundell 10689, and "lavender-purple" on H. E. Moore 529.

Hyland (1972) reports this plant in cultivation, probably at Beltsville, Maryland, from seeds collected by Robert MacEwan in Bexar County, Texas.

Additional citations: SOUTH CAROLINA: Aiken Co.: Ellison & Ellison 1010 (B1-251005). GEORGIA: Dougherty Co.: Moldenke & Moldenke 26908 (Ac, Ba, Ld). FLORIDA: Leon Co.: Godfrey 56533a (Ba). Walton Co.: Moldenke & Moldenke 26734 (Ac, Ba, Ld, Ws). MISSISS-

IPPI: Harrison Co.: Richmond s.n. [Apr. 30, 1964] (Ba). LOUISIANA: Union Par.: Thomas & al. 13501 (Bl—244367). TEXAS: Bexar Co.: J. O. Perez 21 (Bl—209654). Cameron Co.: C. L. Lundell 10689 (Mi). Dallas Co.: Lundell & Lundell 12107 (Mi). Dimmit Co.: Ramirez & Cardenas 3 (Bl—209442). Frio Co.: Ramirez & Cardenas 25 (Bl—210679). Galveston Co.: Lindheimer 155 (Bl—262806). Gonzales Co.: L. H. Bailey 756 (Ba). Harris Co.: L. C. Higgins 3925 (Mi). Kenedy Co.: Lundell & Lundell 10847 (Mi). Lavaca Co.: Strother 185 (Bl—197849). Rusk Co.: C. E. Porter 51-1830 (Bl—81769). San Patricio Co.: Holden s.n. [Aransas City, 10 May 1890] (Mi). Smith Co.: H. E. Moore 529 (Ba). Webb Co.: Novoa & Cantu 10 (Bl—210116). MEXICO: Chihuahua: Pringle s.n. [Ortiz, Apr. 11, 1887] (Bl—149327). Tamaulipas: Dominguez M. & McCart 8183 (Bl—197825); Reséndez 9 (Bl—197872). Veracruz: Gutiérrez R. 218 (Ws). Zacatecas: Taylor & Taylor 6230 (N).

VERBENA HALEI f. ROSEIFLORA (Benke) Moldenke

Additional bibliography: Fedde & Schust. in Just, Bot. Jahrbuch. 60 (2): 575. 1941; Moldenke, Phytologia 23: 244. 1972.

Recent collectors have found this plant growing on roadbanks. The corollas are described as having been "pink" on Dress & Hansen 914.

Additional citations: GEORGIA: Charlton Co.: Dress & Hansen 914 (Ba).

VERBENA HASSLERANA Briq.

Additional bibliography: Stafleu, Internat. Code Bot. Nom. 425. 1972; Moldenke, Phytologia 23: 244 (1972) and 25: 368. 1973; Anon., Biol. Abstr. 56 (2): B.A.S.I.C. S.280. 1973; Moldenke, Biol. Abstr. 56: 653. 1973.

VERBENA HASSLERANA var. GIANDULOSA Moldenke, Phytologia 25: 368. 1973.

Bibliography: Moldenke, Phytologia 25: 368 (1973) and 26: 363. 1973; Anon., Biol. Abstr. 56 (2): B.A.S.I.C. S.280. 1973; Moldenke, Biol. Abstr. 56: 653. 1973.

Citations: BRAZIL: Mato Grosso: Hatschbach 29600 (Z-type).

VERBENA HASTATA L.

Additional synonymy: Verbena urticae fol. angustiore flore coerul. Herm. ex Rivin., Introd. Gen. Rem Herb. Ord. Pl. Irreg. Monop. [24]. 1690. Verbena hastata ~~ex~~ floribus violaceis Willd., Enum. Pl. Hort. Berol. 2: 633. 1809.

Additional & amended bibliography: Rivin., Introd. Gen. Rem Herb. Ord. Pl. Irreg. Monop. [24], pl. [57]. 1690; Raesch., Nom. Bot., ed. 3, 3. 1797; Desf., Tabl. Ecol. Bot., ed. 1, 55. 1804; Willd., Enum. Pl. Hort. Berol. 2: 633. 1809; Desf., Tabl. Ecol. Bot., ed. 2, 66. 1815; S. Ell., Sketch, pr. 1 & 2, 2: 97—98 (1821) and 2: 743. 1824; Bigel., Florul. Boston., ed. 1, 238—239. 1824; J. Torr., Compend. Fl. 238. 1826; Mohl., Ann. Sci. Nat., ser.

2, 3: 319. 1835; Bigel., *Florul. Boston.*, ed. 3, 254. 1840; *Paxt.*, *Pock. Bot. Dict.*, ed. 1, 328. 1840; J. Torr., *Fl. N. Y.* 2: 51—52. 1843; *Paxt.*, *Pock. Bot. Dict.*, ed. 2, 328. 1849; O. R. Willis, *Fl. Westchester Co.* 801. 1880; J. L. Bennett, *Pl. Rhode Isl.* 30. 1888; K. Brandeg., *Zoe* 4: 216. 1893; J. Jacks., *Fl. Worcester Co.*, ed. 2, 40. 1894; W. Stone, *Rep. N. J. State Mus.* 1910 (2): 660 & 661. 1911; W. C. Ferguson, *Torreya* 25: 113. 1925; Wangerin in *Just, Bot. Jahresber.* 53 (2): 644. 1925; Blewitt, *Fl. Waterbury* 105. 1926; Clute, *Am. Botanist* 33: 112. 1927; Tischler, *Tabul. Biol.* 4: 43. 1927; Grieve, *Modern Herb.*, pr. 1, 2: 832. 1931; Bemmer, *Fl. Bucks Co.* 255. 1932; Rydb., *Fl. Prairies & Plains*, pr. 1, 677—678 & 967, fig. 479. 1932; Wangerin in *Just, Bot. Jahresber.* 56 (1): 668. 1935; Oertel, *U. S. Dept. Agr. Circ.* 554: 35. 1939; Martin, *Zim, & Nels.*, *Am. Wildlife & Pl.*, pr. 1, 444. 1951; W. A. Weber, *Handb. Pl. Colo. Front Range*, ed. 1, 156—157. 1953; L. Bradley, *Ferns & Flow. Pl. Audub. Center* 67 & 100. 1955; Fell, *Fl. Winnebago Co.* 122. 1955; C. E. Phillips, *Weeds Northeast* 32 & 80. 1956; Martin, *Zim, & Nels.*, *Am. Wildlife & Pl.*, pr. 2, 444. 1961; W. A. Weber, *Handb. Pl. Colo. Front Range*, ed. 2, 156—157. 1961; Nair & Rehman, *Bull. Nat. Bot. Gard. Lucknow* 76: 3—5, text fig. 5. 1962; Grieve, *Modern Herb.*, pr. 2, 2: 832. 1967; W. A. Weber, *Rocky Mtn. Fl.*, ed. 1, 306. 1967; Betz & Cole, *Trans. Ill. Acad. Sci.* 62: 48. 1969; Stuckey & Wentz, *Ohio Journ. Sci.* 69: 237. 1969; Delorit, *Illustr. Tax. Man. Weed Seeds* 96 & 97. 1970; [Morris Co. Park Comm.] *Anon.*, *Fl. & Fauna Great Swamp*, ed. 1, 12. 1971; Eilers, *Univ. Iowa Stud. Nat. Hist.* 21: 60 & 123. 1971; S. Ell., *Sketch*, pr. 3, 2: 97—98 & 743. 1971; Ellis, Wofford, & Chester, *Castanea* 36: 242. 1971; Rydb., *Fl. Prairies & Plains*, pr. 2, 2: 677—678 & 967, fig. 479. 1971; Sipple, *Bartonia* 41: 27. 1971; Wherry, *Bartonia* 41: 79. 1971; Chuey, *Ohio Journ. Sci.* 72: 43. 1972; D. S. & H. B. Correll, *Aquat. & Wetland Pl. SW. U. S.* 1396, [1398], & 1399, fig. 654. 1972; Crum, *Proc. Iowa Acad. Sci.* 78: 86. 1972; Farnsworth, *Pharmacog. Titles* 7 (8): xxvii & item 16419. 1972; Moldenke, *Biol. Abstr.* 54: 1729. 1972; Nettleton & al., *Detect. Potent. Antitumor Agents (mss.)* 1972; W. A. Weber, *Rocky Mtn. Fl.*, ed. 2, 306. 1972; Wilkinson & Jaques, *How Know Weeds*, ed. 2, 124, 207, 219, 222, 228, & 231, fig. 299 & 300. 1972; Moldenke, *Phytologia* 24: 21—22, 51, 135, 224, 230, 247, & 249 (1972) and 25: 225 & 227. 1973; Cody, *Ind. Sem.* 1973: 26. 1973; Farnsworth, *Pharmacog. Titles* 6, *Cum. Gen. Ind.* [121] (1973) and 8 (6): x & 479. 1973; Lomasson, *Nebr. Wild Fls.* 86 & 184. 1973; A. L. Moldenke, *Phytologia* 25: 167. 1973; Ralph, *Checklist Vasc. Pl. Plant Comm.* 29. 1973; Rickett, *Wild Fls. U. S.* 6 (3): 544, [545], & 783, pl. 196. 1973; Rimpler & Schafer, *Tetrahed. Let.* 17: 1463—1464. 1973; W. Stone, *Pl. South. N. J.*, pr. 2, 660. 1973.

Additional & emended illustrations: Rivin., *Introd. Gen. Rem Herb. Ord. Pl. Irreg. Monop. pl.* [57]. 1690; Rydb., *Fl. Prairies & Plains*, pr. 1, 678, fig. 479. 1932; Martin, *Zim, & Nels.*, *Am. Wildlife & Pl.*, pr. 1, 444 (1951) and pr. 2, 444. 1961; Delorit, *Illustr. Tax. Man. Weed Seeds* 97 (in color). 1970; Rydb., *Fl. Prairies & Plains*, pr. 2, 2: 678, fig. 479. 1971; Wilkinson &

Jaques, How Know Weeds, ed. 2, 124, fig. 299. 1972; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. [1398], fig. 654. 1972; Rickett, Wild Fls. U. S. 6 (3): [545], pl. 196 (in color). 1973.

The Corrells (1972) comment that "In dry fields and pastures a field-form is developed with the leaves more canescent-puberulous beneath and slightly rough above, the stem many-branched, and the terminal inflorescences in many groups, all more or less equally dense". My son, my wife, and I have observed this curious form many times in dry pastures in the mid-western states. It seems to me to be worthy of nomenclatural recognition, but this has as yet not been done.

Crum (1972) records V. hastata from Black Hawk County, Iowa, where he notes that it inhabits marsh edges and moist prairies, is frequent, and flowers in July. Ellis, Wofford, & Chester (1971) record it from Trigg County, Kentucky. Wherry (1971) found it in Montgomery County, Pennsylvania. Wilkinson & Jaques (1972) describe the species as "Common in moist places", flowering from June to September. Bradley (1955) records it as "fairly common in open swamps" in Fairfield County, Connecticut. Benner (1932) reports it as frequent in low ground, especially in waste places, and cites from Bucks County, Pennsylvania, a collection by Ruth from Monroe, by Long from Rich Hill, Morrisville, Emilie, and Grenoble, by Fretz from Pleasant Point, by Meredith from Doylestown, and by MacElwee from Tullytown.

Torrey (1843) gives its habitat in New York state as "Wet meadows and margins of creeks", blooming from July to September. In the experience of my son, my wife, and myself in observing this species for many years in the northeastern and middle Atlantic states, this is an accurate description of its normal habitat in this portion of its range. Eilers (1971) records it as common in marshes, on moist prairies, and in open alluvial woods in Benton, Black Hawk, Bremer, Buchanan, Butler, Cerro Gordo, Chickasaw, Delaware, Floyd, Grundy, Hardin, Johnson, Linn, and Winneshiek Counties, Iowa. Raeschel (1797) gives its native home as "Canada". Sone (1911) describes it as "One of the components of the typical late summer flora of the damp meadows and swamps of the Middle district [of New Jersey] along with Eupatorium maculatum, E. perfoliatum, Asclepias pulchra, Vernonia noveboracensis, etc." He also notes that it inhabits "Open moist ground" and is "common throughout the State, except in the Pine Barrens, where it is absent", flowering from "Late June to early September". Paxton (1840) tells us that it was introduced into cultivation in England in 1810, but is "worthless" horticulturally.

Fell (1955) says that in Winnebago County, Illinois, V. hastata is "Common on roadsides and in open woods and pastures but usually in damp soil. X rydbergii Moldenke, a hybrid with V. stricta is common and variable." Blewitt (1926) records V. hastata as frequent at Waterbury, Connecticut, in "Fields, roadsides and waste places, in moist and dry soil", flowering there in July and August. Willis (1880) reports it from "Waste places about dwellings" in Westchester County, New York. Oertel (1939) states that it is a

honey and pollen plant in Texas, while Martin and his associates (1951) assert that its seeds are eaten by such birds as the stilt sandpiper, lark bunting, cardinal, junco, and field, song, swamp, tree, and white-crowned sparrows and the entire plant is eaten by cottontail rabbits.

Stuckey & Wentz (1969) report that V. hastata is an infrequent species upstream from Lima, Ohio, inhabiting river bottoms. Pollution of the river has caused it to be completely absent now downstream from that city. The same is now true of Eleocharis obtusa, Eupatorium perfoliatum, Juncus torreyi, Scirpus atrovirens, Sium suave, and Sparganium eurycarpum. These same species are widespread and generally common in roadsides and drainage ditches where the city pollution into the river has not reached them.

It should be noted that the "Verbena pinnatifida Lam." of Nair & Rehman (1962) is most probably a misidentification of V. tenuisecta Briq. The O. E. White s.n. [27 Aug. 1946], distributed as V. hastata, is actually var. scabra Moldenke.

Recent collectors have found V. hastata growing in meadows, open pond banks, and wet soil in general. The corollas on Moldenke & Moldenke 9886 are described as having been "blue", but since I am more or less colorblind to reds, it is probable that they were actually the normal purple of the typical form of this species.

Delorit (1970) describes the seeds of V. hastata as follows: "Oblong in outline; about the same width throughout. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where they join. Both ends of the seed usually bluntly rounded. Dorsal side usually with three to five weak but rather broad-based longitudinal ribs with a few weak transverse ribs which frequently occur only between the margins and the first adjacent longitudinal rib. Transverse ribs usually occur only in the upper one-fourth to one-third of the seed. Seed scar oval, oblique, white. Dark reddish-brown to almost black, 1.7--2.0 mm long, 0.7--0.9 mm wide."

Rimpler & Schafer (1973) have isolated the chemical "hastatocid" from this species and V. officinalis L.

The corollas on E. C. Leonard 20629 are described as having been "purple", the usual color for the typical form of this species, in spite of the fact that the most commonly used English vernacular name for it is "blue vervain", perhaps indicating a wider prevalence of red-colorblindness in the general populace than is usually assumed.

The H. G. Smith s.n. [Berkeley, Colo.], cited by me in a previous installment of these notes as typical V. hastata, seems better placed as var. scabra Moldenke, as are also the Ramaley 12393 & 12890 distributed in some herbaria as typical V. hastata. Hotchkiss 1561 is probably xV. engelmannii Moldenke, Horr 4691 is xV. rydbergii Moldenke, and Field Mus. Econ. Pl. 5669 is not verbenaecous.

Additional citations: QUEBEC: Sherbrooke Co.: Poulin & Legault

8507 (Bl—210631). Wolfe Co.: Blais, Hamel, & Legault 11498 (Bl-222085); Hamel 13050 (Bl—223418). VERMONT: Windham Co.: Moldenke & Moldenke 9886 (Ba). NEW YORK: Ontario Co.: A. H. Graves s.n. [Aug. 29, 1923] (Ba), s.n. [Aug. 22, 1924] (Ba). Queens Co.: Wendolowski s.n. [July 22, 1896] (Ba). Schuyler Co.: McCarty s.n. [Watkins, Aug. 1887] (Ba). NEW JERSEY: Middlesex Co.: Kelsey 173 (Ba). MARYLAND: Garrett Co.: E. L. Braun s.n. [VII-25-06] (W—2712375). Harford Co.: Shull 156 (W—640955). Prince Georges Co.: Knowlton s.n. [July 25, 1897] (W—336825); E. C. Leonard 19422 (W—1895457, W—1895458), 20629 (W—2162717, W—2162718). Plummer's Island: Killip 31909 (W—2761259). DISTRICT OF COLUMBIA: Collector undesigned s.n. [First Locks in Potomac] (W—221211); Eseltine 157 (W—642215); E. C. Leonard 466 (W—2163036); Seaman s.n. (W—787355); Steele s.n. [July 16, 1896] (W—364285, W—364286); Tidestrom 8294 (W—1769327); Ward s.n. [Aug. 12, 1877] (W—147576), s.n. [1878] (W—2761249, W—2761250), s.n. (W—155633). VIRGINIA: Fairfax Co.: W. Palmer s.n. [Aug. 10, 1901] (W—1438795). Fauquier Co.: Allard 5349 (W—1787552). OHIO: Hamilton Co.: E. L. Braun s.n. [IX-3-03] (W—2712376). Lorain Co.: Dick s.n. [August 9, 1894] (Mi). INDIANA: Lake Co.: Shimek s.n. [Sept. 1, 1920] (Bl—105243). Madison Co.: McCoy 2237 (Bl—131299). KENTUCKY: Boone Co.: E. L. Braun 3314 (W—2667625). MINNESOTA: Mahanomen Co.: R. G. Baker s.n. [June, July 1964] (Bl—214584). COLORADO: Weld Co.: Arp 1351 (Bl—250952). NEBRASKA: Cherry Co.: G. N. Jones 35870 (Bl—191350). OKLAHOMA: Muskogee Co.: Wallis 7728 (Ba). LOCALITY OF COLLECTION UNDETERMINED: Burke s.n. [Snake country] (Pd); Field Mus. Econ. Pl. 271190 (Oa).

VERBENA HASTATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 266. 1972.

Lawrence & Dress describe this as a perennial plant, 1 m. tall, with white flowers, growing in marshy ground, flowering and fruiting in August.

Additional citations: NEW JERSEY: Ocean Co.: Lawrence & Dress 570 (Ba).

VERBENA HASTATA f. CAERULEA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 266—267. 1972.

The corollas on E. C. Leonard 19915 are described as having been "bright-blue" when fresh.

Additional citations: MARYLAND: Prince Georges Co.: E. C. Leonard 19915 (W—1873203).

VERBENA HASTATA f. ROSEA Cheney

Additional synonymy: Verbena hastata β floribus rubris Willd., Enum. Pl. Hort. Berol. 2: 633. 1809.

Additional bibliography: Willd., Enum. Pl. Hort. Berol. 2: 633. 1809; Moldenke, Phytologia 23: 267 & 414. 1972.

VERBENA HASTATA var. SCABRA Moldenke

Additional bibliography: K. Brandeg., *Zoe* 4: 216. 1893; D. S. & H. B. Correll, *Aquat. & Wetland Pl. SW. U. S.* 1396 & 1399. 1972; Moldenke, *Phytologia* 23: 262, 264, 265, & 267-268. 1972; A. L. Moldenke, *Phytologia* 25: 167. 1973.

Recent collectors have found this plant growing in low meadows and in sandy soil of Yucca-Artemisia-Rhus communities. Brandege refers to it as "very abundant, 5-8 feet tall" on Bouldin Island, California. It has been collected in flower and fruit in August and at altitudes up to 4500 feet. The Corrells (1972) assert that it "differs in its more rigid leaves that are conspicuously scarious above and often more or less conspicuously pubescent beneath". They state that it is known from Hemphill County, Texas, and give its overall distribution as "a western form of the species, B.C., Ida., Mont. and N.D. to Calif., N. M. and Tex., e. to Wisc. and Kan."

The Over 7079, Ramaley 12393 & 12890, and H. G. Smith s.n., cited below, were previously reported by me as typical V. hastata in this series of notes before the variety was recognized nomenclaturally.

Additional citations: SOUTH DAKOTA: Washabaugh Co.: Over 7079 (Bl-42326). UTAH: Salt Lake Co.: F. E. Leonard s.n. [July 17, 1884] (Mi). COLORADO: Boulder Co.: W. A. Weber 13388 (Bl-218522). Denver Co.: H. G. Smith s.n. [Berkeley, Aug. 2, 1901] (Bl-42312). Las Animas Co.: C. M. Rogers 4981 (Bl-55579). Weld Co.: Ramaley 12393 (Bl-42316), 12890 (Bl-42315). NEBRASKA: Holt Co.: O. E. White s.n. [27 Aug. 1946] (W-2646207). TEXAS: Potter Co.: L. C. Higgins 4842 (Mi). WASHINGTON: Yakima Co.: Kruckeberg 2545 (Bl-79935).

VERBENA HATSCHBACHI Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 268. 1972.

The corollas on Hatschbach 24707 are described as having been "violet" in color when fresh. This collector refers to the plant as procumbent and found it flowering in September.

Additional citations: BRAZIL: Paraná: Hatschbach 24707 (N).

VERBENA HAYEKII Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 268 & 270. 1972.

This plant has been collected in flower in October (in addition to the months previously recorded by me in these notes). Material has been misidentified and distributed in some herbaria under the name V. littoralis H.B.K.

Additional citations: PERU: Cuzco: E. L. Johnson 6310 (Bl-55080).

VERBENA HIRTA Spreng.

Additional & amended bibliography: Reitz, *Sellowia* 22: 145. 1970; Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 839, map

1392. 1971; Moldenke, *Phytologia* 23: 268—269. 1972; A. L. Moldenke, *Phytologia* 23: 318. 1972.

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

The Eitens describe this plant as a low shrub and found it growing at altitudes of 2300—2450 meters on open sedge-grass slopes and "On planalto of steep hilly terrain, many hills topped with mountainous outcrops of bare sienite quartz, the hillsides with frequent rounded outcropping quartz rocks and boulders and a thin black almost pure humus soil supporting a periodically-burned natural tussock sedge-grassland with scattered low Chusquea bamboo and occasionally other shrubs, the lower valley sides often with dense Chusquea brakes or brooks lined with a marsh of Cladium in tussocks or with 'trunks' of massed rhizomes." Hatschbach reports that the plant grows to 35 cm. tall and found it growing on campos and on "campo seco limpo".

The corollas are described as having been "lilac" in color on Hatschbach 25608, 25843, & 26440, "violet" on Hatschbach, Smith, & Klein 28312 and Krapovickas, Cristóbal, & Maruñak 23375, "purple" on Eiten & Eiten 6660, and "light-violet with a violet center" on Eiten & Eiten 6611.

Additional citations: BRAZIL: Paraná: Hatschbach 25608 (N), 25843 (Ld), 26440 (Ac). Rio de Janeiro: Eiten & Eiten 6611 (W—2687599), 6660 (W—2687722). Santa Catarina: Hatschbach, Smith, & Klein 28312 (Ld). ARGENTINA: Misiones: Krapovickas, Cristóbal, & Maruñak 23375 (Ld).

VERBENA HIRTA var. GRACILIS Dusén

Additional bibliography: Moldenke, *Phytologia* 23: 269. 1972.

The corollas on Hatschbach & Guimarães 25403 are said to have been "lilac" in color when fresh and these collectors describe the plant as a subshrub, 40 cm. tall, growing in a dry campo.

Additional citations: BRAZIL: Paraná: Hatschbach & Guimarães 25403 (N).

VERBENA HISPIDA Ruiz & Pav.

Additional & emended bibliography: Part., *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed. 2, 328. 1849; Anon., *Kew Bull. Misc. Inf.* 1929, App. 3: 108. 1929; R. C. Foster, *Contrib. Gray Herb.* 184: 170. 1958; Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 839. 1971; Beadle, Evans, Carolin, & Tindale, *Fl. Sydney Reg.*, ed. 2, 507. 1972; Moldenke, *Phytologia* 23: 269—270 & 291. 1972; A. L. Moldenke, *Phytologia* 23: 318. 1972.

According to Paxton (1840) this species was introduced into cultivation in England in 1816; the form known as V. glandulosa in 1832. Beadle and his associates (1972) state that the species is "Rare" in the Sydney, Australia, region, "Introd. from S. Amer.", and the plants always "under 1 m high", with "Glandular hairs present on inflorescence". The corollas are said to have been "pale-

mauve" on Alston 1603.

Material of V. hispida has been misidentified and distributed in some herbaria as V. officinalis L. and V. rigida Spreng.

Additional citations: SOUTH AFRICA: Cape Province: Lake 2999 (Ba). CEYLON: Alston 1603 (Pd). CULTIVATED: Ceylon: Collector undetermined s.n. [Hakegala Botanical Garden, Jan. 1888] (Pd).

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 368 & 426. 1972.

The corollas on Rufz Leal 20012 are said to have been "rose to lilac" in color when fresh.

Additional citations: ARGENTINA: Mendoza: Rufz Leal 20012 (Tu--162422).

VERBENA HUMIFUSA Cham.

Additional bibliography: Moldenke, *Phytologia* 24: 218. 1972.

Additional citations: BRAZIL: State undetermined: Sellow s.n. (Ba--cotype).

xVERBENA HYBRIDA Voss

Additional synonymy: "Verbena grandiflora Sessé & Moc. var. Hybr. Hort." ex Lasser, Braun, & Steyerl., *Act. Bot. Venez.* 9: 36, nom. nud. 1974. Verbena multiflora gigantea Burpee, *Burpee Seeds* 1974: 54. 1974.

Additional & emended bibliography: Dupuis, *Nouv. Fl. Usuel. & Med.* 2: 158. 1860; Tischler, *Tabul. Biol.* 4: 43. 1927; Gough, *Gard. Book Malaya* 248. 1928; Furusato, *Bot. & Zool. Theoret. & Appl. Tokyo* [Syokubutu Oyobi Dobutsu] 8: 46. 1940; Wherry, *Horticulture* 36: 279. 1958; Braga, *Pl. Nordest.*, ed. 2, 476. 1960; Graf, *Exotica* 3: 1483 & 1733. 1963; Badhwar & Fernandez, *Edible Wild Pl. Himal.* 283. 1968; Misra, *Bull. Bot. Surv. India* 12: 136. 1970; Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 839. 1970; Ellis, Wofford, & Chester, *Castanea* 36: 242. 1971; Burpee, *Burpee Seeds & Everything for Gard.* 56. 1972; Encke & Buchheim in Zander, *Handwörterb. Pflanzennam.*, ed. 10, 520 & 544. 1972; Huang, *Pollen Fl. Taiwan* 244, pl. 163, fig. 8--11. 1972; Moldenke, *Phytologia* 24: 218 & 232. 1972; G. W. Park, *Parks Flow. Book* 1973: 86. 1972; F. Perry, *Fls. World* 303 & 320. 1972; R. R. Stewart in Nasir & Ali, *Fl. West Pakist.* 608. 1972; R. J. Weaver, *Pl. Growth Subst. Agr.* 136. 1972; D. E. Clark, *Color in Your Gard.*, ed. 2, 18, 45, & 52. 1973; Jackson & Perkins, *Seedbook 1972-1973*: 18. 1973; Moldenke, *Phytologia* 25: 226 & 234. 1973; Moldenke in Woodson, Schery, & al., *Ann. Mo. Bot. Gard.* 60: 44--45 & 48. 1973; W. A. Burpee, *Burpee Seeds* 1974: 54. 1974; Lasser, Braun, & Steyerl., *Act. Bot. Venez.* 9: 36. 1974.

Additional illustrations: Burpee, *Burpee Seeds & Everything for Gard.* 56. 1972; Graf, *Exotica* 3: 1483. 1963; Huang, *Pollen Fl. Taiwan* pl. 163, fig. 8--11. 1972; F. Perry, *Fls. World* 303 (in color). 1972; Jackson & Perkins, *Seedbook 1972-1973*: 18 (in color).

1973; G. W. Park, Parks Flow. Book 1973: 86 (in color). 1973; W. A. Burpee, Burpee Seeds 1974: 54 (in color). 1974.

Burpee (1972) offers a cultivar named "Ruffled White" which he describes as "Superb sweetly scented variety producing large well-filled trusses of pure white flowers so freely the display has the appearance of a white carpet" and offers it in a packet of seeds for 75 cents, 1/16 ounce for \$2.25, 1/2 ounce for \$4.25, and 3/4 ounce for \$8. He offers "Rainbow Mixed Colors" ("Early flowering, upright plants. Ideal for pots, window boxes and bedding. Wide color range. Ht. 8 in."), "Ideal Florists' Mixed Colors" ("Earliest free-flowering strain with large flowers in an exceptionally wide range of colors. Most of them 'eyed'. Height 10 in."), "Sparkle Mixed Colors" ("Very good rich range of colors"), and "Finest Mixed Colors" ("Includes rose-pink, lavender, blue, white, violet, salmon-pink, scarlet and red shades. Many 'eyed'"). In his 1974 work he adds "Ruffled Pink" — a "delicate salmon-pink, better foliage, earlier and more vigorous than Miss Susie." He describes his "Ruffled" types as a "Unique multiflora gigantea type bearing semi-double ruffled flower clusters that look like balls of color", 10 inches tall. He also refers to these as "Burpee's Semi-Double".

Jackson & Perkins (1973) offer a "Florist Strain Mixed" Verbena which they describe as "will provide a low growing carpet of bright clear color all summer. Our variety grows a neat 8 to 10 inches high and spreads to 18 inches - quickly filling window boxes or flower pots. Florist Mix includes white, pink, purple, scarlet - many of which are accented with white in the center. The more of the sweet-smelling branches you cut, the more new shoots the hardy little plants will produce."

Lasser, Braun, & Steyermark (1974) record this plant as cultivated in Venezuela. My wife and I personally saw it widely cultivated in Ceylon, India, and Pakistan in 1974, and I saw it also growing in parks and home flowerbeds in Egypt that same year.

It seems most probable that the "Verbena phlogiflora Cham." of Huang (1972) is actually xV. hybrida. Ellis and his associates (1971) record xV. hybrida as growing wild in Lyon County, Kentucky, doubtless escaped from cultivation or merely persistent after cultivation. Misra (1970) asserts that it is a "Weed in shade" in Bihar, India.

J. W. Peterson describes the corollas of his collection, cited below, as "corolla lobes RHS Neyron Rose 623/1 distally, proximally RHS Neyron Rose 623; throat of lobes white". Bayliss encountered the plant in cultivation at 5600 feet elevation in South Africa.

Burkill (1966) says "The garden V. hybrida hort., seems to have been evolved by the hybridization of four species, V. chamaedryfolia, Juss., V. phlogiflora, Cham., V. incisa, Hook., and V. teucrioides, Gill. and Hook.; but the history is not quite clear. All the four species are South American plants, and were brought together in gardens in the nineteenth century. V. hybrida does not fruit in Malaysia, as the climate is too moist. The presumed parents are perennials...."

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"FLORA PALAESTINA" Volume Two Platanaceae to Umbelliferae by Michael Zohary. Part I - Text - viii & 493 pp., illus. Part II - Plates - 656 & xxxviii pp., illus. The Israel Academy of Sciences and Humanities, Jerusalem. 1972. \$30.00.

This carefully written text and its accurately illustrated companion in this second volume continue with the same botanical and printing excellence that was appreciated in a recent issue of this journal. It has been over four decades since the last comprehensive botanical study has been published for this important area of our world.

"WATER ATLAS OF THE UNITED STATES" 2nd Edition by James J. Geraghty, David W. Miller, Frits van der Leeden & Fred L. Troise, [200] pp., illus., Water Information Center, Port Washington, New York 11050. 1973. \$35.00.

"The authors and the publisher would like to regard this book as a contribution to help the International Hydrological Decade program fulfill its expressed need for practical water resources publications." A very valuable and effectively organized contribution indeed!

The book size of 13 1/2 by 9 inches allows for the most efficient display of the 86 plates, all drawn to scale for our conterminous 48 states. On similar separate scales there are 20 plates for Alaska and 16 for Hawaii, our other two states. On the opposing pages there are descriptive and analytic texts. On each map much uncluttered, graphically neat material is shown, such as: physiography, precipitation in each form, frost penetration, air and surface water temperatures, seasons of highest and lowest surface water run-off, aquifers, fish kills from pollution, population distribution, thermal springs, and projected water supply and demand for 2000 A.D.

This source book of important information can be and certainly should be used by not only hydrologists, but also urban and land use planners, ecologists, wildlife management biologists and political leaders who will have important choices and decisions to make or urge.

"DRAWINGS OF BRITISH PLANTS" Part XXXI by Stella Ross-Craig, un-paged, 46 plates, & index, G. Bell & Sons Ltd., London. 1973 [1974]. £2.

The excellently detailed line-drawings on these plates are for

native members of the following plant families: Lemnaceae, Alismataceae, Butomaceae, Juncaginaceae, Scheuchzeriaceae, Potamogetonaceae, Ruppiaceae, Zanichelliaceae, Zosteraceae, Najadaceae and Eriocaulaceae.

This is the last part exclusive of a comprehensive index now in preparation. British sedges are covered by Jermy & Tutin with illustrations, and British grasses are covered by C. E. Hubbard, also with illustrations.

"THE CONDENSED CHEMICAL DICTIONARY" Eighth Edition revised by Gessner G. Hawley, xiii & 971 pp., Litton Educational Publishing Inc., Van Nostrand Reinhold Co., Melbourne, London, Toronto, Cincinnati & New York 10001. 1971. \$27.50.

This book and its earlier editions for over a half century have been in prominent places for practical and frequent use on the desks and library shelves of many kinds of chemically oriented students, scientists, technicians, teachers and of non-chemists stymied by chemical problems or terminology incidentally or critically related to their own fields of endeavor and understanding. To the botanically oriented readers of this journal this new edition of the dictionary becomes of increasing value because of the tremendous advances in the biochemical approach to life's nature, workings, and problems. In addition to the virtue of accuracy, this book has those of directness, clarity and easy legibility.

"DEVELOPMENTAL SYSTEMS: INSECTS" Volume I edited by S. J. Counce & C. H. Waddington, xiii & 304 pp., illus., Academic Press, London NW 1 & New York 10003. 1972 [1973]. \$8.45 or \$18.

This volume consists of five valuable papers, each equivalent to a condensed and well referenced book. The first paper is Mahowald's "Oogenesis" in which the panoistic and the merocistic types are analyzed. The second paper is Jura's "Development of the Apterygote Insects" with the embryogenesis of both entognathous and ectognathous members of these four orders. The third paper is Anderson's "The Development of Hemimetabolous Insects" which surveys the detailed embryology of known examples from eleven orders, describes the immersed growth or anatrepsis in some and concludes that there are more similarities realized now. The fourth paper is the same author's "The development of Holo-metabolous Insects" in which he shows this type, found among almost as many orders, as derived from the hemimetabolous with the obvious innovation of the change in ratio of cytoplasm to yolk making possible a more direct and rapid development.

The fifth paper is Ivanova-Kasas' "Polyembryony in Insects" in certain Hymenoptera and Strepsiptera. In these two orders "similar biological conditions (parasitism and vivipary) have brought

about one and the same phenomenon of polyembryony, attained, however by different evolutionary routes."

On the first page of text chromosome is misspelled; on the last page of text in the quote above a comma is omitted. Otherwise this book with its fine illustrations and indexes of authors, subjects and scientific names matches the expected fine quality of Academic Press publications.

"THE COMPLETE BOOK OF TERRARIUM GARDENING" by Jack Kramer, ix & 146 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1974. \$9.95.

Only a popularly oriented book would presume to place "complete" or "all" in its title, and that choice is usually the fault of the publicity or advertising staff rather than the author(s). Because this book actually is so thoroughly and well presented and is most effectively illustrated by photographer Mathew Barr and artist Michael Valdez, it comes closer to anything in print at present or probably anything in the near future to earning such a title. It is really such a good book that it does not need the artificial bolstering that such a title would offer.

It will prove so helpful and intriguing in its detailed directions with all its different shapes and materials for the containers and with its long lists of various sized plants for woodland, bog, desert and tropical type terraria.

Aralia is misspelled on page 52.

"FLOWERING SHRUBS AND SMALL TREES — One Hundred and Sixty Nine Varieties for Your Garden" by Jean Hersey, iii & 81 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1974. \$7.95.

For the garden enthusiasts, whether of the dirt-digging or arm-chair type, this attractive book literally centers about 15 full pages of these 169 plants drawn in beautifully colored sprays by Allianora Rosse and grouped according to blooming seasons. For each there is accompanying text with the necessary growing information in outline form and with statements of special interest as to origin, use, myths, etc.

The word "write" is misspelled in the foreword.

Any finitely limited work almost always provokes in readers' mind the thought that "But so-and-so should really have been included", especially if the candidate would be in good company and well treated. I feel that the widely adaptable chaste-tree, Vitex agnus-castus f. latifolia, was ostracized undeservedly.

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TROPICAL AMERICAN PLANTS, XVI

LOUIS O. WILLIAMS

Field Museum of Natural History

The notes which follow are based on my studies in preparing manuscript for Flora of Guatemala as well as notes made on a recent field trip to Central America. Field work and floristic research have both been supported by generous grants from National Science Foundation.

COMPOSITAE

SENECIO ARMENTALIS L. Wms. nom. nov. — Nelsonianthus epiphyticus H. Robinson & Brittell, Phytologia 27: 54. 1973, not Senecio epiphyticus O. Kuntze, 1898.

The genus Nelsonianthus proposed recently by H. Robinson and Brittell seems dubiously distinct when considered in the context of the vast genus Senecio. However the species described seems amply distinct from other species of Senecio known to me from tropical America. Senecio armentalis is an attractive epiphytic species found on the highest elevations of Cerro María Tecum in the Guatemalan Sierra Madre where it occurs in the open forest, usually on oaks.

The basis for the name Nelsonianthus is not given but I assume that it is for E. W. Nelson who collected this species near Cabel in the Department of Quezaltenango at 11,000 feet on January 20, 1896, his collection number 3682. Material of our own collections from the same general area are being distributed. These are Williams, Molina & Williams 41719, 41723 and 41747.

CONVOLVULACEAE

IPOMOEA TRILOBA L. Sp. Pl. 161. 1753; Standley & Williams, Fieldiana, Bot. 24, pt. 9: 58. 1970.

I have had the pleasure of travelling through Mexico, and in Central America as far as Nicaragua during November and December 1973, at the end of an especially heavy rainy season. There were literally millions of acres of land abundantly covered with Ipomoea triloba in flower. It is everywhere in disturbed areas

and perhaps most common from some 400 to 800 meters elevation although it goes to near sea level and occasionally is seen as high as 1,500 meters. This species must be the commonest and most abundant weed from Vera Cruz to Nicaragua and further south.

GRAMINEAE

HYPARRHENIA RUFA (Nees) Stapf in Prain, Fl. Trop. Africa 9: 304. 1918. Trachypogon rufus Nees, Agrost. Bras. 345. 1829. Swallen, Fieldiana, Bot. 24, pt. 2: 170. 1955.

Jaraguá grass is native of Africa and was doubtless taken from Africa to Brazil as a forage grass. It is thought to have been introduced from Brazil to Honduras by Tiburcio Carías (president of Honduras 1932-1947) and sown as a pasture grass on the government farm in the Zamorano valley, probably in the early 1930s. This grass was well established in the Zamorano valley in the mid-1940s when I went there and had essentially driven out Panicum maximum Jacq., a much superior pasture grass also native of Africa. Panicum maximum, Guinea grass, was so common and widely known in Central America that the usual name for it was zacate or zacatón, which translates simply as "grass" or "big grass!"

Jaraguá is a tall, rough, and when mature a very tough grass that most animals can not eat. It has been the common practice to burn over Jaraguá pastures in the dry season to clear them and to make available the tender young grass as the rainy season starts. The rhizomes of the grass are resistant to fire so that it is the surviving plant over millions of acres of Mexican and Central American pasture lands. The native grasses and forbs that are not resistant to fire are killed out in the annual burnings.

Jaragua is now naturalized in most open or pasture land of Central America from a bit above sea level to some 1,600 meters. It is the dominant cover in many places. The Jaraguá covered hills can be very beautiful at the end of the rainy season but in the dry season it forms a rather unattractive cover. When Jaraguá and Ipomoea triloba grow together, at middle and lower elevations, they may form a thicket that is almost impenetrable.

HAMAMELIDACEAE

MATUDAEA TRINERVIS Lundell, Lloydia 3: 210. 1940.

Dr. B. F. Kukashka wrote in October 1973 and suggested that I check on several trees being cut commercially and exported by Maderas Centro América, S. A. of Matagalpa, Nicaragua. Among these was a tree the lumber of which is being marketed in the United States as varazón, the local name in Nicaragua. Upon the basis of wood specimens Dr. Kukashka thought the tree to be a Distylium (=Molinadendron).

Professor Molina R. and I visited Mr. Dharam Yadav at Matagalpa in November 1973 and were given specimens of the varazón. Flowering material will be supplied as soon as the tree comes into flower. There seems no question that the tree is Matudaea trinervis and that it adds an important commercial timber to those known from Central America.

The genus Matudaea, named for the well known Mexican botanist Eizi Matuda, was discovered in the state of Chiapas, Mexico as recently as 1940. Standley found the genus in Guatemala soon afterward and reported it in the Flora of Guatemala. Standley, Molina and myself have made a half dozen collections in Honduras since 1950, where the common name is reported as esquiuro. Salas and Taylor found the species at "La Fundadora", Department of Matagalpa, Nicaragua in 1957 and reported the common name of guayabo.

The foresters of Maderas Centro América, the largest saw mill operators in Central America, now report the species as an abundant and very fine commercial timber in the Cordillera Isabelia (=Cordillera Central de Nicaragua), a tree to 35 meters or more tall and to about one meter in diameter.

RUBIACEAE

BORRERIA EXILIS L. Wms. nom. nov. — Borreria gracilis L. Wms. Phytologia 26: 487. 1973, not Miq. ex Hook. nor Scheele.

Dr. Joseph Kirkbride has called my attention to the improper use of the name Borreria gracilis which I applied to a Costa Rican species. A specific name with the same meaning is substituted.

PSYCHOTRIA CALOPOGON L. Wms. sp. nov. - Subg. Heteropsychotria. Arbusculae usque ad 2.5 m. altae pilosae. Folia elliptica vel late elliptica acuminata pilosa, laminae usque ad 30 cm. longae; inflorescentia pedunculata paniculata multiflora; calyx dense pilosus, lobi anguste lanceolati acuti; corolla alba, tubi cylindrici, lobi ovati acuti pilosi; stylus tubo subaequilongus, stigma bilobatum; fructus desideratur.

Shrubs to 2.5 m. tall, the stems spreading pilose pubescent, probably glabrescent with age, stipules lanceolate, bilobate, the apices scarious. Leaves narrowly elliptic to broadly elliptic, acuminate, with about 20 pairs of secondary nerves, these prominent below, pilose on both surfaces, more so below and along the mid-nerve, pale green above and lighter below, the blades 12-30 cm. long and 3.5-12 cm. broad, the petioles 1-3 cm. long, spreading pilose pubescent; inflorescence terminal, pedunculate, a rather loose many-flowered panicle with the lateral branches of capitulate bracteate cymules; cymules subtended by 3-5 lanceolate, acute or acuminate pilose bracts mostly 4-5 mm. long and 1.5-2 mm. broad; hypanthium and calyx about 2 mm. long,

densely pilose, the calyx lobes narrowly lanceolate, acute, about 0.7-0.8 mm. long; corolla white, mostly 4-5 mm. long, the tube narrow and about 3.5 mm. long, the lobes ovate, acute, pilose dorsally, 1-1.5 mm. long; style about as long as the corolla tube, stigma bipartite; stamens attached in the throat of the corolla and the anthers exerted and about 0.5 mm. long; fruits not known.

Guatemala: shrub about 5-8 feet tall, flowers white; calyx pale green; leaves membranaceous, pale green above, grey-green beneath, dense rich forest between Ixcán and Río Ixcán, Sierra de los Cuchumatanes, Dept. Huehuetenango, alt. 150-200 m.; July 23, 1942, Steiermark 49308 (type, F); Cubilquitz, Dept. Alta Verapaz, alt. 350 m., July 1903, Tuerckheim 8403 (F).

A representative of a complex group of taxa related to P. pilosa Ruiz & Pavón of South America. The Central American specimens called P. pilosa are a mixture of several species.

PSYCHOTRIA CHRYSOCALYMMA L. Wms. sp. nov. - Subgenus Heteropsychotria. Arbusculae usque ad 2 m. vel ultrae, ramuli dense piloso-pubescentes. Folia petiolata elliptica acuminata utrinque pubescentia usque ad 15 cm. longa; inflorescentiae laterales longe pedunculatae subumbelliformes; hypanthium et calyx dense et breviter pilosum, lobi angusti lanceolati acuti; corolla alba extus pilosa, lobi oblongo-lanceolati; fructus anguste ovoideus pubescens porcatus.

Shrubs to 2 m. tall or perhaps more, the branches densely and softly short pilose-pubescent; stipules persistent, with two lateral lanceiform lobes 2-3 mm. long. Leaves short petiolate, elliptic, acuminate, pilose-pubescent or sparsely hirsute on both surfaces, 12-15 cm. long and 4-5.5 cm. broad when mature, secondary nerves 11-13 pairs, conspicuous below, petiole slender, 1-2 cm. long; inflorescence lateral, long pedunculate subumbelliform cyme covered with yellowish or golden multicellular pubescence, the peduncle about 6 cm. long, the cyme about 4 cm. long, the bracts subtending each division of the inflorescence linear and acute, 3 to 10 mm. long; flowers in each cymule about 4-5, short pedicellate, subtended by bracts longer than the calyx; hypanthium and calyx about 4 mm. long, densely short pilose, calyx lobes narrowly lanceolate, acute, 1.5-2 mm. long; corolla white, tubular, widest above the middle, pubescent outside especially above, 13-15 mm. long, the lobes short, oblong-lanceolate, about 2 mm. long; style as long as the corolla, apex shortly bilobate; stamens inserted in the throat of the corolla, included, anthers about 3 mm. long; fruits narrowly ovoid, each carpel prominently 3-ribbed dorsally, sparsely to densely pubescent, 5-6 mm. long.

Guatemala: shrub 5-7 feet tall; leaves membranaceous, dull green above, gray-green beneath with prominent nerves; peduncles spreading or slightly drooping, brownish green or suffused with dull brick; pedicel mustard-yellow-tawny or golden tawny as is the calyx and corolla tube; corolla lobes white; ovary dull green; hills north of Finca Piamonte, between Finca Piamonte and summit of Volcán Santa Luisa, Dept. El Progreso, alt. 2,400-3,333 m., Feb. 5, 1942, Steyermark 43518 (type, F).

Related to P. purpusii Standl. from which it may be distinguished easily by the narrow bracts, instead of broad ones, subtending the segments of the inflorescence, the fruits narrowly ovoid, not subglobose. It is a species of the eastern highlands while P. purpusii is known only from the western highlands of Guatemala and adjacent Chiapas.

The specific name recalls the "golden head-covering" of the plant.

PSYCHOTRIA IZABALENSIS L. Wms. sp. nov. - Subg. Heteropsychotria. Arbusculae aut arbores usque ad 4 m. altae glabrae vel sparse pubescentes. Folia membranacea late elliptica vel oblongo-elliptica longe acuminata glabra vel subtus leviter puberula usque ad 30 cm. longa; inflorescentia terminalis in cyma paniculata pedunculata multiflora nato; calyx perparvus, lobi triangulari-ovati acuti; corolla alba extus pubescens tubo cylindrica, lobi oblongo-lanceolati acuti; fructus desideratur.

Shrubs or small trees to 4 m. tall, the stems and leaves glabrous or sparsely pubescent, the inflorescence short pilose pubescent, the stipules persistent, truncate with the erect lateral lobes linear, densely pubescent and about 4-6 mm. long. Leaves membranaceous, broadly elliptic or oblong-elliptic, long acuminate, glabrous except the petioles and nerves on lower surface sparsely puberulent, the blades when mature 15-30 cm. long and 5-11 cm. broad and attenuate into a short 1-2 cm. long petiole; inflorescence terminal, a many-flowered paniculate cyme with the cymules at most subcapitate but usually more open, densely short pilose pubescent, pedunculate, 8-11 cm. long and 4-6 cm. broad, bracts subtending the main divisions linear-lanceolate, about 1 cm. long, bracts in the cymules conspicuous, lanceolate to oblong-lanceolate, acute, sparsely pubescent and ciliate, exceeding the calyx, mostly 3-4 mm. long; hypanthium and calyx small, about 1 mm. long, pubescent, the calyx divided to the base, the lobes triangular-ovate, acute, about 0.5 mm. long; corolla white, crisped-pubescent externally, tube cylindric but broadened and sparsely barbate in the throat, about 4 mm. long, the lobes oblong-lanceolate, acute, about 2 mm. long; stamens inserted in the corolla throat, anthers barely exerted, about 1 mm. long; style as long as the corolla, the stigma lobate; fruits not known.

Guatemala: tree 4 m., inflorescence yellow-green, along old road, Exmibal Camp 2 (La Gloria), NW of Lake Izabal, serpentine-derived laterite, vicinity of Lago Izabal, Dept. Izabal (long. $89^{\circ} 25'$ lat. $15^{\circ} 15'$), alt. 0-600 m., 6 May 1966, Jones & Facey 3257 (F, NY, EAP); shrub 3 m., corolla translucent white, 1-2 km. south of Izabal, vicinity of Lago Izabal (long. $89^{\circ} 25'$ lat. $15^{\circ} 15'$), alt. 0-600 m., 22 April 1966, Jones, Proctor & Facey 3024 (F, type; NY).

Related to Psychotria brachiata Sw. and to the complex around P. costaricensis Polak. From the first of these it is easily distinguished by the stipules and details of the inflorescence and flowers, by the larger long acuminate leaves.

PSYCHOTRIA OREODOXA L. Wms. sp. nov. — Subgenus Heteropsychotria. Arbusculae usque ad 5 m. altae ramosae glabrae aut leviter puberulae. Folia elliptica vel elliptico-oblancoolata longe acuminata glabra basi attenuata 10-18 cm. longa et 2-5 cm. lata; inflorescentia thyrsiformis pedunculata; calyx brevis, lobis angustis triangularibus acutis; corolla parva infra medium tubularis; fructus carnosus atropurpureus.

Shrubs to 5 m. tall, branched, the branches glabrous or obscurely puberulent, stipules persistent, about 3 mm. long with lateral aceriform lobes. Leaves elliptic or elliptic-oblancoolate, long acuminate, attenuate to the slender petiole, glabrous, with about 10 pairs of secondary nerves, the blades 10-18 cm. long and 2-5 cm. broad, the slender petiole mostly 1-3 cm. long; inflorescence terminal, thyrsiform, pedunculate, to about 7 cm. long; flowers white, abundant; hypanthium and calyx 1-1.5 mm. long, the calyx short, the lobes narrowly triangular, acute, about 0.5 mm. long; the corolla small, tubular below and slightly expanded above, about 5-6 mm. long, the lobes small, oblong; stamens inserted in the corolla throat, the anthers exerted and about 1.5 mm. long; fruits very fleshy, purple-black, the seeds about 2.5 mm. long, obscurely ridged.

Guatemala: moist forest, shrub 8 feet, near Vuelta del tigre below Santa María de Jesús, Dept. Quezaltenango, alt. about 1,500 m., March 11, 1939, Standley 68162; "chile", along Quebrada San Jerónimo, Finca Pirineos, lower south facing slopes of Volcán Santa María, between Santa María de Jesús and Calahuaché, alt. 1,300-2,000 m., January 1-2-3, 1940, Steyermark 33355, 33816; shrub 15 feet tall, corolla white, south facing slopes and barrancos of Volcán Santa Clara 1 1/2-2 miles west of Finca Naranjo, alt. 1,250 m., June 1, 1942, Steyermark 46803 (type, F); south facing slopes of Volcán Atitlán, above Finca Mocá, Dept. Sololá, alt. 1,000-1,250 m., June 20, 1942, Steyermark 47929.

PSYCHOTRIA OROGENES L. Wms. sp. nov. — Subgenus Heteropsychotria. Arbusculae vel arbores parvae usque ad 3-4 m. altae dense piloso-pubescentes; stipulae persistentes bilobatae, lobi lineares. Folia elliptica vel elliptico-oblancoolata acuminata pilosa, petiolis brevibus; inflorescentia terminalis pedunculata panicula cymosa pilosa; calyx parvus, lobis lanceo-triangularibus; corolla alba parva extus villosa, lobis oblongis acutis; fructus subglobosus porcatus.

Shrubs or weak trees 3-4 m. tall, the branches densely pilose pubescent with spreading hairs, the stipules persistent, joined and surrounding the branches, each pubescent stipule with a lateral pair of linear-lanceolate lobes 3-4 mm. long. Leaves elliptic or elliptic-oblancoolate, acuminate, sparsely pilose above, prominently and softly so below, with mostly 13-16 pairs of lateral nerves, the blade 8-15 cm. long and 1.5-4 cm. broad, petioles short, 0.7-1.5 cm. long; inflorescence a terminal pedunculate panicle of cymes up to about 6 cm. long, conspicuously soft pilose when immature but less so in fruit, bracteolate, the bracts linear-filiform, those of the main branches 1 cm. long, those subtending flowers smaller; flowers white, conspicuously short pilose, usually subtended by a filiform bract about as long as the calyx; hypanthium and calyx 1-1.5 mm. long; calyx very small, the lobes lance-triangular, about 0.5 mm. long; corolla small, 4-5 mm. long, short villous outside, the lobes oblong, acute, about 2 mm. long; fruits subglobose, pilose, prominently ridged, 4-5 mm. long.

Guatemala: flores cremas, arbusto 3 m., poco frecuente, bosque denso 5 km. al noroeste de Cobán, Depto. Alta Verapaz, alt. 1,400 m., Mayo 10, 1963, Molina & Molina 12026 (F, EAP); weak tree 4 m. high, wet cloud forest, Sierra de las Minas about 5 km. south of Purulhá, Dept. Baja Verapaz, alt. 1,600 m., January 2, 1973, Williams, Molina & Williams 41924 (F, type; EAP, US, NY).

A montane cloud forest species somewhat related to P. pubescens Sw., a species of the low wet tropical forests. It is easily distinguished by the narrower densely pubescent leaves and details of flowers and inflorescences.

SPERMATOCYTES. — This tribe is perhaps as easily distinguished as any tribe in the Rubiaceae. There are in Guatemala, and in Central America, eight genera belonging to the tribe. All of these, except Ernodea, have species that superficially are much like those in others of the genera. Characters to separate these genera mostly are found in the fruits and if fruiting material is not available, or not looked at, it is easy to put a plant into an incorrect genus.

The facility with which capable botanists, - Standley, Dwyer, Molina R. and Gómez Pompa for example, - who are familiar with the tribe and have placed a species into two or

three different genera indicates that perhaps there is something wrong in the delimitation of the genera. The distinction of *Crusea* from *Diodia* is not good; that of *Spermacoce* and *Hemidiodia* is not sharp; the large genus *Borreria* has look-alikes in almost all of the other genera and in *Borreria* are to be found "misplaced" specimens of all of them. The tribe needs a friend for it is not feasible for a floristic worker to give it the time that it needs.

NEW PERUVIAN GESNERIACEAE

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The pongo zone of the Río Marañón in Peru is exceedingly rich in endemic species. Each expedition to that remote region of northwestern Amazonian Peru has garnered many species new to science, particularly the expeditions by Tessmann in 1924 and by Mexia in 1931-1932. Both of these collectors gathered plants from the downstream end of the pongo region near Pongo de Manseriche (see Wurdack, 1964). In 1962 John Wurdack visited the pongo region from Montenegro near the upper limit of the pongo zone downstream to Borja near Pongo de Manseriche, as well as adjacent areas. From the more than 700 field collections two new species of Besleria have been described (Morton, 1968) and also, a new species of Nautilocalyx now known in the horticultural trade from seeds collected by Wurdack (Skog, 1974).

Presented here are three additional new species of Gesneriaceae collected by Wurdack, including another new species of Nautilocalyx, and new species of Monopyle and Napeanthus. Additional collections of Gesneriaceae by Wurdack are yet to be studied and will probably yield additional new taxa.

MONOPYLE FLAVA L. Skog, sp. nov. (Figure 1)

Herba erecta ad 0.5-1.5 m alta, prope basim ca 1 cm in diam., ramis brevibus. Internodia usque ad 20.5 cm longa, viridia vel ferruginea, sparse albo-pilosa vel glabrescentia. Folia opposita per paria aequalia vel valde inaequalia; petiolus sulcatus, 3-6 mm longus, 2-3 mm latus, viridis, tomentosus trichomatibus albis uncinatis adpressis; lamina membranacea, ovata vel aliquanto falcata, 6.6-21.2 cm longa, 4.1-10.8 cm lata, basi obliqua, cordata, margine crenato-dentata vel serrata, apice acuminata, supra viridis, sparsim inter venas trichomatibus dispersa vel glabrescens, infra pallide viridis secus venas pilosa. Cymae axillares, pluriflorae, ad usque duplo longiores quam folia subtenta; pedunculus primarius teres, 2.8-6.7 cm longus, 1-3 mm in diam., viridis sparse pilosus; pedunculus secundarius 2.1-9.1 cm longus, divergens; bracteae primariae lineares vel lanceolatae ca 7 mm longae, 1-2 mm latae, virides, pilosae; pedicellus 0.4-1.6 cm longus, viridis, pilosus trichomatibus apicem versus densioribus. Florae tubus obliquus, globosus, 2-4 mm in diam., viridis vel rubellus, albo-pilosus, costis non visis. Calycis lobi 5, sub anthesim ca 1 mm connati, oblongi, 2-4 mm longi, 1.0-1.5 mm lati, virides, nervis prominulis, rubris vel



Figure 1. Monopyle flava L. Skog, sp. nov. (Wurdack 2104, holotype US). Photographs by V. E. Krantz, Staff Photographer, National Museum of Natural History.

atrovirentibus, apice acuto rubello, extus pilosi, intus virides, praeter glandes flavas sparsas glabri, nervis flavis. Corolla campanulata vel olliformis; tubus stamina duplo superans, 0.8-2.3 cm longus, ad basim 3-5 mm latus, ad orem 1.3-1.6 cm latus, extus flavus (fide Wurdack), albo-pilosus trichomatibus limbus versus minus densis, intus flavus, pagina inferiore basim versus marronina vel purpurea maculata, glabra; limbus 1.2-2.2 cm latus, 5-lobatus, lobis orbicularibus, glabris, margine integris, lobis superis 5-6 mm longis, 6-8 mm latis, lobis lateralibus 7-9 mm longis, 7-8 mm latis, lobo basali 0.7-1.0 cm longo, 0.7-1.3 cm lato. Stamina 4, vero discreta, filamentis curvis, ca 1 mm ad basim latis, flavis, glabris; antherae adhaerentes, 1-2 mm longae; staminodium nullum. Ovarium inferum, apice pilosum, stylo 5 mm longo, versus stigma stomatomorphum glabrescento; discus nullus. Capsula oblonga, ad basim gibbosa, 0.8-1.0 cm longa, 3-4 mm lata, costis 5-15; semina numerosa, nigra, late fusiformia, oblique striata, ca 0.3 mm longa, 0.3 mm lata.

Type: J. J. Wurdack 2104 (holotype US, 2404406!; isotypes BH!, USM not seen, others to be distributed), collected in high rainforest along Río Marañón near Teniente Pinglo, just above Pongo de Manseriche, Provincia de Alto Amazonas, Departamento de Loreto, Peru, elev. 250-300 m, 4-7 October 1962. "Herb. 0.5-1.5 m, occasional in moist ravine. Corolla yellow; maroon-dotted in throat inside."

Other specimens examined: Peru: Departamento de Loreto, Provincia de Alto Amazonas: J. J. Wurdack 2303 (US 2404454!), rainforest on lower northwest slopes of Cerros Campanquiz, Río Marañón just above Pongo de Manseriche, elev. 250-350 m, 17 October 1962; G. Tessmann 4170 (NY!, US 2223618!), mouth of Río Santiago, on high land.

Three Peruvian species of Monopyle were treated by Morton in his revision of the South American species in 1945. All other known species of Monopyle have corolla tubes which are white to purple with a completely purple limb or with purple spots on the limb, or grading into a completely blue-purple corolla. Monopyle flava differs from the other species in having a yellow corolla, and with maroon maculae congested at the base of the corolla tube.

Evidently the most closely related species is Monopyle subsessilis Benth., typified by a Spruce collection from near Tarapoto. Monopyle subsessilis differs from the species described here by a suite of characters: the leaves are nearly always anisophyllous; inflorescences are condensed with secondary peduncles scarcely 1 cm long and not diverging; lack of an oblique floral tube; calyx lobes lanceolate, 6-9 mm long; and the corolla limb 2.0-3.3 cm broad.

Günter Tessmann also collected Monopyle flava in the same area in 1924, but the specimens at NY and US remained unidentified until the present study.

The lack of nectar-producing glands or disk and the presence of the maroon maculae at the base of the corolla suggest that Monopyle flava may be visited and pollinated by male euglossine bees in somewhat the same manner as Gloxinia perennis (Vogel, 1966).

NAPEANTHUS LORETENSIS L. Skog, sp. nov. (Figure 2)

Herba rupicola, caulis brevissimis. Folia rosulata sessilia; lamina anguste oblanceolata, 3.7-16.3 cm longa, 0.8-3.2 cm lata, membranacea, ad basim cuneata, margine minute serrata ad apicem acuta vel acuminata, supra viridis, sparse pilosa vel glabrescens, subtus pallide viridis, secus venas pilosa. Inflorescentiae pauciflorae, pedunculis tenuis teretibus, 1.0-4.7 cm longis, minus quam 1 mm in diam., ca 1 mm latis, pilosis, bracteis viridis, lanceolatis, 2-6 mm longis, ca 1 mm latis, pilosis, pedicellis 1.4-2.1 cm longis, pilosis, in fructibus elongatis. Sepala 5, e basi discreta, lanceolata vel elliptica, ca 3 mm longa, ca 1 mm lata, viridia, marginibus integris ciliatis, partibus exterioribus sparse pubescentibus, partibus interioribus glabris. Corolla pallide azurea, tubo campanulato, 2-3 mm longo, lobis 5, marginibus subintegris, superis 1-2 mm longis, ca 2 mm latis, lateralibus ca 3 mm longis, 2-3 mm latis, lobo basali ca 3 mm longo, ca 2 mm lato. Stamina quattuor aequalia, filamentis geniculatis ad basim corollae insertis, ca 1 mm longis, ad geniculum minute pubescentibus, antheris ovatis, ca 1 mm longis, ca 1 mm latis, staminodio brevissimo. Ovarium oblongum, glabrum, ca 1 mm longum, stylo ca 3 mm longo, glabro, stigmatate capitato. Capsulae bi- vel quadrivalvae, ca 1.25 mm longae, seminibus oblongis, nigris, oblique striatis, ca 0.5 mm longis, 0.25 latis.

Type: J. J. Wurdack 2159 (holotype US, 2404417! isotypes BH! USM not seen), collected in high rainforest along Río Marañón near Teniente Pinglo, just above Pongo de Manseriche, Provincia de Alto Amazonas, Departamento de Loreto, Peru, elev. 250-300 m, 4-7 October 1962. "On moist cliff, occasional. Corolla pale blue-purple."

The genus Napeanthus Gardn. was revised in 1958 by Leeuwenberg who treated 12 species from Central and South America. Napeanthus lorentensis differs from all other known species of Napeanthus by possessing the combination of a stemless habit, leaves narrowly oblanceolate and sparsely pilose to glabrous above, inflorescences shorter than the leaves and bearing few flowers, each flower having a calyx of 5 separate, 3-nerved sepals about 3 mm long, and a pale blue-purple corolla nearly twice as long as the calyx. This species is apparently the first Napeanthus described from



Figure 2. Napeanthus lorentensis L. Skog, sp.
nov. (Wurdack 2159, holotype US).

only Peru, a country from which few collections of this genus are known. Surely Napeanthus is more common in Peru than the paucity of specimens demonstrates?

NAUTILICALYX MINUTIFLORUS L. Skog, sp. nov. (Figure 3)

Herba paene acaulescens vel suffruticosa erecta vel decumbens; caulis ad 20 cm longus, 5 mm crassus, ad basim ramificans; stolones nulli. Internodia 0.1-1.0 cm longa, viridia vel brunnescentia, pilosa vel glabrescentia. Folia opposita per paria subaequalia; petiolus 0.3-1.0 cm longus, 2-3 mm latus, viridis, pilosus; lamina membranacea elliptica vel obovata, 7.4-20.5 cm longa, 3.6-10.1 cm lata, basi acuta vel truncata interdum cuneata, margine serrata vel crenata, apice acuta vel obtusa, supra atrovirens bullata pilosa trichomatibus adpressis ad bullae apicem, venis leviter immersis pallide viridibus, infra pallide viridis, secus venas flavo-virentes emersas pilosa, inter venas interdum pilosa. Inflorescentiae axillares, pluri-flores, cymosae vel racemosae quam folia subtenta usque $1/4$ longiores; pedunculus gracilis, 2.1-4.1 cm longus, viridis, albo-tomentosus; pedicellus 0.6-1.0 cm longus, albo-tomentosus. Receptaculum turbinatum, 1-2 mm longum, 1-2 mm latum, viride, albo-tomentosum. Sepala 5, e basim discreta lanceolata, 3-5 mm longa, ad basim ca 1 mm lata, apice acuminata, extus pilosa, intus glabra. Corollae tubus infundibuliformis calcaratus 3-5.5 mm longus, ad basim 2 mm latus, extus sparsim pilosus, intus glaber sed ad orem pilosus, purpureo-vittatus vel maculatus; limbus ca 6 mm latus, dense glandulosus, lobis superis erectis ca 1.5 mm longis, 1.0-1.5 mm latis, lobis lateralibus patentibus 1-2 mm longis, ca 1 mm latis, lobo basali patenti, 1-2 mm longo, 1.0-1.5 mm lato. Stamina 4, inclusa; filamenta ad tubae corollae basim per ca 1 mm adnata, ca 5 mm longa, glabra, post dehiscentiam spiralia; antherae adhaerentes, loculis globosis ca 0.5 latis, dorsaliter sparsim pilosis; staminodium nullum. Ovarium ovoideum, ca 1 mm longum, pilosum; stylus ca 5 mm longus, ad basim pilosus, stigmatem conspicue bilobo, glanduloso; discus 2-glandulosus, glandula posteriore $1/3$ base ovario cingenti, ca 0.75 mm longa, glandula anteriore ca 0.25 mm longa. Capsula globosa, bivalvis, ca 2 mm lata; semina fusiforma, oblique striata, ca 0.3 mm longa, 0.2 mm lata, ferruginea.

Type: J. J. Wurdack 2072 (holotype US, 2404394!, isotypes BH!, USM not seen, others to be distributed), collected in high rainforest along Río Marañón near Teniente Pinglo, just above Pongo de Manseriche, Provincia de Alto Amazonas, Departamento de Loreto, Peru, elev. 250-300 m, 4-7 October 1962. "Locally frequent. Corolla white."



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Figure 3. Nautilocalyx minutiflorus L. Skog, sp. nov. (Wurdack 2072, holotype US).

This species resembles some members of the genus Cremosperma in its inflorescences of numerous small flowers, but the flowers in this plant despite their size are definitely those of a Nautilocalyx in having a spurred corolla and two discrete glands. Other species of Nautilocalyx have corollas well over 1 cm long; N. picturatus also collected by Wurdack from the valley of Río Marañón has corollas up to 4.5 cm long. The leaves of the latter species differ markedly from Nautilocalyx minutiflorus in the light green bands along the veins on the upper surface and the lower surface suffused with reddish-purple with pale green bands.

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ADDITIONAL NOTES ON THE GENUS VERBENA. XXI

Harold N. Moldenke

VERBENA [Dorst.] L.

Additional & emended bibliography: Alston in Trimen, *Handb. Fl. Ceylon* 6: 229 & 231. 1931; Kanjilal, Das, Kanjilal, & De, *Fl. Assam* 3: 461, 462, & 561. 1939; Glover, *Prov. Check List Brit. & Ital. Somal.* 56, 268, & 269. 1947; R. O. Williams, *Useful & Ornament. Pl. Zanzib.* 76, 95, & 482. 1949; McVaugh, *N. Y. State Mus. Bull.* 360A: 195--196, 353, 358, 388, & 432. 1958; Abeywickrama, *Ceylon Journ. Sci. Biol.* 2: 217. 1959; A. M. Anderson in Mrs. A. S. Anderson, *Our Gard. Herit.* 44. 1961; Mrs. C. H. Stout in Mrs. A. S. Anderson, *Our Gard. Herit.* 51. 1961; Mrs. M. J. Fox in Mrs. A. S. Anderson, *Our Gard. Herit.* 66. 1961; E. Anderson in Mrs. A. S. Anderson, *Our Gard. Herit.* 79. 1961; Mrs. E. M. Cheston in Mrs. A. S. Anderson, *Our Gard. Herit.* 357. 1961; Irwin & Wills, *Roadside Fls. Seyl.* 147. 1968; C. A. Br., *Wildfls. La.* 155, 156, 242, 244, & 246. 1972; Altschul, *Drugs & Foods* 243 & 358. 1973; Borland, *Seasons* 49. 1973; Burlage, *Wild Flow. Pl. Lakes Country* 143--144. 1973; Farnsworth, *Pharmacog. Titles* 8 (10): xvii. 1973; Fenaroli, *Webbia* 28: 356 & 410. 1973; R. R. Rao, *Stud. Flow. Pl. Mysore Dist.* 2: 752 & 754 [thesis]. 1973; Anon., *Sunset* 152 (4): 226. 1974; Moldenke, *Phytologia* 28: 195--221. 1974.

Gunawardena (1968) gives the derivation of the generic name, Verbena, as "Latin, twigs of laurel, olive, myrtle, cypress, etc., used in Roman sacrifices and other religious acts; a corruption of the Celtic fervain which led to English vervain for V. officinalis." Williams (1949) describes the genus as consisting of "creeping plants, lvs. soft and finely divided, fls. small and rosy violet", but this description applies to only a very few species in the genus. Such generic "descriptions", based on only one or a few species, or on the species found in a small geographic area, are most misleading to the non-specialist who may rely on them as descriptive of the entire genus.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Moldenke, *Phytologia* 28: 195, 199, 200, 204, & 211. 1974.

Spellenberg and his associates encountered this plant in a swale. The corollas on Spellenberg, Ragan, & Willson 3390 are described as having been "pink-lavender" in color when fresh.

Additional citations: NEW MEXICO: Lincoln Co.: Spellenberg, Ragan, & Willson 3390 (N).

VERBENA AMBROSIFOLIA f. EGLANDULOSA Perry

Additional bibliography: Moldenke, *Phytologia* 28: 111 & 211. 1974.

Lehto and his associates found this plant growing in ponderosa

pine-Gambel oak forests in Arizona.

Additional citations: ARIZONA: Greenlee Co.: Lehto, McGill, Nash, & Pinkava 11267 (N).

VERBENA BIPINNATIFIDA Nutt.

Additional & emended bibliography: Irwin & Wills, Roadside Fls. Tex. 189, pl. 39. 1961; Burlage, Wild Flow. Pl. Lakes Country 143. 1973; Moldenke, Phytologia 28: 195--196 & 199. 1974.

Emended illustrations: Irwin & Wills, Roadside Fls. Tex. pl. 39 (in color). 1961.

Irwin & Wills (1961) give the distribution of this species as "South Dakota to Alabama, west to Arizona and northern Mexico" and say of it that "The Prairie Verbena is one of the most abundant wildflowers in Texas, from the points of view of both distribution and period of flowering. While commonest on limestone soils, it is found throughout most of the state, the only exceptions being the pine forests of the East and the most desertous western regions. It flowers most freely in the spring, but in moist situations in the southern part of the state the flowers keep coming nearly throughout the year. The low matted habit suits the plant well for edge-work in the garden. Restricted to the Trans-Pecos is a plant of similar habit, Wright's Verbena, V. wrightii Gray, an annual with leafy erect or spreading stems and rosy or light purple flowers in spring."

Burlage (1973) records the common names "Dakota Verbena", "Sweet-William", "Small Flowered Verbena", "Common Verbena", "Wild Verbena", and "Plains Verbena" for this plant and says of it that "The flowers bloom from spring until severe freeze. They are clusters of flowers on the top of the stalk, which has many prostrate branches. The leaves are thick, rough, divided into narrow segments. Children suck the nectar from the corollas tube. The Highway Department uses it for roadside planting."

VERBENA BONARIENSIS L.

Additional bibliography: Alston in Trimen, Handb. Fl. Ceylon 6: 231--232. 1931; Abeywickrama, Ceylon Journ. Sci. Biol. 2: 217. 1959; Gunawardena, Gen. & Sp. Pl. Zeyl. 147. 1968; Moldenke, Phytologia 28: 196. 1974.

Alston (1931) describes the inflorescence of this plant as "usually simple", but this is not true. He describes the flower color as "pale mauve" and notes that the plant blooms in Ceylon in December and January. Gunawardena (1968) comments that the specific epithet is derived from Bonaria, the classical name for Buenos Aires, Argentina.

VERBENA BRACTEATA Lag. & Rodr.

Additional bibliography: Moldenke, Phytologia 28: 196. 1974.

Recent collectors have found this plant in grassy areas of pinyon-juniper formations and as a member of the shortgrass prairie community in New Mexico.

Additional citations: NEW MEXICO: Lincoln Co.: Spellenberg, Ragan, & Willson 3400 (N). Quay Co.: L. C. Higgins 6915 (N).

VERBENA CAMERONENSIS L. I. Davis

Additional bibliography: Moldenke, *Phytologia* 28: 120. 1974.

Additional citations: TEXAS: Cameron Co.: C. L. Lundell 10771 (Mi). MEXICO: San Luis Potosí: C. L. Lundell 12256 (Ld, Mi).

VERBENA CANADENSIS (L.) Britton

Additional bibliography: E. Anderson in Mrs. A. S. Anderson, *Our Gard. Herit.* 79. 1961; C. A. Br., *Wildfls. La.* 155, 244, & 246. 1972; Burlage, *Wild Flow. Pl. Lakes Country* 143. 1973; Moldenke, *Phytologia* 28: 197--200 & 209. 1974.

Additional illustrations: C. A. Br., *Wildfls. La.* 155 (in color). 1972.

Burlage (1973) records the common names, "rose verbena", "rose vervain", and "Lambert's verbena", for this species. He says of it: "These have ovate leaves which are toothed or lobed, but not divided as is Wild Verbena [V. ciliata]. The flowers are reddish-purple with white eye surrounded by a black line." Anderson (1961) comments that in the Ozark Mountains this species and Lithospermum canescens "mix brilliant magenta and vivid orange on many hillsides in springtime."

VERBENA CANESCENS H.B.K.

Additional & emended bibliography: Irwin & Wills, *Roadside Fls. Tex.* 190. 1961; Moldenke, *Phytologia* 28: 200--202, 204, 207, & 212. 1974.

VERBENA CAROLINA L.

Additional bibliography: Altschul, *Drugs & Foods* 243. 1973; Farnsworth, *Pharmacog. Titles* 8 (10): xvii. 1973; Moldenke, *Phytologia* 28: 202--203. 1974.

Altschul (1973) cites Hinton 2729 from Mexico and reports his statement that this species is "triturerated [and] taken for malaria".

VERBENA CILIATA Benth.

Additional synonymy: Verbena ciliate Benth. ex Burlage, *Wild Flow. Pl. Lakes Country* 143, sphalm. 1973.

Additional bibliography: Burlage, *Wild Flow. Pl. Lakes Country* 143. 1973; Moldenke, *Phytologia* 28: 201 & 203--205. 1974.

Burlage (1973) records the common names, "fringe verbena" and "wild verbena" for this plant and notes that it "is an annual with spreading, square stems with flat-topped clusters of small, reddish or purple flowers. The leaves are opposite. The flowers are tubular. These grow in patches, but never in extended areas."

VERBENA ELEGANS H.B.K.

Additional bibliography: Altschul, *Drugs & Foods* 243. 1973; Moldenke, *Phytologia* 28: 200, 201, & 206--209. 1974.

Altschul (1973) cites Gentry 2730 from Mexico and reports his statement that a decoction is there made of the herbage of this plant and that this is used in the treatment of stomach ailments.

xVERBENA ENGELMANNII Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 209 & 216. 1974.

Gunderson found this plant growing in cow pastures in Wisconsin, flowering in September, and describes the corolla color as "purple".

Additional citations: WISCONSIN: Grant Co.: J. Gunderson 264 (Ws, Ws).

VERBENA HALEI Small

Additional & emended bibliography: Irwin & Wills, *Roadside Fls. Tex.* 190. 1961; Burlage, *Wild Flow. Pl. Lakes Country* 143. 1973; Moldenke, *Phytologia* 28: 212--213. 1974.

Burlage (1973) records the common names, "blue vervain", "candelabra vervain", "slender verbena", "slender vervain", "standing verbena", and "vervain", for this species. He describes it as "A perennial which takes on renewed blooming from early spring until fall, but only scattered plants bloom after June. The flowers are small, scattered at the top of the stem and are purple. The upper leaves are narrow, those of the midstem are divided and the lower are broad and irregularly toothed." Higgins reports it from gravelly soil in the desert shrub community of Texas.

Additional citations: TEXAS: Brewster Co.: L. C. Higgins 6762 (N).

VERBENA HASTATA L.

Additional & emended bibliography: McVaugh, *N. Y. State Mus. Bull.* 360A: 195, 196, 353, & 432. 1958; Borland, *Seasons* 49. 1973; Moldenke, *Phytologia* 28: 213--218. 1974.

McVaugh (1958) speaks of this plant as "common" in "Pastures and wet places.... Abundant in moist meadows and along streams, but also often weedy, in pastures and cultivated ground." He refers to the corolla-color as "violet-blue".

The D. Wills s.n. [July 27, 1957], distributed as V. hastata, is actually xV. rydbergii Moldenke.

xVERBENA HYBRIDA Voss

Additional & emended bibliography: R. O. Williams, *Useful & Ornament. Pl. Zanzib.* 482. 1949; A. M. Anderson in *Mrs. A. S. Anderson, Our Gard. Herit.* 44. 1961; Mrs. C. H. Stout in *Mrs. A. S. Anderson, Our Gard. Herit.* 51. 1961; Mrs. M. J. Fox in *Mrs. A. S. Anderson, Our Gard. Herit.* 66. 1961; Mrs. E. M. Cheston in *Mrs. A. S. Anderson, Our Gard. Herit.* 357. 1961; Irwin & Wills, *Roadside Fls. Tex.* 190. 1961; Moldenke, *Phytologia* 28: 220--221. 1974.

Burkill (1966) says that "V. hybrida must be grown as an annual from imported seed [in Malaya], and, as Mrs. Gough says (*Gard. Book for Malaya*, 1928, p. 248), is impatient of damp and not always a success in wet weather." Williams (1949) records it as cultivated on Zanzibar and Pemba islands in many colors, rooting "at the joints", and "especially in garden beds during cooler weather."

The Boulos s.n. [July 1952], distributed as xv. hybrida, is actually V. rigida Spreng.

Additional citations: CULTIVATED: Bermuda: Brown & Britton 1728 (Ba--photo). Canada: Gillett 40-422-67 (Ba). Ceylon: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28291 (Pd). Egypt: Has-sib s.n. [29/4/1941] (Gz); Mahdi s.n. [16/6/1971] (Ac); Sisi s.n. [26/5/1973] (Gz); V. Täckholm s.n. [30/10/1959] (Gz). New York: R. B. Clark s.n. [B. H. 64-106] (Ba); D. A. Fisher s.n. [July 6, 1936] (Ba). Pennsylvania: J. W. Peterson J.104 (Ba). Saint Thomas: Britton & Britton 237 (Ba--photo). South Africa: Bayliss BC.1184 (Ba). Texas: C. L. Lundell 10936 (Mi). Zambia: Coxe 18 (Ba).

xVERBENA ILLICITA Moldenke

Additional bibliography: Rydb., Fl. Prairies & Plains, pr. 1, 677 (1932) and pr. 2, 2: 677. 1971; Moldenke, Phytologia 23: 278. 1972.

VERBENA INCISA Hook.

Additional synonymy: Verbena arraniana Paxt., Pock. Bot. Dict., ed. 1, 328. 1840.

Additional & emended bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Dupuis, Nouv. Fl. Usuel. & Med. 2: 158. 1860; Furusato, Bot. & Zool. Theoret. & Appl. Tokyo [Syokubutu Oyobi Dobuti] 8: 1304, 1306, 1307, 1310, & 1311 [8 (8): 40, 42, 43, 46, & 47], fig. 3. 1940; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839, map 1393. 1971; Encke & Buchheim in Zander, Handwörterb. Pflanzenn., ed. 10, 520. 1972; F. Perry, Fls. World 303 & 320. 1972; Moldenke, Phytologia 24: 218 & 237 (1972) and 25: 234 & 244. 1973; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 45 & 148. 1973; Moldenke, Phytologia 28: 221. 1974.

Additional illustrations: Furusato, Bot. & Zool. Theoret. & Appl. Tokyo [Syokubutu Oyobi Dobuti] 8: 1307 [8 (8): 43], fig. 3. 1940.

Furusato (1940) reports that seeds of this plant required about 18 days to germinate under normal conditions; with 0.02 percent colchicine they also required 18 days; with 0.05, 0.1, and 0.2 percent 20 days; and with 0.4 and 0.8 did not germinate at all. The species' normal chromosome number he reports as 10, diploid 20, and tetraploid 40; no octoploid was produced.

The Angely (1971) reference cited in the bibliography above was previously cited by me as 1970, the title-page date, but this work was not actually published until 1971.

Paxton (1840) asserts that V. incisa was introduced into cultivation in England in 1835 and his V. arraniana in 1837. Dupuis (1860) describes the color of the flowers as "rose pourpre", which leads one to suspect that his plant was not V. incisa.

The late Dr. T. A. Sprague, in a letter to Dr. L. H. Bailey dated 9/6/24, says "Verbena incisa Hook. Bot. Mag. t. 3628 (1838).

Only a fragment (two nodes, without flowers) of the actual type-specimen was preserved, and this would not make a satisfactory photograph. There is, however, a fine contemporary specimen of a plant cultivated as V. incisa in the Gardens of the Horticultural Society. This agrees with the Bot. Mag. plate and may be accepted as a 'working type'. It is being photographed. The sheet containing the wild specimens cited by Hooker is also being photographed." These photographs have been examined by me and are cited below; all three specimens are preserved in the herbarium of the Royal Botanic Gardens at Kew. The corollas on Quarín 655, cited below, are said to have been "red" when fresh and the collector comments that it is a "maleza en cultivos de algodón" [weed in cotton-fields].

Additional citations: BRAZIL: Rio Grande do Sul: Tweedie 504 (Ba--photo), 505 (Ba--photo). PARAGUAY: Hassler 12335 (Ba--photo, Ba--photo). ARGENTINA: Santa Fé: Quarín 655 (Ld); Tweedie 460 (Ba--photo), s.n. [Santa Fé] (Ba--photo). CULTIVATED: England: Herb. Hort. Soc. Lond. s.n. (Ba--photo). MOUNTED ILLUSTRATIONS: Hook., Bot. Mag. 65: pl. 3628. 1839 (Ba--photo).

VERBENA INTEGRIFOLIA Sessé & Moc.

Additional bibliography: Moldenke, *Phytologia* 23: 280. 1972.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: C. Hayden s.n. (Pd).

xVERBENA INTERCEDENS Briq.

Additional bibliography: Moldenke, *Phytologia* 23: 280 (1972) and 28: 116. 1974.

Recent collectors describe this plant as attaining a height of about 1 meter. When in cultivation as "a garden annual" in the United States gardens it flowers and fruits in July and August. In Brazil it has been encountered on the campos. The corollas are said to have been "pale-violet" on Dress 1393, "violet" on Krapovickas, Cristóbal, & Maruffak 23056, and "purple" on Cowgill 903 -- the last mentioned collection being taken from plants grown from seed of Archer 4821 from Paraguay.

Additional citations: BRAZIL: Santa Catarina: Krapovickas, Cristóbal, & Maruffak 23056 (Z). CULTIVATED: Maryland: Cowgill 903 [Pl. Introd. 121505] (Ba). New York: Dress 1393 (Ba).

VERBENA INTERMEDIA Gill. & Hook.

Emended synonymy: Verbena intermedia Gill. ex Gibert, Enum. Pl. Montev. 43. 1873.

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Gibert, Enum. Pl. Montev. 43. 1873; Fedde in Just, Bot. Jahresber. 57 (2): 909. 1938; Reitz, Sellowia 22: 145. 1970; Moldenke, *Phytologia* 23: 280--281 (1972), 25: 235 (1973), and 28: 201. 1974.

Gibert (1873) reduces V. canescens to synonymy under V. inter-

media, but this is obviously an error. Verbena canescens is a very distinct species of Nevada, Texas, and Mexico. Paxton (1840) avers that V. intermedia was introduced into cultivation in England in 1828. Rosengurt Gallinal refers to it as "rare" in Uruguay, and the corollas on Rosengurt Gallinal 6018 are described as having been "violet" in color when fresh.

Additional citations: URUGUAY: Rosengurt Gallinal 6018 (Ba), B.765 (Ba).

VERBENA JORDANENSIS Moldenke

Additional & emended bibliography: Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839 & xix, map 1393, 1971; Moldenke, Phytologia 23: 281. 1972.

The corollas on Hatschbach 30749 are said to have been "white" when fresh and the plant was encountered on rocky campos.

Additional citations: BRAZIL: Paraná: Hatschbach 30749 (Ld).

VERBENA LACINIATA (L.) Briq.

Additional synonymy: Verbena erinaides Willd. ex Lindl. in Edwards, Bot. Reg. 21: pl. 1766, in textu. 1835. Lychnidea verbenae tenuifoliae folio, vulgo Sandia Laguen Feuille. ex Lindl. in Edwards, Bot. Reg. 21: pl. 1766, in syn. 1835. Verbena pulcherrima Hook. ex Dupuis, Nouv. Fl. Usuel. & Med. 80. 1860.

Additional & emended bibliography: Desf., Tabl. Écol. Bot., ed. 1, 54. 1804; Willd., Enum. Pl. Hort. Berol. 2: 634. 1809; Desf., Tabl. Écol. Bot., ed. 2, 66. 1815; Lindl. in Edwards, Bot. Reg. 21: pl. 1748 & 1766. 1835; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Dupuis, Nouv. Fl. Usuel. & Med. 2: 80 & 104. 1860; Gibert, Enum. Pl. Montev. 43. 1873; Anon., Kew Bull. Misc. Inf. 1929, App. 2: 108. 1929; R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839, vii, & xix, map 1393. 1971; Moldenke, Phytologia 24: 22, 46, 137, 147, 218, 233, & 237--240 (1972), 25: 234 (1973), and 28: 112. 1974.

Dupuis (1860) describes what he calls V. pulcherrima as "Annuelle; tige de 50 cent.; fleurs violettes; juin-octobre" and V. erinoides as "Annuelle; tiges de 10 cent.; fleurs lilas; juin-octobre". Desfontaines (1804) calls the species "verveine laciniée". Paxton (1840) asserts that it was introduced into cultivation in England in 1818. The Verbena erinaides Willd., listed in the synonymy above, was previously erroneously listed by me as a synonym of var. contracta (Lindl.) Moldenke.

The Herb. Desfontaines 4 specimen, of which there is a photograph in the Bailey Hortorium herbarium, bears a label in Desfontaines' own handwriting reading "Verbena multifida F. peruv. V. erinoides L. hb., Erinus laciniatus L." To this Spach (curator of the Paris Museum herbarium at the time) has added: "Verbena tenera Sprgl. — pulchella Sweet (Non V. erinoides)". A memorandum to Dr. L. H. Bailey from the Paris herbarium curator states that this IS probab-

ly the type specimen of V. erinoides. However, that binomial is based on Erinus laciniatus of Linnaeus and THAT is based on a Feuillée non-existent specimen, so the illustration given by Feuillée must be regarded as the "standard" type according to the late expert on the International Rules, Dr. Sprague of Kew. The Desfontaines and the two Lamarck specimens, photographs of which are cited below, are deposited in the herbarium of the Muséum National d'Histoire Naturelle at Paris.

The corollas on Asplund 20147 are said to have been "pale-violet" when fresh and this distinguished collector encountered the plant on dry slopes in Ecuador at 2300 meters altitude.

The Mahu 758-L & 4232 and Morrison 16771, distributed as V. laciniata, are actually V. berterii (Mesin.) Schau., while Eyer-dam & Beetle 22317 is V. dissecta Willd. The Angely (1971) work cited in the bibliography above was previously cited by me as 1970, the title-page date, but was not actually published until 1971.

Additional citations: ECUADOR: Tunguragua: Asplund 20147 (W--2652458). URUGUAY: Herb. Lamarck 3 (Ba--photo). ARGENTINA: Buenos Aires: Herb. Lamarck 2 (Ba--photo). CULTIVATED: France: Herb. Desfontaines 4 (Ba--photo).

VERBENA LACINIATA var. CONTRACTA (Lindl.) Moldenke

Additional synonymy: Verbena erinoides var. sabini Sweet, Brit. Fl. Gard. 7 [ser. 2, 4]: pl. 347. 1836. Verbena sabini Hort. ex Sweet, Brit. Fl. Gard. 7 [ser. 2, 4]: pl. 347, in syn. 1836. Verbena multifida sabini D. Don ex G. Don in Loud., Hort. Brit. Suppl. 2: 680. 1839. Verbena sabini Sweet ex Schau. in A. DC., Prodr. 11: 553, in syn. 1847. Verbena sabiniana Hort. ex Briq., Ann. Conserv. & Jard. Bot. Genève. 7-8: 297. 1904. Verbena erinoides sabinii D. Don ex Stapf, Ind. Lond. 6: 429. 1931. Verbena laciniata var. sabini (Sweet) Moldenke, Phytologia 3: 426. 1951. Verbena laciniata var. sabinii Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2211. 1951.

Additional & emended bibliography: Willd., Enum. Pl. Hort. Berol. 2: 634-635. 1809; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Regel, Gartenfl. 28: 372-373. 1879; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 1179. 1895; Briq., Ann. Conserv. & Jard. Bot. Genève. 7-8: 296-297. 1904; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 1179 (1946) and pr. 3, 2: 1179. 1959; Moldenke, Résumé 223, 364, 370, 373, & 472. 1959; Moldenke, Résumé Suppl. 3: 14, 29, 37, 38, 40, & 41. 1962; Moldenke, Phytologia 9: 394-396, 399, & 401-403 (1963) and 11: 188, 189, 271, & 469. 1965; Moldenke, Fifth Summ. 1: 193, 201, & 371 (1971) and 2: 667, 668, 678, 684, 694, & 916. 1971; Moldenke, Phytologia 23: 284. 1972.

Additional illustrations: Sweet, Brit. Fl. Gard. 7 [ser. 2, 4]: pl. 347 (in color). 1836.

The original description of var. contracta (1835) reads "What

we now figure is a dwarfer and more short-jointed kind [than V. multifida Ruiz & Pav.], our drawing of which was made in the Garden of the Horticultural Society last June. It looks almost like a species of scentless Thyme, and grows into a very dense patch which has but little disposition to extend itself." The original description of var. sabini (1836) is "It differs from the normal variety of erinoides only by its dwarfer, denser, and more glabrous habit, and rich purple flowers". It seems most likely to me now that these two names apply to the same taxon, for which the earlier varietal name must be adopted. Paxton (1840) avers that it was introduced into cultivation in England in 1834; Willdenow (1809) lists it as cultivated at the Berlin Botanical Garden in 1809.

Additional citations: MOUNTED ILLUSTRATIONS: Edwards, Bot. Reg. 21: pl. 1766. 1835 (Ba--photo, Ba--photo, Ba--photo); Sweet, Brit. Fl. Gard. 7 [ser. 2, 4]: pl. 347. 1836 (Ba--photo, Ba--photo, Ba--photo).

VERBENA LACINIATA var. SABINI (Sweet) Moldenke

This taxon is now regarded as a synonym of V. laciniata var. contracta (Lindl.) Moldenke, so all the data recorded by me previously under this trinomial should be transferred to the latter.

VERBENA LASIOSTACHYS Link

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Anon., Kew Bull. Misc. Inf. 1929, App. 3: 108. 1929; Higgins, Occas. Pap. San Diego Soc. Nat. Hist. 8: 121. 1949; Wetzel, Madroño 21: 195. 1971; Moldenke, Phytologia 23: 284--287. 1972; Howitt & Howell, Suppl. Vasc. Pl. Monterey Co. 28. 1973.

Higgins (1949) says that this species is "Common from Point Loma....and San Onofre....to Palomar Mt....and Cuyamaca Mts....; has been taken at Japatul" and cites nos. 6787, 11037, 21028, 22058, & 28844 from California. Wetzel (1971) found it "Fairly common along margins of Alameda Creek" in the same state. Paxton (1840) asserts that it was introduced into cultivation in England in 1826, but is "worthless" in cultivation.

The M. Hall s.n. [May 18, 1940], distributed as V. lasiostachys, is actually V. abramsii Moldenke, while Ferlatte & Rogers 2031 is V. lasiostachys var. septentrionalis Moldenke.

Additional citations: CALIFORNIA: Alpine Co.: Hoover 4161 (Bl--191614). Monterey Co.: L. S. Rose 53042 (Bl--91003, Bl--253598).

VERBENA LASIOSTACHYS var. SEPTENTRIONALIS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 218. 1972; Howitt & Howell, Suppl. Vasc. Pl. Monterey Co. 28. 1973.

Recent collectors describe this plant as "woody at base, in large clumps" and found it growing on open rocky hillsides burned over about 3 years previously and in gravel waste lands by old

cabins with Plantago, Lepidium, and Cryptantha. The corollas on Ferlatte & Rogers 2031 are said to have been "purple" and these collectors speak of the plant as being "occasional" in its distribution.

Additional citations: CALIFORNIA: Santa Cruz Co.: Moldenke & Moldenke 25971 (Ac). Trinity Co.: E. K. Balls 13802 (B1-60169); Ferlatte & Rogers 2031 (B1-245222).

VERBENA LILACINA Greene

Additional bibliography: Moldenke, Phytologia 23: 288. 1972.

Recent collectors describe this species as a rounded shrub, 1 m. tall, or a bushy herb, and found it growing at altitudes of 10 to 1100 meters on silty flats or the steep north slope of canyons. Moran 17123 bears a notation that this collection represents "the northernmost [specimen] seen on the coast road, Puerto San José", Baja California. The Haines & Hale unnumbered specimen in the University of Arizona herbarium is said to be a topotype of the species. The corollas on Moran 8195 & 10669 are said to have been "lavender" when fresh.

Additional citations: MEXICO: Baja California: R. Moran 8195 (Ba, B1-187272), 17123 (Ld), 17127 (B1-264354). MEXICAN OCEANIC ISLANDS: Cedros: Haines & Hale s.n. [9 March 1939] (B1-76561), s.n. (Tu-102687); R. Moran 10669 (Ba), 10698 (B1-187261).

VERBENA LINDMANI Briq.

Additional & emended bibliography: Reitz, Sellowia 13: 110 (1961) and 22: 145. 1970; Moldenke, Phytologia 23: 288. 1972.

VERBENA LITORALIS H.B.K.

Additional & emended bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Gibert, Enum. Pl. Montevid. 43. 1873; Hartwell, Lloydia 34: 387. 1922; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 417. 1939; Oertel, U. S. Dept. Agr. Circ. 554: 21. 1939; Garcia Alcover, Med. Herb. Chil. 1950; Angely, Taxon 4: 120. 1955; R. C. Foster, Contrib. Gray Herb. 184: 171. 1958; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839, 840, & xix, map 1394. 1971; Beadle, Evans, Carolin, & Tindale, Fl. Sydney Reg., ed. 2, 507. 1972; Faernsworth, Pharmacog. Titles 7 (4): xxv & 222. 1972; Hinton & Rzedowski, Journ. Arnold Arb. 53: 167. 1972; Rouleau, Taxon Index Vol. 1-20, part 1: 378. 1972; Moldenke, Phytologia 24: 216, 218, & 224 (1972) and 25: 234. 1973; Altschul, Drugs & Foods 243. 1973; Farnsworth, Pharmacog. Titles 6, Cum. Gen. Ind. [121]. 1973; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 44-47 & 148, fig. 1. 1973; Moldenke, Phytologia 28: 203 & 218. 1974.

Additional illustrations: Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 46, fig. 1. 1973.

Recent collectors have found this species growing in wet sand or roadside marl, open fields and clearings, hillside pastures, rainforests on mountains, mountain slopes, and cloudforests, along

weedy roadsides, on high ridges and hillslopes, at the edges of old coffee plantations in fertile soil with rocks, and on steep slopes with Quercus, Pinus, Liquidambar, Podocarpus, and Magnolia. In South Africa it has been found in mountainous areas with many springs and streams, some wooded and some grassy areas, basically dolomites and limestone covered with deep humus in many places. They describe it as 0.8--1 m. tall, the stems quadrangular and ribbed, the uppermost parts and calyx-tips purple, and the leaves medium-green. Scora refers to the species as abundant on exposed lava on Quaternary continental deposits in Veracruz, Mexico; Bristol says that it is common in waste places in Putumayo, Colombia; and Ruiz-Teran & López-Figueiras found it "en paties y jardines" in Mérida, Venezuela. Chindoy B. asserts that it is medicinal in Colombia.

Additional vernacular names recorded for V. littoralis are "mountain verbena", "verbena de montana", and "vervenushe". The corollas are described as having been "violet" in color on Quarín, Mroginski, & González 396 and Proctor 25090, "blue-violet" on Contreras 8783, "lilac" on Breteler 3056 and Contreras 6152, "blue" on Chindoy B. 42, Contreras 2635 & 5241, Dodson & Thien 1810, Hinton & al. 12156, and Rodín 3917, "bluish" on Krapovickas, Cristóbal, Arbo, Maruffak, Maruffak, & Irigoyen 16634, "purple" on Sousa & Diego 1471, "moradas claras" on Ruiz-Teran & López-Figueiras 1903, "pink" on Gentle 6481, "pinkish" on Gentle 7119, "white to pink" on Cooley 11255, and "blue in spring" on Pfeifer 1315, while on Bristol 1154 they are described as "corolla-tube light-purple, limb white" and on Tucker 1308 "throat pale-lavender or white, lobes lavender". Beadle and his associates (1972) describe the corollas as "blue-purple". These authors describe the species as having the spikes short and dense, the peduncles naked for some distance below the flowers or bearing very reduced leaves, the corolla-limb 2--5 mm. in diameter, the tube about 4 mm. long, the calyx about 3 mm. long. They say that the plant is "Hispid with simple hairs becoming almost glabrous in the older parts", the leaves "elliptic to lanceolate in outline, dentate or lobed."

Oertel (1939) lists this species as a honey plant and a pollen-yielding plant in Louisiana. Paxton (1840) states that it was introduced into cultivation in England in 1832. Gibert (1873) reduces V. brasiliensis Vell. and V. littoralis var. pyncnostachya Schau. to synonymy under what he calls V. littoralis Kunth, but seems incorrect. Verbena brasiliensis is quite distinct, although admittedly closely related to V. littoralis, and Schauer's trinomial is synonymous with it.

Altschul (1973) cites Hinton 3731 from Mexico, Steinbach 5137 from Bolivia, and Hinckley & Hinckley 64 from Peru and reports the statements of these well-known collectors that the juice of macerated plants of V. littoralis is taken against malaria and that the plant is also employed as a purgative, in the treatment of contusions, against fevers, and as a "general remedy" for coughs.

The Santa Cruz 1938, distributed as V. litoralis, is actually V. bonariensis L., E. L. Johnson 6310 is V. hayekii Moldenke, Breedlove 9458 is V. litoralis var. albiflora Moldenke, Lindeman & Haas 3692 is V. minutiflora Briq., and Rambo 49723 is V. montevidensis Spreng. The Schultes & Reko 237, cited below, is a mixture with V. carolina L.

Additional citations: FLORIDA: County undetermined: C. D. Byrd s.n. [South Florida, 29 July 1969] (Ft). MEXICO: Chiapas: Ton 2847 (Ws, Ws). Michoacán: Hinton & al. 12156 (Tu--21347). Oaxaca: Pringle 4877 (Pd); Schultes & Reko 237, in part (Oa). Puebla: Marcks & Marcks 794 (Ws). Veracruz: Scora 2451 (W--2635482); Sousa & Diego 4471 (Ba). GUATEMALA: El Petén: Contreras 2635 (Ld), 6152 (Ld), 8783 (Ld, Ld). El Quiché: Contreras 5241 (Ld, Ld); Proctor 25098 (Ld, Ld). BRITISH HONDURAS: Gentle 6481 (Ld), 7119 (Ld). HONDURAS: Department undetermined: Pfeifer 1315 [Mount Yuuca] (W). EL SALVADOR: Santa Ana: Tucker 1308 (Ba). NICARAGUA: Matagalpa: F. C. Seymour 4050 (Vt); Zelaya M. 2324 (Mi, Ws). COLOMBIA: Putumayo: Bristol 1154 (Oa, Oa); Chindoy B. 42 (Oa). VENEZUELA: Mérida: Breteler 3056 (Ws); Ruiz-Teran 5988 (N); Ruiz-Teran & López-Palacios 1903 (N), 6617 (N). ECUADOR: Tunguragua: Dodson & Thien 1810 (Ld, Ws). BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 28721 (N). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Arbo, Maruñak, Maruñak, & Irigoyen 16634 (Ws); Quarín, Mroginski, & González 396 (Ld); Ruiz Huidobro 4275 (Bl--104300), 4710 (Bl--104299). SOUTH AFRICA: Transvaal: Rodin 3917 (Ba). HAWAIIAN ISLANDS: Hawaii: Rubtzoff 2615 (W--2624777). Maui: Cooley 11255 (Ws). Oahu: Moldenke & Moldenke 28105 (Ac); Nuttall s.n. [photo BM.3129] (Gz--photo).

VERBENA LITORALIS var. ALBIFLORA Moldenke

Additional bibliography: Hinton & Rzedowski, Journ. Arnold Arb. 53: 167. 1972; Moldenke, Phytologia 23: 369. 1972.

Recent collectors have found this plant growing in clearings beside houses, on slopes with Quercus, and as weedy plants in streets, blooming in March and both flowering and fruiting in August. Breedlove encountered it at 5200 feet altitude. The corollas are described as "white" on all the specimens cited.

Additional citations: MEXICO: Chiapas: Breedlove 9458 (Ws). HONDURAS: Distrito Central: Pfeifer 2012 (W). PERU: Loreto: Martin & Lau-Cam 1261 (Oa).

VERBENA LITORALIS var. CARACASANA (H.B.K.) Briq.

Additional bibliography: Schau., Linnaea 20: [476]. 1847; Moldenke, Phytologia 23: 293--295, 371, & 419. 1972.

VERBENA LITORALIS var. CONGESTA Moldenke

Additional & emended bibliography: Moldenke, Excerpt. Bot. A. 18: 445. 1971; Moldenke, Phytologia 23: 295. 1972.

VERBENA LOBATA Vell.

Additional & emended bibliography: Reitz, Sellowia 22: 145. 1970; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 839, 840, & xix, map 1394. 1971; Moldenke, Phytologia 23: 295—296. 1972.

Hatschbach has found this plant growing in the caopeira association. The corollas on Hatschbach 25324 are described as having been "lilac" in color when fresh, while those on 30676 were "violet".

Additional citations: BRAZIL: Paraná: Hatschbach 25324 (N), 30676 (Ld).

VERBENA LOBATA var. HIRSUTA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 296. 1972.

Hatschbach describes this plant as an herb and found it growing in wet soil in clearings in a forest. The corollas on Hatschbach 28517 are said to have been "lilac" in color when fresh.

Additional citations: BRAZIL: Paraná: Hatschbach 28517 (Ld, N).

VERBENA LONGIFOLIA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 296. 1972.

Contreras describes this plant as an herb with white flowers and found it growing "in a village", flowering in July.

Additional citations: GUATEMALA: El Quiché: Contreras 5247 (Ld).

VERBENA MACDOUGALII Heller

Additional bibliography: D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1397 & 1399—1400. 1972; Farnsworth, Pharmacog. Titles 7 (10): xvi. 1972; Fong & al., Lloydia 35: 147. 1972; Moldenke, Phytologia 23: 369 & 436 (1972) and 24: 139. 1972; Halse, Fl. Canyon de Chelly 147 & 148 [thesis]. 1973; Rickett, Wild Fls. U. S. 6 (3): 544—546 & 783, pl. 196. 1973; Moldenke, Phytologia 28: 203. 1974.

Moir encountered this species "in steppe openings dominated by Festuca arizonica in Pseudotsuga menziesii forest zone" in New Mexico, while Lehto and his associates found it in a "mountain meadow in ponderosa pine zone". My wife, son, and myself have seen it abundant along roadsides and in clearings in ponderosa pine forests, often producing a spectacularly beautiful display. The Corrells (1972) give its distribution as "On flats at high elev., in wet mt. meadows and valleys, w. Tex. (Culberson Co.), N. M. (widespread in mts.) and Ariz. (Apache, Navajo, Coconino, Greenlee, Yavapai and Pima cos.), June—Oct., also s. Wyo. and cent. Ut." They refer to it as the "New Mexican Vervain".

The corollas on E. Meyer 604 are said to have been "purple" in color when fresh. Halse (1973) cites Halse 472 & 641 from the Canyon de Chelly. The P. A. Wilson 622, distributed as V. macdougalii, is actually f. albiflora Moldenke, as is also the plate 196 in Rickett's work (1973).

Additional citations: COLORADO: Conejos Co.: W. A. Weber 7865a

(Bl--73325); Weber & Salamun 12913 (Bl--199535). NEW MEXICO: Colfax Co.: L. C. Higgins 5764 (N). Lincoln Co.: Moir 66-21 (Bl--211259); Wooton & Standley 3497 (Bl--90189), 3651 (Bl--90199). Santa Fe Co.: Gillett & Mosquin 12246 (Bl--211571). ARIZONA: Apache Co.: Lehto, McGill, Nash, & Pinkava 11506 (N); Moldenke & Moldenke 27849 (Ac, Gz, Id). Coconino Co.: Holmgren & Holmgren 4691 (W--2648521); E. Meyer 604 (Ba); H. H. Rusby 780 (N).

VERBENA MACDOUGALII f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 298. 1972; Rickett, *Wild Fls. U. S. 6* (3): [545], pl. 196. 1973.

Illustrations: Rickett, *Wild Fls. U. S. 6* (3): [545], pl. 196 (in color). 1973.

Material of this form has been distributed in some herbaria as typical V. macdougalii Heller. The illustration on plate 196 of Rickett's work (1973) is labeled and described as the typical form of the species, but the picture shows white corollas, so seems to represent f. albiflora instead.

Additional citations: NEW MEXICO: Santa Fe Co.: P. A. Wilson 622 (N).

VERBENA MACRODONTA Perry

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 575. 1941; Moldenke, *Phytologia* 23: 298. 1972.

VERBENA MACROSPERMA Speg.

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 54 (2): 747 (1934) and 59 (2): 417. 1939; Moldenke, *Phytologia* 23: 298. 1972.

VERBENA MARITIMA Small

Additional bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 573. 1941; Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87 & 89. 1968; Moldenke, *Phytologia* 23: 298--299 (1972) and 28: 250. 1974.

Solbrig (1968) reports that the normal pollen fertility in this species is 85 percent. The two photographs in the Bailey Hortorium herbarium, cited below, are of specimens deposited in the Britton Herbarium at the New York Botanical Garden.

There is an as yet unnamed artificial hybrid between V. maritima and V. canadensis (L.) Britton for which see under the reverse cross in this series of notes.

Additional citations: FLORIDA: Brevard Co.: Curtiss 5706 (Ba--photo). Dade Co.: Small & Small 5422 (Ba--photo). Saint Lucie Co.: MacDaniels s.n. [April 24, 1936] (Ba).

VERBENA MARRUBIOIDES Cham.

Additional bibliography: Reitz, *Sellowia* 22: 145. 1970; Moldenke, *Phytologia* 23: 299. 1972.

Additional citations: BRAZIL: São Paulo: Sellow s.n. [Bras. merid

Macbride photos 17429] (Ba--isotype).

VERBENA MEGAPOTAMICA Spreng.

Additional synonymy: Verbena phlogiflora var. alfa Troncoso, Darwiniana 16: [613], in syn. 1971.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87-89. 1968; Reitz, Sellowia 22: 145. 1970; Anon., Biol. Abstr. 54 (5): B. A. S. I. C. S.106. 1972; Moldenke, Phytologia 23: 299-301, 372, 373, 419, & 431 (1972) and 24: 39 & 140. 1972; "S. K. J.", Biol. Abstr. 54: 2319. 1972.

Solbrig (1968) states that the normal pollen fertility in this species is 99 percent.

The Sellow collection cited below appears to be the type collection both of V. megapotamica Spreng. and of V. phlogiflora var. C Cham.

Additional citations: BRAZIL: Rio Grande do Sul: Sellow 13 [Macbride photos 17438, in part] (Ba--isotype).

VERBENA MEGAPOTAMICA Spreng. x V. PULCHELLA Sweet

Synonymy: Glandularia megapotamica x G. pulchella Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

Bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

This unnamed hybrid was apparently produced artificially by Solbrig and his associates in Massachusetts. Until authentic herbarium voucher specimens of the parental species can be examined it seems pointless to propose a binomial designation for it. The name, V. pulchella, is interpreted differently by South American workers and I am not at all sure that this species is really involved in this cross. In any case, such a hybrid might occur in nature where the ranges of the two parental species overlap and may be represented now in herbaria as some of the perplexing intermediate specimens about whose identity there has been such difference of opinion. Vouchers of the artificially produced hybrids most certainly should be made available for study.

VERBENA MENDOCINA R. A. Phil.

Additional & emended bibliography: Schnack & Covas, Darwiniana 7: [71], 72, 74, & 75, pl. 1 B. 1945; Moldenke, Phytologia 23: 301 (1972) and 24: 238. 1972.

VERBENA MENTHAEFOLIA Benth.

Additional bibliography: Higgins, Occas. Pap. San Diego Soc. Nat. Hist. 8: 121. 1949; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [thesis]. 1951; Sanchez Sanchez, Fl. Val. Mex., ed. 1, 328, fig. 263-B. 1969; Moldenke, Phytologia 23: 369-370 & 374 (1972), 24: 40 & 126 (1972), and 28: 212. 1974.

Additional illustrations: Sanchez Sanchez, Fl. Val. Mex., ed. 1, fig. 263-B. 1969.

Recent collectors have found this plant growing along roadsides and in grazed meadows with an abundance of sedge species including Cyperus fendlerianus, C. rusbyi, C. spectabilis, C. manimae, and

others, growing in shallow loamy soils in open oak-pine forests. The Marcks comment that their collection, cited below, has the "spikes panicked at apex". Higgins (1949) asserts that the species is common around San Diego, California, from Point Loma to San Ysidro and Sweetwater Valley, citing his nos. 6783, 11518, 17067, & 21049. Sanchez Sanchez (1969) found it on the pedregal in the Valley of Mexico.

The corollas on H. E. Moore 1625 are said to have been "light-blue" in color when fresh, while those on no. 3094 were "lavender".

Material of V. menthaefolia has been misidentified and distributed in some herbaria as V. gracilis Desf.

Additional citations: MEXICO: Durango: Marcks & Marcks 1244 (Ws). Hidalgo: H. E. Moore 1625 (Ba), 3094 (Ba). México: Pringle 8534 (Pd). Michoacán: Hinton & al. 11991 (Tu--98813).

VERBENA MICROPHYLLA H.B.K.

Additional bibliography: Schau., Linnaea 20: 477. 1847; R. C. Foster, Contrib. Gray Herb. 184: 171. 1958; Anon., Biol. Abstr. 54 (7): B. A. S. I. C. S.280. 1972; Moldenke, Phytologia 24: 218, 238, & 243. 1972.

The photograph in the L. H. Bailey Hortorium herbarium, cited below, is of sheet 1190005 in the United States National Herbarium in Washington.

The Vervoorst 3197, distributed as V. microphylla, is actually V. parodii (Covas & Schnack) Moldenke, while Soejarto & Hernandez 1339 is Hierobotana inflata (H.B.K.) Briq.

Additional citations: PERU: Cuzco: Herrera s.n. [Cuzco, July 1923] (Ba--photo). Province undetermined: MacLean s.n. (Pd).

EOLIVIA: La Paz: Rea C. 39 (W--2635748).

VERBENA MINUTIFLORA Briq.

Additional & emended bibliography: Angely, Fl. Anal. & Fitogeog. S. Paulo, ed. 1, 840 & xix, map 1395. 1971; Moldenke, Phytologia 23: 370. 1972.

The Angely (1971) reference in the bibliography above was previously erroneously cited by me as "1970", the title-page date, but the work was not actually published until 1971.

Recent collectors have encountered this plant in moist places, "brejo" associations, roadsides on campos, and pastures near artificial lakes, describing it as a shrub 1--1.7 m. tall. Hatschbach refers to it as "common". In addition to the months previously reported by me, it has been collected in anthesis in April, September, and November. The corollas are described as having been "lilac" in color when fresh on Hatschbach 24209, 25327, 25739, 27062, & 30740 and "purple" on Lindeman & Haas 3692.

Material of V. minutiflora has been misidentified and distributed in some herbaria as V. sagittalis Cham.

Additional citations: BRAZIL: Paraná: Hatschbach 24209 (N), 25327 (N), 25739 (Ld), 27062 (Ld), 30740 (Ld). Rio Grande do Sul:

Lindeman & Haas 3692 (N).xVERBENA MOECHINA Moldenke

Additional synonymy: Verbena simplex x stricta Ahles ex Mohlenbrock & Voigt, Fl. South. Ill. 287. 1974.

Additional bibliography: Rydb., Fl. Prairies & Plains, pr. 1, 678. 1932; Fell, Fl. Winnebago Co. 122. 1955; Eilers, Univ. Iowa Stud. Nat. Hist. 21: 61 & 123. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 2: 678. 1971; Moldenke, Phytologia 23: 370 & 437 (1972) and 28: 109. 1974; Mohlenbrock & Voigt, Fl. South. Ill. 286, 287, & 389. 1974.

Eilers (1971) records this hybrid as rare on sandy alluvial flats in Blackhawk and Johnson Counties, Iowa. He cites from the former county two collections by Shimek and from the latter Adams s.n. and Thorne 17398, all deposited in the herbarium of the University of Iowa. Braun found the plant growing on limestone-gravelly prairies, flowering and fruiting in July. Her collection, cited below, is a mixture with typical V. simplex Lehm. Mohlenbrock & Voigt (1974) record the hybrid from Hardin County, Illinois.

Additional citations: ILLINOIS: Story Island: E. L. Braun s.n. [VII-22-12] (W-2712369).

VERBENA MONACENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 371. 1972.

Sivaraajan asserts that this plant is cultivated at Calicut, Kerala, India, in shade of "deep-blue to white, all shades available". My wife and I have seen it in cultivation in private gardens and public parks in Delhi, India, and in various places in Ceylon.

Additional citations: CULTIVATED: India: Sivaraajan 1583 (Z).

VERBENA MONTEVIDENSIS Spreng.

Additional bibliography: Reitz, Sellowia 22: 145. 1970; Moldenke, Phytologia 23: 371-372 (1972), 25: 244 (1973), and 28: 110. 1974.

Recent collectors refer to this plant as a shrub, 1-3 m. tall, almost leafless, and have encountered it in the "brejo" association and in the interior of woodlands, fruiting (in addition to the months previously recorded by me) in October. The corollas are said to have been "violet" in color when fresh on Hatschbach 28464 and Pire & Mroginski 152, but "purple (5 P 5/8)" on Lindeman & Haas 3010.

The Hatschbach 24209 and Lindeman & Haas 3692, distributed as V. montevidensis, are actually V. minutiflora Briq.

Additional citations: BRAZIL: Paraná: Hatschbach 28464 (Ld); Lindeman & Haas 3010 (N). Rio Grande do Sul: Rambo 49723 (B1-64841). ARGENTINA: Corrientes: Quarín & Schinini 1088 (Ld). Misiones: Pire & Mroginski 152 (Ld).

VERBENA MORICOLOR Moldenke

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax.

87—89. 1968; Moldenke, *Phytologia* 23: 372—373 & 427 (1972) and 24: 36 & 38. 1972.

Solbrig (1968) reports that the normal pollen fertility in this species is 97 percent.

VERBENA MORICOLOR Moldenke x *V. PERUVIANA* (L.) Britton

Synonymy: *Glandularia moricolor* x *peruviana* Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87. 1968.

Bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87 & 89. 1968; Moldenke, *Fifth Summ.* 2: 917 & 970. 1971; Moldenke, *Phytologia* 23: 372—373 (1972) and 24: 38. 1972.

Solbrig (1968) reports that the hybrid of *V. moricolor* with *V. peruviana* has a pollen fertility of 81 percent, while the reverse cross of *V. peruviana* with *V. moricolor* has a pollen fertility of only 56 percent. These hybrids are as yet without binomial designation and had best remain so until herbarium vouchers confirm the actual parentage. They may yet be found wild in South America where the ranges of the parental species overlap. It is to be hoped that authentic herbarium vouchers and photographs of the artificially produced hybrids will soon be available for study and for comparison with the many perplexing "intermediate" herbarium specimens now deposited in various herbaria.

VERBENA NANA Moldenke

Additional & emended bibliography: Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 840 & xix, map 1395. 1971; Moldenke, *Phytologia* 23: 373. 1972.

VERBENA NEOMEXICANA (A. Gray) Small

Additional bibliography: Fedde & Schust. in Just, *Bot. Jahresber.* 60 (2): 575. 1941; Kearney, *List Citations Place Publ. Spp. Ariz. Fl.* 112 [thesis]. 1951; Mahler, *Keys Vasc. Pl. Black Gap*, ed. 3, 70. 1971; Moldenke, *Phytologia* 23: 373—376 (1972) and 24: 45 & 54. 1972.

Recent collectors have found this plant growing on Acacia flats, while Moran states that it is "locally common on open upper slopes" in Baja California. In addition to the months previously reported by me in this series of notes, it has been collected in fruit in May. The corollas are said to have been "light-blue, paler in the center" on Moran 17658.

The Johnson & Webster 566, distributed as *V. neomexicana*, is actually *V. canescens* H.B.K., Taylor & Taylor 6230 is *V. halei* Small, Wootton & Standley 3651 is *V. macdougalii* Heller, Gooding 90-50 and Perry, Lehto, Hensel, & Pinkava 11033 are *V. neomexicana* var. *xylopoda* Perry, and A. Ruth 1289 is *V. plicata* Greene.

Additional citations: MEXICO: Baja California: Moran 17658 (Ld). Chihuahua: Weber & Charette 11660 (B1—176213).

VERBENA NEOMEXICANA var. *HIRTELLA* Perry

Additional bibliography: Fedde & Schust. in Just, *Bot. Jahres-*

ber. 60 (2): 575. 1941; Mahler, Keys Vasc. Fl. Black Gap, ed. 3, 70. 1971; Moldenke, Phytologia 23: 374-375 (1972) and 24: 257. 1972.

Additional citations: MEXICO: Durango: Katuda 38515 (Ac), 38516 (Ac), 38524 (Ac).

VERBENA NEOMEXICANA var. XYLOPODA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [thesis]. 1951; Moldenke, Phytologia 23: 374-376 (1972) and 24: 45 & 257. 1972.

Recent collectors have encountered this plant on overgrazed land, on rocky outcrops with Fouquieria on hillsides, and in limestone soil in Larrea-mesquite communities. The Moran 17658, distributed as this variety, is actually typical V. neomexicana (A. Gray) Small.

Additional citations: TEXAS: Presidio Co.: L. C. Higgins 5070 (N). ARIZONA: Cochise Co.: Goodding 90-50 (Bl-103409). Pinal Co.: Lehto, Hensel, & Pinkava 11033 (N); Neff s.n. [Oracle, 27-V-73] (Rm). Santa Cruz Co.: Neff s.n. [Gardner Canyon, 2-VI-1973] (Rm); Pringle s.n. [Santa Rita Mtns., May 11, 1884] (Ml).

VERBENA OFFICINALIS L.

Emended synonymy: Verbenaca recta Fuchs, Hist. Plant. Basil. 591. 1542. Verbenaca recta sive mas Fuchs, Hist. Plant. Basil. 592. 1542. Verbena officinalis Cham. ex Angely, Fl. Anal. & Fito-geogr. S. Paulo, ed. 1, 4: 839, sphalm. 1971.

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Additional & emended illustrations: Fuchs, Hist. Plant. Basil. 593 (in color). 1542; W. Baxt., Brit. Phaenog. Bot., ed. 2, 1: pl. 26 (in color). 1834; Mentz & Ostenfeld, Billed. Nord. Fl. 4: 51, fig. 4. 1924; Parsa, Fl. Iran 4 (1): 538, fig. 253. 1949; Fournier, Quat. Fl. France 807, fig. 3352. 1961; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 3, text fig. 3. 1962; Fourcroy, Atlas Recon. Dir. Pl. Comm., ed. 2, pl. 158 [inf.]. 1963; Malik, Rehman, & Ahmad, Pakist. Journ. Sci. Indust. Res. 7: 134, pl. 4, fig. 31. 1964; Huang, Pollen Fl. Taiwan pl. 163, fig. 6 & 7. 1972.

It is of interest to note the disagreement of authors about the longevity of this plant. Raeuschel (1797) and Datta & Majumdar (1966), for instance, categorically classify it as an annual. Pat-

zat & Rechinger (1967), on the other hand, describe it definitely as a perennial. Probably it varies depending on local climate and other ecologic conditions. Abedin 2735 is actually described on its label as a "shrub".

The corollas are described as "violet" in color by LeGrand (1887), "lavender-rose" on Koelz 13246, "bright-lavender" on Fosberg 37559, "lavender" on Fosberg 37244 & 38169, "rose-purple" on Fosberg 38374, "purple" on Farooqi & Qaiser 2769, 2797, & 3421, Fosberg 38613, and Qureshi 263, "blue" on Brydolf s.n. [24/5/1972], Farooqi 14, Qaiser & Ghafoor 1659, and J. M. Wood 473, "bluish" on Abedin 2735 & 7522, "bluish-white" on Qaiser & Ghafoor 1674, "pink" on Abedin 7740 and Qaiser 259, "light pinkish-purple" on Qaiser & Ghafoor 4892, and "pinkish-white" on Qaiser & Ghafoor 1851.

Huang (1972) describes the pollen of V. officinalis as having "Grains 3 (—4)-colporate; suboblate to oblate-spheroidal; 26-33 x 29--38 μ ; amb subangular; colpi 23--24 x 3 μ ; exine 2 μ thick; tectum psilate; sexine finely reticulate, with OL-pattern; nexine as thick as sexine." This description is based on material taken from Sasaki s.n. [Taipei, July 1921] and Huang 2126. He provides illustrations. Brenan (1961) informs us that the period when abundant pollen is shed is from 7--11:30 a.m.; small quantities of pollen are still present until 2 p.m. Löve (1971) reports the chromosome count as $2n = 14$, based on Murin & Sheikh s.n. from a canal bank at Kadhimiya, Iraq.

The supposed hybrid of V. officinalis with Veronica maritima L., described and illustrated by Haartman in 1751 and later tentatively named xVeronicena haartmani by me, is probably nothing more than a specimen of what Linnaeus named Veronica spuria in 1753, but a search ought to be instituted for any specimens so named among Linnean material in Sweden or England.

Parsa (1949) cites Darlington 1726, Lindsay 1026, Stapf s.n., and numerous of his own collections from Iraq. DeMiré & Gillet (1956) record the species from the Niger Republic; Rainha found it growing in wet ground in Portugal. Beadle and his associates (1972) describe it as "widespread" in the Sydney, Australia, region, the corollas there "pink to lilac" in color. Urbschat (1972) records it from Schleswig-Holstein, but comments that it has not been found there anymore in recent years. Similarly, in Staffordshire, England, Edees (1972) reports that it is found in "Waste places about villages....rare now, formerly 'unfrequent'". Kunkel (1972) found it on Lanzarote island in the Canaries. Polunin (1971) gives its general distribution as "Schutt, Wegränder, Ufer. Juni-Oktober. Ganz Europa (ausser IS. [Iceland]): eingebürgert IRL. N. SF [Ireland, Norway, Finland]" — interestingly he here seems to regard it as native in Sweden, while in his 1969 work he regards it as introduced there (as in Norway). Also, he here says "all of Europe", while in 1969 he said "Much of Europe".

Lousley (1971) records it from Saint Mary's and Tresco islands

in the Scilly Islands group and cites Millett 1852, commenting that it is "rare on roadsides and waste places" there. Ferrarini (1971) found it on Palmaria Island in cultivated land and in areas of abandoned cultivation.

Jacobsen (1973) says that in Rhodesia it is occasional "In grassland and scrub, escape from earlier cultivation?" The Collector undetermined s.n. specimen, cited below as having been cultivated in India, is said to have been grown there from seed secured in Nepal. Kanjilal and his associates (1939) record it from an altitude of 5000 feet in the Khasa Hills of Assam, where, they say, it flowers in the rainy season and fruits in the cold season. In an apparent reference to xv. hybrida Voss, they comment that "Many Verbenas are beautiful garden plants". Fenaroli (1973) describes its habitat as "Geol. eurasicum. Gramineti e incolti" and cites collections by Béguinot (1902), Fenaroli (1959), Gussone (1823), and Rabenhorst (1847).

From India, Saxena (1970) reports it "Rare in open places" in Madhya Pradesh, citing Indorkar 11146, while Singh (1969) found it to be "Frequent, along the sides of sugarcane and paddy fields" and "Near water", citing Bot. Surv. India 19640, 25510, 27415, 31337, & 31639. Datta & Majumdar (1966) found it in waste places in Bengal, flowering from March to June. Misra (1969) found it growing "In waste places, sides of walls". In Bihar the Banerjees (1969) encountered it in open land, including roadsides and waste places. Deb and his associates (1968) describe it as an "Erect herb with violet flowers, occurring in open situations, citing Deb 329 and Sengupta 1271, 1275, & 1278.

Bicknell (1896) reports it as very abundant in grassy places in western Liguria, flowering there throughout the summer. Koelz found it on the borders of fields in Afghanistan. Vigo (1968) says that it grows in the "Loto-juncetum acutiflori" association, while Bolós & Masclans (1955) found it to be part of the "Paspalo-Agrostidion" association in Spain. Grieve (1967) gives its general distribution as "Europe, Barbary, China, Cochin-China, Japan". Rauschel (1797) accredits the synonymous V. spuria to "Canada".

Fosberg found V. officinalis "common along paths on broken cultivated land with rough limestone outcrops, rock piles, and stone walls" on Taketomi island in the Ryukyus. On other islands of the same archipelago he found it to be common on roadsides in cultivated land, at the edges of cultivated fields near the edge of a narrow mangrove belt, occasional on weedy roadsides and waste places, and in cultivated ground in general. Perring, Sell, & Walters (1964) describe it as occasional throughout the county of Cambridgeshire, England, on roadsides and in grassy and waste places; also in Wales, Ireland, and Fife in Scotland. They assert that it was first reported from Cambridgeshire by Ray in 1660, Evans (1939) asserts that in Cambridgeshire it occurs "on dry roadsides and waste ground on all soils, even in peat districts, newer common".

Drar (1970) cites his nos. 1667, 2032, & 2394 from the Sudan, while Khattab & El-Hadidi (1971) cite their no. 334 from Yemen and

nos. 445 & 1515 from Hedjaz, Arabia. The Sudan specimens were collected along roadsides and in a wadi, while the Hedjaz ones came from sandy canal banks. Tamaro (1971) records the plant from Palmaria Island in the Gulf of Spezia islands of Italy. López (1949) cites his nos. 1702 & 1703 from eastern Guinea, where he found the species to be very common "Vive en los taludes, caminos, escombros; planta ruderal. Sube a los 1.500 m.s.m." He gives its overall distribution as "Europa, Africa del Norte, Asia Central y Septentrional y además difundida por casi toda la superficie terrestre; su límite septentrional en Europa pasa por las Islas Británicas (Northumberland), Dinamarca, Schonen, Kowno; en Africa tiene su límite meridional en las Islas de Cabo Verde y Abisinia; además de Africa del Sur, en la India, Australia, Nueva Zelanda, Polinesia, Indias Occidentales, América del Norte y del Sur."

Baker (1900) cites Hildebrandt 445, Schweinfurth & Riva 1116, and Stuedner 1304 from Eritrea, Quartin-Dillon s.n., Rohlf's & Steker s.n., and Schimper 7 & 284 from Ethiopia, Scott-Elliot 7800 from Kenya, Révoil s.n. from Somalia, Cienkowski s.n. from Sudan, and two Gürke records from Tanganyika. He gives the species' distribution as "Spread through the north temperate zone in the Old World, and extending to South Africa; introduced into America." Stewart (1972) says that in Pakistan it is "A common weed throughout our range, sometimes ascending to c. 8000'. Baluch., N. Wazir., NWFP, Pb., Haz., Lower Swat, Kashmir, etc." Takematsu and his associates (1973) tell us that in Japan the plant is known as "kumatuzura" and that it is a "weed" in the U. S. S. R.

Paxton (1840) calls both V. officinalis and V. spuria "worthless" from the horticultural standpoint. Additional common names (in addition to the very numerous ones previously recorded by me) are "ayauhochitl", "berberina", "chichiatic", "erba croce", "herba verbenae", "kumatsuzura", "laenge-jernurt", "ma pien ts'ao", "seona-se-seholo", "verbenae officinalis", "vervaine officinale", "wild verbenae", and "yaena". The "Procumbent Vervain" of Torrey (1843) probably refers to V. officinalis var. prostrata Gren. & Godr.

In regard to the chemical and pharmaceutical properties of V. officinalis much has recently been published. Trease & Evans (1972) say "Verbenae officinalis, the Herba Verbenae of many pharmacopoeias. This plant contains a hormone-like substance, verbenalin, with strong parasympathetic action." Miller (1973) notes "verbenalin (XVIII), the glucoside of verbenalinol, occurs in all parts of Verbenae officinalis L.; the inflorescences are especially rich in the glucoside". Bischoff (1831) notes that "Die Blätter (Herba Verbenae) sind geruchlos, von einem schwachen, herben und bitterlichen Geschmackem sie waren früher als ein Art Universalmittel gegen eine Menge von Krankheiten im Ruse und man schrien ihnen wunderbare Kräfte zu. Jetzt sind sie höchstens noch zuweilen als ausserliches, erweichendes Volksmittel im Gebrauche."

[to be continued]

NEW SPECIES OF PARMELIA (LICHENS) FROM TROPICAL AMERICA 1.

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Parmelia boquetensis Hale, sp. nov.

Thallus corticola, adnatus ad ramos, 8-12 cm latus, cinereo-albidus, lobis subirregularibus, margine lobulascensibus, 3-4 mm latis, isidiis sorediisque destitutis; cortex superior 13-16 μ crassus, stratum gonidiale 16-18 μ crassum, medulla alba, 100 μ crassa, cortex inferior 14 μ crassus; subtus niger, sparse vel modice rhizinosus, rhizinis sparse dichotome ramosis. Apothecia numerosa, adnata, 2-3 mm diametro, disco imperforato, hymenio 45-50 μ alto, sporis 8, simplicibus, 6 X 12 μ (Fig. 1).

Chemistry: Atranorin and salazinic acid.

Holotype: Panama. Scrub trees in dry pasture near Boquete, Chiriquí, elev. about 1500 m, M.E. Hale 38878, 1 April 1973 (US).

Additional specimens examined. Panama. 3 km south of Volcan, Chiriquí, Hale 38811, 38831, 38902 (US); Boquete, Chiriquí, Hale 38848 (US).

This species at first glance resembles P. sublaevigata (Nyl.) Nyl., which contains norstictic acid in addition to salazinic acid and has crowded shorter lobes and often a dull pruinose surface. This and all following species belong to subgenus Parmelia section Hypotrachyna.

Parmelia contradicta Hale, sp. nov.

Thallus saxicola, laxe adnatus, coriaceus, cinereo-albus, 6-8 cm latus, lobis linearibus, 1-2 mm latis, dichotome ramosis, isidiis sorediisque destitutis; superne planus, nitidus; cortex superior 18-20 μ crassus, stratum gonidiale 22-28 μ crassum, medulla alba, 130-150 μ crassa, cortex inferior 14-18 μ crassus; subtus niger, sparse rhizinosus, rhizinis sparse dichotome ramosis. Apothecia numerosa, adnata, 2-4 diametro, disco imperforato, hymenio 40-45 μ

alto, sporis 8, simplicibus, 4 X 6 μ (Fig. 2).

Chemistry: Atranorin and protocetraric acid.

Holotype: Brazil. Serra dos Orgãos National Park, Terezopolis, Rio de Janeiro, W. Watson 521, 5 September 1950 (BM; US, isotype).

Additional specimen examined. Brazil. Lajes, Morro do Pinheiro Seco, Santa Catarina, Reitz & Klein 15719a (US).

This species is closely related to P. brasiliana Nyl., another much more common saxicolous species in southeastern Brazil. It differs chiefly in having atranorin instead of lichexanthone in the cortex.

Parmelia eitenii Hale, sp. nov.

Thallus saxicola, laxe adnatus, rumpens, ca. 6 cm latus, cinereo-albidus, lobis linearibus, elongatis, 2-3 mm latis, dichotome ramosis, isidiis sorediisque destitutis; cortex superior 18-22 μ crassus, stratum gonidiale 20-24 μ crassum, medulla alba, 80-100 μ crassa, cortex inferior 14-16 μ crassus; subtus nigricans, sparse vel modice rhizinosus, rhizinis longis, dichotome ramosis. Apothecia adnata, 3-4 mm diametro, disco imperforato, hymenio 45-50 μ alto, sporis 8; simplicibus, 5 X 7-8 μ (Fig. 3).

Chemistry: Atranorin, lichexanthone, and anziaic acid.

Holotype: Brazil. Serra dos Orgãos National Park, Rio de Janeiro, G. & L. Eiten 7125, 22 April 1966 (US).

This species is also part of the P. brasiliana complex so richly developed in Brazil. It differs principally in the unusual chemical constituents, anziaic acid instead of protocetraric. P. eitenii also seems to be more fragile than P. brasiliana.

Parmelia osorioi Hale, sp. nov.

Thallus saxicola, fragilis, ca. 8 cm diametro, cinereo- vel pallide castaneo-albidus, lobis sublinearibus, 1.5-2 mm latis, crasse isidiatis, isidiis simplicibus vel ramosis, fere pustulatis; cortex superior 14-16 μ crassus, stratum gonidiale 12-14 μ crassum, medulla alba, 65-75 μ crassa, cortex inferior 16-18 μ crassus; subtus niger, modice rhizinosus, rhizinis dichotome ramosis. Apothecia ignota (Fig. 4).

Chemistry: Atranorin and gyrophoric acid.

Holotype: Uruguay. On stones in forest, Abra de Cotto, Lavalleja. H.S. Osorio 6507, 12 October 1969 (MVM; isotype in US).

Additional specimen examined. Uruguay. Santa Teresa, Rocha, Hosseus 48 (H).

P. osorioi has very unusual isidia, simple to nearly coralloid and very large and more or less breaking down apically. It is known only from Uruguay and has no close relatives.

Parmelia protoboliviana Hale, sp. nov.

Thallus corticola, adnatus, fragilis, ca. 8 cm diametro, pallide cinereo-flavicans, lobis sublinearibus, 4-5 mm latis, isidiis sorediisque destitutis; superne planus, nitidus; cortex superior 14-16 μ crassus, stratum gonidiale 16-20 μ crassum, medulla alba, 85-100 μ crassa, cortex inferior 14 μ crassus; subtus niger, dense rhizinosus, rhizinis dichotome ramosis. Apothecia male evoluta, adnata, 1 mm diametro, sporis non evolutis (Fig. 5).

Chemistry: Usnic acid, barbatic acid, obtusatic acid, norobtusatic acid, and 4-O-demethylbarbatic acid.

Holotype: Costa Rica, Volcán Irazú, Cartago, D. Flenniken 1874 (US).

Additional specimen examined. Costa Rica, Same locality as the holotype, Flenniken 2358, 10 July 1969 (US).

All species previously known that contain the barbatic acid complex (cf. C. F. Culberson and M. E. Hale, *Brittonia* 25:162-173, 1973) have colorless atranorin in the cortex. This species produces usnic acid, giving the plants a distinct yellow-green color. Otherwise it is closely related to the broad lobed corticolous population of P. physcioides Nyl. (= P. boliviana Nyl.).

Parmelia singularis Hale, sp. nov.

Thallus corticola, subcoriaceus, ca. 8 cm diametro, cinereo-albus, lobis subirregularibus vel sublinearibus, 3-5 mm latis, margine lobulatis, lobulis usque ad 1 mm longis, angustis; superne planus, nitidus, isidiis sorediisque destitutus; cortex superior 18 μ crassus, stratum gonidiale 12-15 μ crassum, medulla alba, 40-45 μ crassa, cortex inferior 18 μ crassus; subtus niger, dense rhizinosus, rhizinis dense dichotome ramosis. Apothecia numerosa, adnata, ad 5 mm diametro, disco imperforato, hymenio 45-50 μ alto, sporis 8, simplicibus, 6 X 10-12 μ (Fig. 6).

Chemistry: Atranorin and an unidentified fatty acid.

Holotype: Peru. Cerros Calla Calla, 18 km above Leimebamba, Chachapoyas, Amazonas, elev. 3100 m, P.C. Hutchinson and J.K. Wright 5704, 16 June 1964 (US; isotype in UC).

The thallus is rather stiff and coriaceous for so small a species. It is probably not related to the common P. costaricensis Nyl. which also contains fatty acids but is isidiate.

Parmelia steyermarkii Hale, sp. nov.

Thallus corticola, arcte adnatus supra muscos, fragilis, cinereo-albus, 6-8 cm latus, lobis angustis, sublinearibus, 1-1.5 mm latis, isidiatis, isidiis simplicibus, procumbentibus et pro parte dorsiventrals complanatis, ciliatis; cortex superior 11-12 μ crassus, stratum gonidiale 14-16 μ crassum, medulla alba, 55-65 μ crassa, cortex inferior 12-14 μ crassus; subtus niger, modice rhizinosus, rhizinis dichotome ramosis. Apothecia ignota (Fig. 7).

Chemistry: Atranorin, barbatic acid, obtusatic acid, norobtusatic acid (trace), and 4-O-demethylbarbatic acid (trace).

Holotype: Venezuela. Sierra Parima, 45 km NE las Cabeceras del Rio Orinoco, Amazonas, J. Steyermark 106123, 18-23 May 1972 (US).

This is the only isidiate species in the P. physcioides group which has ciliate and consistently dorsiventral isidia at maturity. The other two species, P. dentella Hale & Kurok. and P. imbricatula Zahlbr., are much larger and have normal cylindrical isidia.

Parmelia subphysodalica Hale, sp. nov.

Thallus ramulicola, fragilis, arcte adnatus, 6-7 cm latus, obscure viridi-flavicans, lobis sublinearibus, 1-2 mm latis, superne planus, nitidus, modice isidiatus, isidiis simplicibus, cylindricis, Ca. 0.3 mm altis, sparse ciliatis; cortex superior 10-12 μ crassus, stratum gonidiale 14-16 μ crassum, medulla alba, 60-80 μ crassa, cortex inferior 12-14 μ crassus; subtus niger, modice rhizinosus, rhizini dichotome ramosis. Apothecia ignota (Fig. 8).

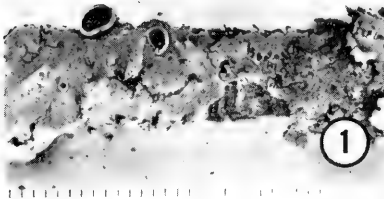
Chemistry: Atranorin (trace), usnic acid, and physodalic acid.

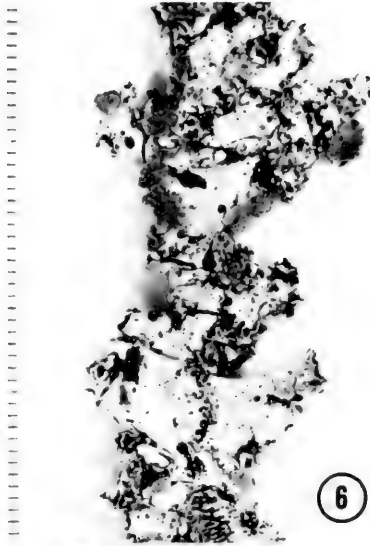
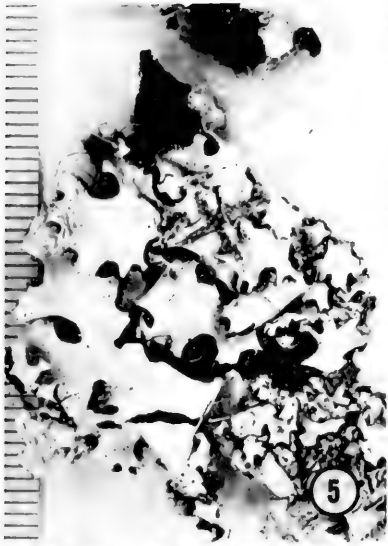
Holotype: Chile. Puerto Ballena, Chiloe, H.A. Imshaug 43121A, 19 September 1969 (MSC; isotype in US).

Physodalic acid is known in only one other species of the section, P. physodalica Hale, a nonisidiate paramo species in Colombia, which is probably not closely related.

This work was supported by a grant from the Smithsonian Research Foundation. Photography was by the Smithsonian Photographic Laboratory. All chemical determinations were made with thin-layer chromatography in the standard three solvent systems (hexane-ether-formic acid, benzene-dioxane-acetic acid, and toluene-acetic acid).

Explanation of figures (scale in mm): 1. P. boquetensis (holotype, US); 2. P. contradicta (isotype, US); 3. P. eitenii (holotype, US); 4. P. osorioi (isotype, US); 5. P. protoboliviana (holotype, US); 6. P. singularis (holotype, US); 7. P. steyermarkii (holotype, US); 8. P. subphysodolica (holotype, US).





STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXIII.

ADDITIONS TO THE GENUS MIKANIA.

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

Recent efforts in the genus Mikania have revealed the following four undescribed species.

Mikania standleyi R.M.King & H.Robinson, sp. nov.
Plantae scandentes vel suffrutescentes paucè vel multo ramosae. Caules fulvi teretes striati dense scabridi interdum fistulosi. Folia opposita breviter petiolata, petiolis plerumque 1.0-1.5 cm longis; lamina ovata 3.5-7.0 cm longa 2-4 cm lata base rotundata margine integra ad apicem obtusa supra et subtus sparsim scabrida, nervis pinnatis, paribus secundariis prominentibus duplicibus in quarta inferiore valde ascendentibus. Inflorescentiae pyramidaliter paniculatae, ramis paniculatis retrorse scabridis. Capitula sessilia plerumque biniter vel tripliciter disposita ca. 9 mm alta. Squamae subinvolucris oblongae ca. 2.5 mm longae abaxialiter glabrae. Squamae involucris anguste oblongae ca. 5 mm longae et 1.0-1.2 mm latae obtusae extus sparsim puberulae. Corollae albae? 4.0-4.5 mm longae extus minute puberulae et paucè glanduliferae, tubis distinctis ca. 1.5 mm longis, limbis anguste campanulatis vel cylindricis, lobis ca. 0.5 mm longis ca. 0.4 mm latis, cellulis quadratis vel breviter oblongis, 25-35 μ latis; thecae antherarum ca. 1.3 mm longae, appendicibus late oblongis, ca. 200 μ longis et latis; styli inferne nodulosi glabri, appendicibus breviter papillosis. Achaenia 5-costata 4.0-4.5 mm longa paucè breviter setifera et glandulifera. Setae pappi ca. 40 plerumque uniseriatae ad apicem vix incrassatae. Grana pollinis ca. 23 μ diam.

Type: COSTA RICA: San Jose: near Finca La Cima, above Los Lotes, North of El Copey, altitude 2100-2400 meters, December 21-22, 1925, Paul C. Standley 42814 (Holotype US!). Paratype COSTA RICA: Cartago: vicinity of Millsville, Pan-American Highway, about 3 km above Nivel, 3000-3300 meters, July 22 1949, Holm & Iltis 506 (US!).

The new species seems very closely related to M. steubelii Hieron. of northern South America but the

latter has generally shorter petioles and at least remotely subserrulate leaf margins, the stems and leaves lack the short stout scabrae and the hairs of the corolla are more concentrated toward the tips of the lobes.

Mikania steyermarkii R.M.King & H.Robinson, sp. nov. Plantae scandentes grosse herbaceae sparsim ramosae. Caules ful-virides teretes vel subhexagoni striati minute puberuli saepe fistulosi. Folia opposita anguste petiolata, petiolis 0.5-2.5 cm longis; lamina ovata vel lanceolata 6-10 cm longa 1.5-6.0 cm lata base rotundata vel subcuneata margine integra vel obscure subserrulata ad apicem anguste acuminata multo glandulo-punctata aliter subglabra prope basin valde trinervata, nervis secundariis prominentibus submargin-alibus longe ascendentibus. Inflorescentiae in ramis corymbosis congestis dispositae. Capitula ca. 1 cm alta plerumque tripliciter disposita sessilia. Squamae subinvolucris prominentes anguste ellipticae 4-5 mm longae glandulo-punctatae et sparsim puberulae. Squamae involucris anguste oblongae 6-7 mm longae ca. 1.2 mm latae ad apicem obtusae extus glandulo-punctatae et aliquantum puberulae. Corollae albae ca. 4.5 mm longae, tubis aliquantum distinctis ca. 2.5 mm longis, limbis anguste campanulatis, lobis brevibus ca. $1\frac{1}{2}$ longioribus quam latioribus extus glanduliferis, cellulis breviter oblongis 20-30 μ latis; thecae antherarum ca. 2 mm longae, appendicibus longe triangularibus 450-500 μ longis ca. 230 μ latis; styli inferne glabri, appendicibus breviter papillosis. Acheania 5-costata 3.5-4.0 mm longa multo glandulifera pauca pilifera. Setae pappi ca. 40 plerumque uniseriatae ad apicem leniter incrassatae. Grana pollinis 18 μ diam.

Type: VENEZUELA: Miranda: Distrito Brion: Entre Chuspa y Aricagua, 5.5 km oeste de Aricagua, 50 metros, 11 Marzo 1973, Steyermark & Espinosa 106893 (Holotype US!). Paratype: same locality, Steyermark & Espinosa 106895 (US!).

The species is rather distinct in the strong pair of secondary leaf veins running near the margins. The species has corymbose branches in the inflorescence and short corolla lobes similar to M. parviflora (Aubl.) Karst. but lacks the long papillae of the style. The species seems closer to M. gleasonii B.L.Robinson of British Guiana but the latter has larger purple corollas and a rather unique form of pappus with extra

smaller setae disposed in a distinct inner series. The new species has the major veins distinctly and narrowly raised on the upper surface but much more prominent below.

Mikania tillettii R.M.King & H.Robinson, sp. nov.
Plantae scandentes grosse herbaceae sparsim ramosae. Caules rubescentes teretes vel subhexagoni striati glabri vel minute puberuli saepe anguste fistulosi. Folia opposita aliquantum anguste petiolata, petiolis 1.0-2.5 cm longis; lamina ovata usque ad 12 cm longa et 7 cm lata base rotundata vel subcuneata margine integra ad apicem breviter anguste acuminata multo minute glandulo-punctata aliter glabra prope basin valde subpinnate 3-5-nervata, nervis tertiariis obscuris. Inflorescentiae in ramis corymbosis laxis dispositae, pedicellis 1-4 mm longis minute puberulis. Capitula ca. 1 cm alta. Squamae subinvolucris anguste oblongae ca. 2 mm longae glabrae. Squamae involucris anguste oblongae ca. 5 mm longae ca. 1.2-1.5 mm latae ad apicem plerumque rotundatae extus glandulo-punctatae sparsim puberulae. Corollae albae vel rubescens? ca. 5.5 mm longae anguste infundibulares extus pauca glanduliferae, tubis indistinctis angustis, lobis ca. 1 mm longis 0.4 mm latis, cellulis oblongis 20-30 μ latis, parietibus sinuosis; thecae antherarum ca. 1 mm longae, appendicibus longe triangularibus 400-450 μ longis ca. 180 μ latis; styli inferni glabri, appendicibus breviter papillois. Achaenia 5-costata 3.5-4.0 mm longa glandulifera. Setae pappi ca. 40 plerumque uniseriatae ad apicem leniter incrassatae. Grana pollinis ca. 23 μ diam.

Type: BRITISH GUIANA: upper Mazaruni River Basin: Mt. Ayanganna, mixed evergreen forest on and below talus from cliffs along NE side; elevation 750-900 m., August 18, 1960, Tillett, Tillett & Boyan 45894 (Holotype US!).

The species has most of the characters of Mikania gleasonii and M. steyermarkii with the more pedicellate heads of the former and the mostly uniseriate pappus of the latter. The species differs from M. gleasonii by the presence of a distinct subinvolucral bract and the bract is much more prominent than in M. steyermarkii.

Mikania tysonii R.M.King & H.Robinson, sp. nov.
Plantae decumbentes vel scandentes saepe epiphyticae
pauca vel multo ramosae. Caules fulvi teretes vel
leniter hexagoni interdum anguste fistulosi. Folia
opposita anguste petiolata, petiolis 0.5-1.5 cm longis;
lamina elliptica vel obovata usque ad 8 cm longa et
3.5 cm lata base breviter cuneata margine integra ad
apicem anguste rotundata vel breviter acuminata
interdum rubre multo glandulo-punctata aliter glabra
in sicca minute rugosa, nervis secundariis binis dup-
licibus parallelis subbasilaribus ascendentibus.
Inflorescentiae irregulariter corymboso-paniculatae,
pedicellis 1.5-6.0 mm longis mm longis sparse puberulis.
Capitula ca. 5 mm alta. Squamae subinvolucris anguste
oblongae ca. 1.5 mm longae. Squamae involucris oblongae
ca. 3.5 mm longae ca. 1 mm latae ad apicem rotundatae
extus sparse puberulae et plerumque rubro-glanduloso-
punctatae. Corollae albae ca. 4.5 mm longae extus
glanduliferae, tubis brevibus indistinctis, lobis duplo
longioribus quam latioribus; thecae antherarum ca. 1 mm
longae, appendicibus late oblongo-ovatis 200-300 μ
longis ca. 150 μ latis; styli inferne glabri, appendici-
bus breviter papillosis. Achaenia 4-5 costata 2-3 mm
longa multo glandulifera interdum puberula. Setae
pappi ca. 50 plerumque uniseriatae ad apicem distincte
incrassatae. Grana pollinis ca. 22 μ diam.

Type: PANAMA: Panama: top Cerro Jefe, 3000 ft.
July 9, 1966, Tyson, Dwyer, & Blum 4429 (Holotype US!
Isotype MO!). Paratypes: PANAMA: Bocas del Toro: Old
Bank Island, vicinity of Chiriqui Lagoon, von Wedel
2041 (MO); Cocle: La Mesa, 5 miles N of El Valle,
2500 ft, Tyson et al 2445 (US); Panama: Cerro Jefe,
2900 ft, Dwyer & Gauger 7378 (MO).

The species occurs in a series of localities in
central and western Panama. The plants are rather
small with mostly elliptical leaves. The inflorescence
is of an intermediate corymbose-paniculate shape that
cannot be easily placed in any of the general group-
ings of the genus. A close relative might be M. lucida
Blake of Venezuela which has a smaller thinner anther
appendage.

Mikania zonensis R.M.King & H.Robinson, sp. nov.
Plantae scandentes grosse herbaceae sparsim ramosae.
Caules sensim subnigrescentes teretes striati subglabri
anguste fistulosi. Folia opposita anguste petiolata,

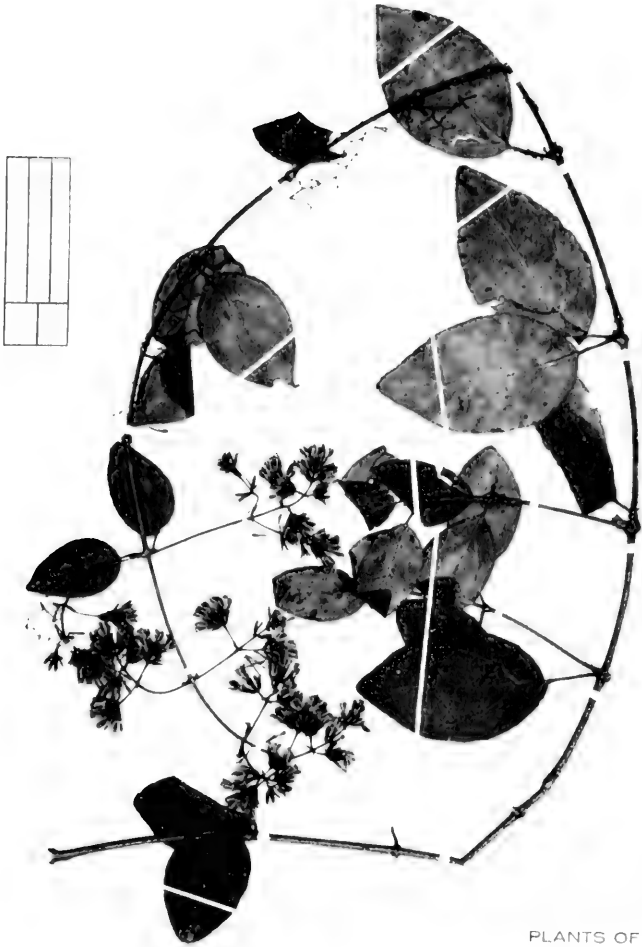
petiolis usque ad 4 cm longis; lamina elliptica-ovata usque ad 21 cm longa 8 cm lata base rotundata vel breviter cuneata non acuminata margine integra ad apicem anguste caudate acuminata supra et subtus subglabra, nervis subtus vix prominentibus sparsim puberulis, paribus secundariis distinctis prope basem paucis valde ascendentibus. Inflorescentiae in ramis corymbosis congestis dispositae. Capitula ca. 8-9 mm alta tripliciter disposita sessilia. Squamae subinvolucris perminutae ca. 1 mm longae. Squamae involucri anguste oblongae ca. 5 mm longae ca. 1.5 mm latae ad apicem rotundatae extus striatae sparsim glandulopunctatae et superne puberulae. Corollae albae, ca. 5 mm longae extus glandulopunctatae, tubis subdistinctis ca. 2 mm longis, limbis anguste infundibularibus extus glandulopunctatis, lobis equilateraliter triangularibus extus puberulis, cellulis quadratis vel breviter oblongis 20-30 μ latis; thecae antherarum ca. 1.5 mm longae, appendicibus longe triangularibus ca. 400 μ longis ca. 240 μ latis; styli inferne distincte sparsim papilloso, appendicibus longe papilloso. Achaenia 5-costata ca. 3.5 mm longa sensim valde corticata. Setae pappi ca. 60 plerumque uniseriatae ad apicem non vel leniter incrassatae. Grana pollinis ca. 18 μ diam.

Type: PANAMA: Canal Zone: Albrook; U. S. Army Tropic Test Center Site, April 1965, Dwyer & Robyns 115 (Holotype MO! Isotype US!).

The species is closely related to M. guaco with the same form of style and achene. The species differs in the leaf which is more elliptical, less decurrent and more glabrous.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB 20502 to the senior author.



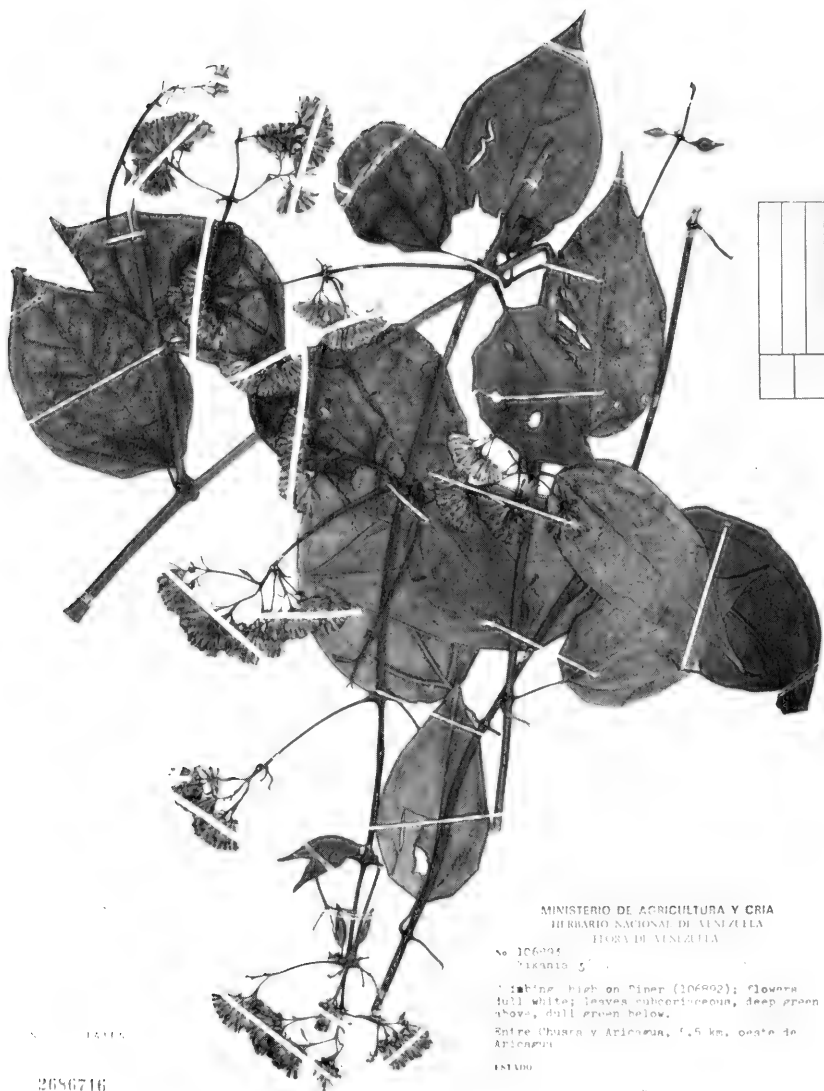
10

PLANTS OF COSTA RICA

No.
 Date
 Locality
 Collector
 No.
 Date
 Locality
 Collector

9

Mikania standleyi R.M.King & H.Robinson.



MINISTERIO DE AGRICULTURA Y CRIA
 HERBARIO NACIONAL DE VENEZUELA
 HOYER DE VENEZUELA

No 106904
 Mikania 5'

Colombia: high on Pinar (106902); flowers
 dull white; leaves subcoriaceous, deep green
 above, dull green below.

Entre Chuspa y Arica, 1.5 km. oeste de
 Arica

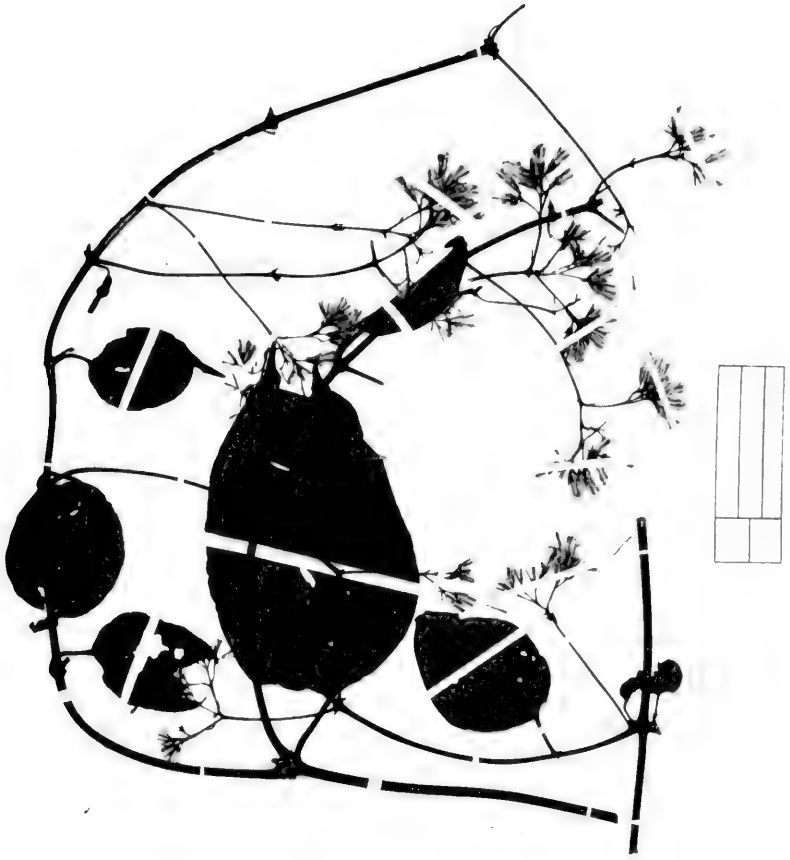
183400

Num. Herb

Altura

Julian A. Steyermark

Mikania steyermarkii R.M.King & H.Robinson.



Mikania tillettii R.M.King & H.Robinson.



ARMY BROWNE TEST CENTER
 2000 Tyson, Canal Zone

Country: PANAMA Herbarium: NY VANCE

2630520

No.

Det.

No.

Date:

ETC Label 1001
 3 Feb 60 (Test)

Mikania tysonii R.M.King & H.Robinson.



PLANTS OF PANAMA

U. S. D. C.
Smithsonian Institution
Washington, D. C.

Mikania zonensis R.M.King & H.Robinson

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXIV.

A NEW GENUS, EITENIA.

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The relatives of Chromolaena DC. and Praxelis Cassini achieve their greatest diversity in Brazil where a number of distinctive genera have been recognized for many years including Lomatozoma Baker in Martius, Eupatoriopsis Hieron., and Praxeliopsis Barroso. Some of the most diverse elements seem rather isolated in the interior of Brazil and a recent collection from Goiás showing additional unique features is described here as a new genus and species.

The new genus resembles Praxelis and Eupatoriopsis in habit and has the same type of flattened carpopodium on the achene opening on the inner side. The receptacle is conical as in Praxelis and not as cylindrical as Eupatoriopsis. The achene is unlike Praxelis and more like Eupatoriopsis in being totally flattened with only two marginal ribs and in having only about eight pappus setae. The pappus setae are unlike Eupatoriopsis in being long and the pappus and the unequally lobed corolla are two characters more suggestive of Praxeliopsis presently known only from Matto Grosso. The latter genus is utterly distinct in achene form and in the insertion of the almost sessile anthers near the bases of the corolla lobes. In addition to its unique combination of characters, the new genus differs from all its relatives by the rows of setae on the inner surface of the corolla limb along the veins. None of the existing genera of the group can be reasonably extended to include this distinctive species.

Eitenia praxeloides R.M.King & H.Robinson, nov. gen. et sp. Asteracearum (Eupatorieae). Plantae herbaceae perennes erectae usque ad 35 cm altae base ramosae. Caules teretes striati hirsuti. Folia opposita breviter petiolata, petiolis 1-4 mm longis; lamina ovata 1-3 cm longa base truncata vel subcuneata margine pauce serrata inferne lobata ad apicem acuta supra sparsim hirsuta subtus sparsim longe hirsuta et plurimum glandulo-punctata. Inflorescentiae peralaxe subcymosae, pedicellis usque ad 7 cm longis remote hirsutis vel glabris. Capitula 6-7 mm alta; flores ca. 40-50; squamae involucri ca. 35 subimbricatae

3-4-seriatae 1.5-5.0 mm longae 1.0 mm latae lanceolatae anguste acuminatae extus glabrae omnino deciduae; receptacula alte conica glabra. Corollae anguste infundibulares ca. 3.5 mm longae, lobis 5 ovatis inaequilongis 0.5-1.0 mm extus pauce glandulifera et setifera intus valde papillosa extus margine breviter papillosa, limbis intus prope nervis hirsutis, cellulis elongatis extus in partibus superioribus minute uni-papillosis, parietibus plerumque sinuosis; filamenta in parte superiore ca. 200 μ longa inferne inflata, cellulis quadratis vel latioribus, parietibus valde transverse vel verticaliter vel oblique annulatis; cellulae exotheciales subquadratae vel breviores, appendicibus anguste ovatis ca. 150 μ longis 75-100 μ latis; styli inferne non nodulosi glabri, appendicibus linearibus dense longe papillosis. Achaenia ca. 3 mm longa anguste obovata complanata solum margine costata dense longe setifera aliter perpauce setifera vel glabra; carpodia brevia complanata lata superna latiora, foraminibus in superficiis interioribus; setae pappi ca. 8 valde discretae 2.5-3.0 mm longae teretes scabridae superne vix angustiores, cellulis apicalibus argute acutis. Grana pollinis ca. 18 μ diam. breviter spinosa.

Type: BRAZIL: Goias: Municipio de Paraiso do Norte de Goiás: north side of city of Paraiso do Norte de Goiás. (300 m west of Belem-Brasilia highway & 250 m N of brook limiting present north edge of city.) 10° 10' S. 48° 53' W. Alt. 390 m 29 December 1969, Eiten & Eiten 10094 (Holotype US!).

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB 20502 A #1 and A #2 to the senior author.



Flora of Israel

Fertile

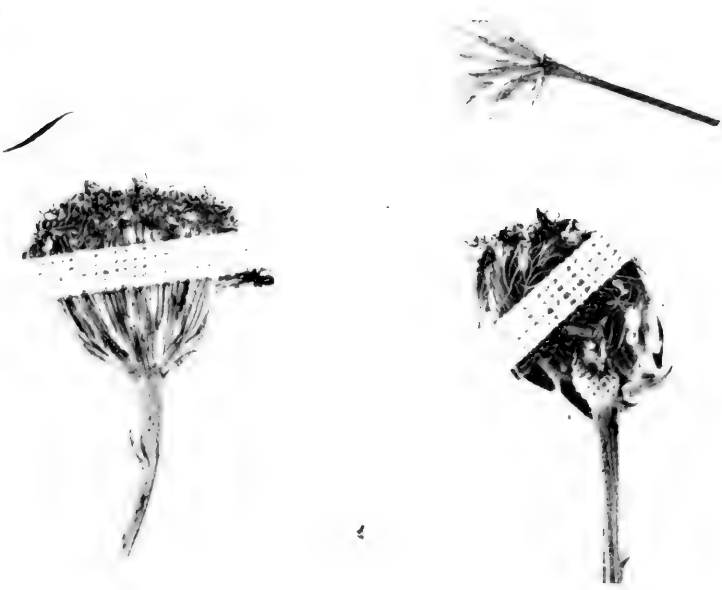
Monotypic

Howe Mt. Golan light violet.

1954

2687991

Eitenia praxeloides R.M.King & H.Robinson.



Eitenia praxeliodes R.M.King & H.Robinson,
Enlargements of heads.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXV.

ADDITIONS TO THE GENUS, BARTLETTINA.

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

Recent efforts on floristic and cytological studies have required a critical review of the rather chaotic species concepts in the largely Mexican and Central American genus Bartlettina. Among the numerous species some revisions have been required including the reduction of B. ruae (Standley) K. & R. to the synonymy of B. pansamalensis (B.L. Robinson) K. & R. and the recognition of the following three new species. Duplicates of Breedlove collections of two of the following species may be filed in other herbaria under the name Eupatorium aschenbornianum Schauer. The latter name actually applies to a distinctive Mexican and Central American species of Ageratina.

Bartlettina breedlovei R.M.King & H.Robinson, sp. nov. Plantae erectae frutescentes usque ad 3.5 m altae. Caules teretes leniter striati rufo-hirtelli interdum fistulosi. Folia opposita, petiolis usque ad 3.5 cm longis angustis; laminae ovatae usque ad 7 cm longae et 5 cm latae base subtruncatae vel breviter cuneata vix breviter acuminatae margine argute multi-serratae apice breviter acuminatae vel longe acutae supra sparsim breviter pilosae subtus distincte multo glandulo-punctatae, nervis subtus dense puberulis, nervis secundariis inferne aliquantum congestis sub-trinervatis. Inflorescentiae subcongestae late pyramidaliter paniculatae, ramis corymbosis, pedicellis 3-8 mm longis dense hirtellis. Capitula 7-8 mm alta; squamae involucri 20-25 subimbricatae ca. 3-seriatae extus dense puberulae exteriores anguste lanceolatae vel oblongo-lanceolatae 2-3 mm longae acutae interiores anguste oblongae 5-6 mm longae apice breviter vel longe acutae anguste scariosae dense minute fimbriatae; receptacula glabra. Flores ca. 30-40. Corollae purpureae ca. 3.5-4.5 mm longae anguste infundibulares, tubis indistinctis, lobis 5 equilateraliter triangularibus extus setiferis et glanduliferis; filamenta antherarum in parte superiore angusta 0.5-0.6 mm longa; thecae 1.2-1.5 mm longae, appendicibus late oblongis ca. 150 μ longis et 200 μ latis; appendices stylorum

lineares dense breviter papillosae. Achaenia ca. 2 mm longa glabra; carpodia brevia; setae pappi ca. 35 plerumque 4-5 mm longae ad apicem non dilatatae. Grana pollinis ca. 20 μ diam. micropapillosae.

Type: MEXICO: Chiapas: San Cristobal las Casas to Tenejapa. Chamula paraje of Las Ollas. Municipio of San Cristobal las Casas. Elevation 8300 ft. 19 Feb. 1965, Breedlove 9075 (Holotype US! Isotype DS!). Paratype GUATEMALA: Huehuetenango: Sierra de los Cuchumatanes. Cloud forest 4 mi E of San Mateo Ixtatan on road to Barillas. Municipio of San Mateo Ixtatan. Elevation 8500 ft., February 7, 1965, Breedlove 8717 (DS!).

The species is related to a group that includes locally B. hylobia (B.L. Robinson) K. & R., B. oresbioides (B.L. Robinson) K. & R. and B. guatemalensis K. & R. n. sp. below. These species all have the rather short anther appendages and the narrower rather oblong involucre bracts in a few series. The present species is distinct in the more pyramidal inflorescence, in the more acute tip of the involucre bracts and in the firmer more pubescent more prominently serrate leaves.

Bartlettina guatemalensis R.M. King & H. Robinson, sp. nov. Plantae erectae frutescentes usque ad 3.5 m altae. Caules teretes leniter striati minute puberuli non fistulosi. Folia opposita longe petiolata, petiolis usque ad 7 cm longis angustis; laminae ovato-rhomboidae usque ad 12 cm longae et 8 cm latae base late cuneatae et breviter acuminatae margine multo crenato-serratae apice breviter apiculatae supra sparsim puberulae subtus glandulo-punctatae, nervis subtus sparsim puberulis, nervis secundariis inferne aliquantum congestis subtrinervatis. Inflorescentiae subcongestae late corymboso-paniculatae, pedicellis 3-8 mm longis minute puberulis. Capitula 7-8 mm alta; squamae involucri ca. 15-18 subimbricatae ca. 3-seriatae extus distincte minute puberulae exteriores oblongo-lanceolatae vel anguste ellipticae 2-3 mm longae anguste obtusae interiores anguste oblongae ca. 5 mm longae apice obtusae vel breviter acutae scariosae minute fimbriatae; receptacula glabra. Flores ca. 20. Corollae lavenderae ca. 4 mm longae anguste infundibulares, tubis indistinctis, lobis 5 equilateraliter triangularibus extus multo setiferis et glanduliferis; filamenta antherarum in parte superne angusta ca. 0.5 mm

longa; thecae ca. 1 mm longae, appendicibus late oblongis ca. 150 μ longis et 200 μ latis; appendices stylorum lineares dense breviter papillosae. Achaenia 1.8-2.0 mm longa glabra; carpodia prominentia; setae pappi ca. 40 plerumque 3.0-3.5 mm longae ad apicem non dilatatae. Grana pollinis ca. 20 μ diam. micro-papillosae.

Type: GUATEMALA: Quiche: Nebaj. 8600 ft., Nov. 17, 1934, Skutch 1700 (Holotype US!). Paratype: GUATEMALA: Huehuetenango: Sierra de los Cuchumatanes: Cloud forest 4 miles E of San Mateo Ixtatan on road to Barillas. Municipio of San Mateo Ixtatan. Elevation 8500 ft., February 7, 1965, Breedlove 8718 (DS!).

The species is closest to B. oresbioides also of Guatemala. The latter differs by its more closely and sharply serrate leaves. The also closely related B. hylobia of adjacent Chiapas has leaf serrations that are more remote but formed of very narrow sharply projecting teeth. Further collections may show that B. oresbioides is not distinct from B. hylobia.

Bartlettina matudae R.M.King & H.Robinson, sp. nov. Plantae erectae frutescentes usque ad 2 m ? altae. Caules teretes in sicco corrugati dense hirsuti. Folia opposita, petiolis usque ad 9 cm longis; laminae latae ovatae ad 23 cm longae et 18 cm latae base late rotundatae et distincte abrupte acuminatae margine breviter late denticulatae apice breviter acutae supra sparsim breviter pilosae subtus plerumque in nervis sparsim hirtellae non glandulo-punctatae, nervis secundariis inferne aliquantum congestis; paribus tres vel quatuor subtrinervatis. Inflorescentiae subcongestae late corymboso-paniculatae, pedicellis 1-5 mm longis hirtellis. Capitula 7-8 mm alta; squamae involucri ca. 18-20 subimbricatae 3-4-seriatae extus distincte puberulae lanceolatae vel anguste oblongo-lanceolatae 2-5 mm longae anguste acutae vix scariosae; receptacula glabra. Flores ca. 30-40. Corollae lavendulae? ca. 4.5 mm longae anguste infundibulares, tubis indistinctis, lobis 5 equilateraliter triangularibus vel latioribus extus setiferis et pauce glanduliferis; filamenta antherarum in parte superiore angusta 0.5-0.6 mm longa; thecae 1.2-1.4 mm longae, appendicibus oblongo-ovatis 300-350 μ longis 175-200 μ latis; appendices stylorum lineares dense breviter papillosae. Achaenia 1.2-1.4 mm longa subglabra superne pauce setifera; carpodia breviter; setae pappi ca. 30 plerumque 3-4 mm longae

ad apicem non dilatatae. Grana pollinis ca. 20 μ diam. micropapillosae.

Type: MEXICO: Veracruz: Acultzinco, May 1, 1937, Matuda 1137 (Holotype US!).

The species is apparently most closely related to B. sordida which occurs in the same general area. The new species is most distinct in the lesser number of flowers and involucre bracts, in the bracts being generally broader and less pubescent and in the leaf blades having a distinct acumination at the attachment to the petiole.

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Bartlettina breedlovei R.M.King & H.Robinson.



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 HERBARIUM
 GEORGETOWN, GEORGIA
 DEPARTMENT OF AGRICULTURE
 WASHINGTON, D. C. 20540

Bartlettina guatemalensis R.M.King & H.Robinson.



FLORA MEXICANA
MEXICO

Mexico
Matuda

Bartlettina matudae R.M.King & H.Robinson.



Enlargements of heads of Bartlettina. Upper left, B. guatemalensis. Upper right, B. breedlovei. Bottom, B. matudae.

STUDIES IN THE SENECEONEAE (ASTERACEAE). VI.

THE GENUS ARNOGLOSSUM.

Harold Robinson
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A previous paper of this series (Robinson & Brettell, 1973) surveyed many of the "Cacalioid" genera of North America and Asia and recognized the eastern North American genus Mesadenia Raf. as distinct. Unfortunately, at that time the existence of an older generic name was overlooked. Arnoglossum, also named by Rafinesque at a much earlier date (1817), has a complete generic description and a description of the single included species, A. plantagineum Raf., in the original publication. Rafinesque was the first to revive this ancient name, though admittedly in a different sense from the original. Rafinesque's use of the name is in no way invalidated by S.F.Gray's subsequent use of the name in its more ancient sense for members of the Plantaginaceae. The latter use provides only one complication in preoccupying the combination A. lanceolatum.

The number of species recognized in the genus varies with different authors. Vuilleumier (1969) discusses the group in some detail and mentions only the following seven species. The necessary new combinations are provided here.

Arnoglossum atriplicifolium (L.) H.Robinson, comb. nov. Cacalia atriplicifolia L., Sp. Pl. 835. 1753.

Arnoglossum diversifolium (Torr. & Gray) H.Robinson, comb. nov. Cacalia diversifolia Torr. & Gray, Fl. N.Am. 2: 435. 1843.

Arnoglossum floridanum (Gray) H.Robinson, comb. nov. Cacalia floridana Gray, Proc. Am. Acad. 19: 52. 1883.

Arnoglossum muehlenbergii (Sch.Bip.) H.Robinson, comb. nov. Senecio muehlenbergii Sch.Bip., Flora 28: 499. 1845. Cacalia reniformis Mühl. in Willd., non C. reniformis Lam.

Arnoglossum ovatum (Walt.) H.Robinson, comb. nov. Cacalia ovata Walt., Fl. Carol. 196. 1788. Cacalia lanceolata Nutt., Mesadenia elliottii Harper.

Arnoglossum plantagineum Raf., Fl. Ludov. 65. 1817. including ? Cacalia tuberosa Nutt., Gen. N.Am. Pl. 2: 138. 1818.

Arnoglossum sulcatum (Fernald) H. Robinson, comb. nov. Cacalia
sulcata Fernald in Coult., Bot. Gaz. 33: 157. 1902.

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Rafinesque, C. S. 1817. Florula Ludoviciana.

Robinson, H. and R. D. Brettell 1973. Studies in the Senecioneae (Asteraceae). IV. The genera Mesadenia, Syneilesis, Miricacalia, Koyamacalia and Sinacalia. Phytologia 27: 265-276.

Vuilleumier, B. S. 1969. The genera of Senecioneae in the Southeastern United States. Jour. Arnold Arb. 50: 104-123.

NOTES ON ARCHIBACCHARIS (COMPOSITAE - ASTEREAEE)

John D. Jackson

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The following notes are drawn from my recent revision of Archibaccharis which is to be published in the near future. They consist of descriptions of new taxa and nomenclatorial changes.

ARCHIBACCHARIS HIERACIIFOLIA Heer. var. HIERACIIFOLIA.

Archibaccharis hieraciifolia Heer., Hamb. Wissensch. Anst. 21: Beiheft 3: 40. 1904 (prim.). Type: MEXICO: State of Oaxaca: Sierra de San Felipe, ele. 2966 m, 13 Dec. 1895, Pringle 6257 (HBG; photo. MIN!; isotypes: BM! F! GH! K! MIN! MO! MSC! NY! P! UC! US!).

Baccharis oxacana Greenm., Proc. Amer. Acad. 40: 37. 1904. Hemibaccharis oxacana (Greenm.) Blake, Contr. U. S. Nat. Herb. 20: 546. 1924. Archibaccharis oxacana (Greenm.) Blake, ibid. 23: 1508. 1926. Type: Pringle 6257.

Heering's publication of Archibaccharis hieraciifolia preceded the publication of Baccharis oxacana Greenm. in the same year. Both names were based on plants from the same collection, Pringle 6257. My study of the holotype of B. oxacana and photos of the holotype of A. hieraciifolia show that these plants are members of the same taxon. I view the two following taxa as varieties of A. hieraciifolia.

ARCHIBACCHARIS HIERACIIFOLIA Heer. var. GLANDULOSA (Greenm.)

J. D. Jackson, stat. nov.

Baccharis glandulosa Greenm., Proc. Amer. Acad. 40: 36-37. 1904. Hemibaccharis glandulosa (Greenm.) Blake, Contr. U. S. Nat. Herb. 20: 546. 1924. Archibaccharis glandulosa (Greenm.) Blake, Journ. Washington Acad. Sci. 17: 60. 1927. Type: MEXICO: Federal District: Serrania de Ajusco, ele. 2895 m, 7 Dec. 1903, Pringle 8782 (GH!); isotypes: BM! C! F! K! MICH! MIN! MO! NY! P! POM! UC! US!).

ARCHIBACCHARIS HIERACIIFOLIA Heer. var. HIERACIOIDES (Blake)

J. D. Jackson, stat. nov.

Baccharis hieraciifolia Hemsl. Biol. Centr. Amer. 2: 129. 1881. Not Lam. 1783. Hemibaccharis hieracioides Blake, Contr. U. S. Nat. Herb. 20: 547. 1924. Archibaccharis hieracioides

* Publication costs were met in part from the Junior F. Hayden Memorial Fund.

Blake, Journ. Washington Acad. Sci. 17: 60-61. 1927. Lectotype: MEXICO: State of Mexico: Desierto Viejo, Valley of Mexico, 3 Nov. 1865 or 1866, Bourgeau 1230 (K! photo. MIN! isolectotypes: C! GH! P! US! photo. of C isolectotype, GH! NY! TEX! photo. and fragments from an undetermined herbarium, MSC!).

ARCHIBACCHARIS SCHIEDEANA (Benth.) J. D. Jackson, comb. nov.

Baccharis scandens Less., Linnaea 5: 146. 1830. Not Pers. 1807. Baccharis Schiedeana Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 83. 1852. Type: B, destroyed (D. E. Meyer, per. comm.). Lectotype: MEXICO: State of Vera Cruz: Jalapa, Aug., no year cited, Schiede 318 (GH!; photo. MIN!).

Baccharis elegans var. Seemannii Schultz Bip., Seem. Bot. Voy. Herald: 303. 1856. Type: MEXICO: Sierra Madre, N. W. Mexico, Seemann 2015 (K!; photo. MIN!; isotypes: GH! K!).

Baccharis Thomasii Klatt, Abh. Naturf. Ges. Halle 15: 326. 1881. Type: MEXICO: State of Vera Cruz: Orizaba, 1866, Thomas s. n. (P!; photo. MIN!).

Hemibaccharis torquis Blake, Contr. U. S. Nat. Herb. 20: 550. pl. 51. 1924. Archibaccharis torquis Blake, ibid. 23: 1508. 1926. Type: COSTA RICA: Prov. of San José: "hospice des alienes," San José, Nov. 1892, Tonduz 1535 (US!; photo. MIN! UC!; isotypes: F! G! GH! NY! P!).

ARCHIBACCHARIS SERRATIFOLIA (H.B.K.) Blake, Contr. U. S. Nat. Herb. 26: 236. 1930.

Baccharis serratifolia H.B.K., Nov. Gen. & Sp. 4: 59. 1820. Type: MEXICO: State of Guanajuato: on steep slopes between Santa Rosa and Los Ioares, ele. ca. 2600 m, Sept., no year cited, H.B.K. 31 (P!).

Baccharis mucronata H.B.K., Nov. Gen. & Sp. 4: 60. 1820. Hemibaccharis mucronata (H.B.K.) Blake, Contr. U. S. Nat. Herb. 20: 550-551. 1924. Archibaccharis mucronata (H.B.K.) Blake, ibid. 23: 1508. 1926. Type: MEXICO: State of Guanajuato: growing with H.B.K. no. 31, H.B.K. 32 (P!; photo. MSC!).

Baccharis micrantha H.B.K., Nov. Gen. & Sp. 4: 60. 1820. Type: MEXICO: State of Guanajuato: near Guanajuato, ele. ca. 2000 m, Sept., no year cited, H.B.K. 33 (P!).

Pluchea floribunda Hemsl., Diag. Pl. Mex. 2: 32-33. 1879. Lectotype: MEXICO: State of Vera Cruz: Mirador, Linden 1171 as part of a mixed sheet including Galeotti 2308, also A. serratifolia (K!; photo. MIN!; isolectotypes: G! P!).

Diplostegium paniculatum Donnell Smith, Bot. Gaz. 23: 8-9. 1897. Hemibaccharis mucronata paniculata (Donn. Smith) Blake, Contr. U. S. Nat. Herb. 20: 551. 1924. Archibaccharis mucronata paniculata (Donn. Smith) Blake, ibid. 23: 1508-1509. 1926. Archibaccharis mucronata var. paniculata (Donn. Smith) Blake, Amer. Journ. Bot. 15: 64. 1928. Archibaccharis serratifolia var. paniculata (J. D. Sm.) Blake, Journ. Washington Acad. Sci. 21: 328. 1931. Type: GUATEMALA: Dept. Huehuetenango: between San Martín and Todos Santos, ele. 2180-2656 m, Dec. 1895, Nelson 3629 (US!; photo. MIN!; isotype: GH!).

ARCHIBACCHARIS HIRTELLA (DC.) Heer. var. ALBESCENS J. D. Jackson, var. nov.

Caulibus glabratis infra, tum paulo sordidis-pilosis albescentibus-pilosis desuper et in ramis, foliis maxime ellipticis sed interdum oblongis-ovatis vel raro ovatis, tenuiter chartaceis, sparsim albidis-pilosis in superis et infernis pagines et stipitatis-glandiferis atque infra, phyllariis glabris.

Type: MEXICO: State of Oaxaca: oak woods, Sierra de Clavellinas, ele. 2812 m, 18 Oct. 1894, Pringle 4988 (MIN!; isotypes: BM! G! GH! K! MICH! MO! MSC! NY! P! POM! UC!).

Scandent vines; 50-70 dm tall; pilosulous, the hairs sordid below becoming whitish above on the branches and leaves. Roots fibrous. Stems strongly fractiflex, terete, the bases 3.0-8.0 mm in diam., graduating to 1.0-2.5 mm above, slender, the internodes 1.0-7.5 cm long, dull, brown or gray-brown below, brown or green above, glabrescent below, pilosulous above. Leaves with petioles 1.5-6.0 mm long, pilosulous; blades usually elliptical but sometimes oblong-ovate or ovate, 3.5-6.5 cm long, 1.0-2.5 cm wide, thinly chartaceous, obtuse at bases, acuminate or just acute at apices, margins often subentire throughout or merely sparsely denticulate, distally serrate or serrulate, the upper surfaces dark-green, somewhat shiny, sparsely pilosulous with some glandular hairs on the major lateral veins, the lower surfaces lighter green, sparsely pilosulous and rather evenly stipitate-glandular, the glands amber. Panicles rather small and close, pilosulous. Pistillate heads: 3.5-4.0 mm high, ca. 2.0 mm wide, phyllaries ca. 5-seriate, acute, the outer lanceolate and glabrous, the inner linear-lanceolate and glabrous; filiform ray flowers 9-14, pappus 2.0-2.7 mm long, whitish becoming brown-tinged, corollas 1.3-1.9 mm long, green-white becoming dark-purple especially above at maturity, puberulous only near the apices, the ligules present or absent, 0.1-0.4 mm long, achenes 0.8-1.2 mm long, 2-3 nerved, shiny and finely hispidulous; disk flowers 1-2, pappus 2.0-2.8 mm long, corollas 2.6-3.3 mm long, anthers sterile, achenes inane. Staminate heads: 3.5-4.0 mm high, 2.0-2.5 mm wide, phyllaries ca. 4-seriate, resembling those of the pistillate heads; disk flowers 11-16, green-white becoming dark-purple especially above at maturity, pappus 1.9-2.2 mm long, whitish becoming brown-tinged, tubes 0.9-1.8 mm long, puberulous above, limb 1.2-1.6 mm long, puberulous below, lobes oblong or barely linear, 1.0-1.3 mm long, dorsally glabrous, style branches rhombic-oblong, short-acuminate or acute, achenes abortive, small knobs.

Chromosome number: $n = 9$ (Jackson, 1969). Published originally as Archibaccharis hirtella (DC.) Heer. var. intermedia Blake.

Pollen diameters (microns): polar, 15.0-20.0; equatorial, 16.7-21.0; Jackson 1025, Smith 259.

This variety of Archibaccharis hirtella is a long, slender-stemmed vine which climbs over shrubs. The floral morphology matches that of the other varieties of A. hirtella very well.



SECTION OF ARCHIBACCHARIS
 HOLOTYPE
 A. *Archibaccharis hirtella* var. *albescens*
 J. D. Jackson, var. nov.
 J. D. Jackson

U. S. DEPARTMENT OF AGRICULTURE
 PLANT MATERIAL SYSTEM
 U. S. GARDEN
 STATE OF CALIFORNIA
 MISS. *Baccharis scandens*, Less.

Fig. 1. Holotype of Archibaccharis hirtella var. albescens.

Although closely resembling *A. hirtella* var. *taeniotricha* from Chiapas, Mexico and Guatemala in vegetative characters, this new variety proved to be consistently different in a few characters. The stems are whitish pilosulous above as are the leaves. The abundant stipitate-glandular hairs on the lower leaf surfaces are lacking on var. *taeniotricha*, a taxon with densely sordid or brown-pilosulous hairs on the stems and thicker, larger leaves. The present variety also possesses glabrous outer phyllaries while those of var. *taeniotricha* are noticeably pilosulous.

Blake (1934, p. 434) cited Pringle 4988 and Smith 259 as var. *taeniotricha*. These collections are now referred to var. *albescens* and the MIN sheet of Pringle 4988 was selected as the holotype.

Growing in oak woods and in a moist, wooded barranca near moving water, 1750-2745 m ele., known only from Sierra de San Felipe and Sierra de Clavellinas, State of Oaxaca, Mexico.

MEXICO: State of Oaxaca: Oaxaca, Conzatti & Gonzalez 997 (GH!); moist, wooded barranca along Rio Puente, Sierra de San Felipe del Agua, Jackson 1025 (B, BM, C, DS, F, G, GH, K, MICH, MIN, MO, MSC, NY, P, POM, TEX, UC, US, WIS); Sierra de Clavellinas, Smith 259 (BM, MICH, MO, NY, UC, US, WIS).

ARCHIBACCHARIS LINEARILOBIS J. D. Jackson, sp. nov.

Herba erecta(?); caulibus, foliis, pediculis dense glandiferis-pubescentibus; corollis florum filiformum capitum pistillatorum 3.9-4.6 mm longis; lobis florum hermaphroditorum disci capitum staminatorum linearibus vel raro oblongis, 1.7-2.2 mm longis.

Type: GUATEMALA: Dept. Huehuetenango: steep, rocky slopes along road to San Juan Ixcocoy, Sierra Cuchumantanes, ele. 3700 m, 12-23 Jan. 1966, Molina, Burger & Wallenta 16446 (F! photo. MIN!; isotype: NY!).

Erect ligneous herbs(?); ca. 15 dm tall; densely glandular-pubescent, the sordid hairs mixed with white or brown pilosulous hairs; subterranean parts and bases not seen. Stems straight or obscurely fractiflex above, terete, 1.5-3.5 mm in diam. above, dull, dark-brown or lighter, glandular-pubescent. Leaves with short petioles, 1.0-3.0 mm long, thickly glandular-pubescent; blades ovate, oblong-ovate or elliptical, 3.5-6.0 cm long, 1.5-3.0 cm wide, firmly chartaceous, shallowly cordate or rarely rounded at bases, short acuminate at apices, margins serrulate distally, the upper surfaces dark-green or perhaps sordid olive-green, somewhat shiny, glandular-pubescent, the lower surfaces dark-green and sordid, duller than the upper surfaces, glandular-pubescent. Panicles convex, densely glandular-pubescent. Pistillate heads: ca. 6.0 mm high, 3.0 mm wide, phyllaries ca. 4-seriate, acute or acuminate, the outer triangular, ovate-oblong becoming lanceolate, puberulous with superficial brown glands, the inner linear-lanceolate and becoming glabrous; filiform ray flowers 30-40, pappus 3.4-4.8 mm long, white or perhaps light-yellow, corollas 3.9-4.6 mm long, white, puberulous above, the ligules erect or obliquely



Fig. 2. Holotype of Archibaccharis linearilobis.

reflexed, 1.5-2.0 mm long, achenes immature, 1.1-1.4 mm long, trigonous, shiny and hispidulous; disk flowers 2, pappus 3.6-4.0 mm long; corollas 3.9-4.2 mm long, anthers sterile, achenes abortive, reduced and inane. Staminate heads: ca. 7.0 mm high, 5.0 mm wide; phyllaries 4-5-seriate, resembling those of the pistillate heads; filiform ray flowers ca. 9; pappus 3.4-3.8 mm long, corollas 5.1-5.8 mm long, achenes apparently infertile; disk flowers ca. 36, white, pappus 3.8-4.4 mm long, white or perhaps light-yellow, tubes 1.9-2.2 mm long, puberulous above, limb 2.6-3.0 mm long, puberulous below, lobes linear, rarely oblong, 1.7-2.2 mm long, sparsely puberulous near the apices of the dorsal surfaces, style branches subclavellate or oblong, abruptly acute, achenes abortive, reduced and inane.

Pollen diameters (microns): polar, 22.2-28.9; equatorial, 24.4-32.1; Molina, Burger & Wallenta 16446.

Archibaccharis linearilobis shares some vegetative and floral characters with A. subsessilis, a species with which it is sympatric, at least in a portion of the range of that species. The head composition of the present species parallels that found in A. subsessilis and A. corymbosa with constant presence of heterogamous heads on both pistillate and staminate plants. As with those species, the heads present a diminished monoecious condition. The type collection of A. linearilobis was distributed as A. corymbosa.

The specific epithet "linearilobis" refers to the distinctive linear lobes found on the disk flowers of the staminate heads.

When the cotton blue test was applied to the pollen from the staminate specimen of A. linearilobis (NY), ca. 92 per cent of the grains were found to be full, thus reducing the probability that the specimens were of hybrid origin. Although only a single sample of the pollen of A. linearilobis was available, there was a marked difference in the size of the grains when compared to those of A. subsessilis.

Although A. linearilobis is known only from the type collection, a single specimen from an additional collection, Breedlove 8515 (MICH), is nearly identical to the present species. This pistillate specimen, however, appears different with angled stems, thicker and harsher leaves, much larger heads and larger floral measurements. The giant characters perhaps suggest a polyploid origin for this specimen. Further collections are needed.

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Jackson, J. D. 1969. IOPB Chromosome Number Reports. Taxon 18: 435.

NOTES ON NEW AND NOTEWORTHY PLANTS. LXVIII

Harold N. Moldenke

LIPPIA VINOSA Moldenke, sp. nov.

Suffrutex 1 m. altus; ramis ramulisque dense brunneo-hirsutulis; foliis decussato-oppositis vel ternatis; petiolis brevissimis dense hirsutulis; laminis foliorum crassiusculis ovalibus usque ad 6 cm. longis 4 cm. latis supra dense scabrido-pubescentibus, subtus densissime velutino-tomentosis, margine regulariter serrulatis, ad apicem acutis vel obtusis ad basin subcordulatis, reticulo venularum supra impresso; inflorescentiis axillaribus pedunculatis dense capitatis.

Subshrub, about 1 m. tall; branches and branchlets subtetragonal, very densely hirsutulous with brownish wide-spreading hairs; principal internodes 3.5--6 cm. long; leaves decussate-opposite or ternate; petioles short, 5--6 mm. long, densely hirsutulous like the branches; leaf-blades rather thick-textured but not stiff, oval in shape, dark-green above, grayish beneath, to 6 cm. long and 4 cm. wide when mature, acute or rounded-obtuse (when young) at the apex, obscurely subcordulate at the base and somewhat cuneately prolonged into the petiole, regularly rounded-serrulate from almost the base to the apex, roughly pubescent above with bulbous-based hairs, very densely velvety-tomentose beneath; vein and veinlet reticulation impressed above and prominent beneath; inflorescence axillary, 2 or 3 per node, shorter than the subtending leaves, to about 3 cm. long when mature; peduncles slender, 1--2 cm. long, densely hirsutulous with brownish spreading hairs like the branches; heads capitate, about 1 cm. long and wide, densely many-flowered; bractlets rather large, oval, about 6 mm. long and 3 mm. wide, very densely strigose-pubescent, acute at the apex; corolla hypocrateriform, wine-red, the tube about 6 mm. long, the limb 1.5 mm. wide.

The type of this species was collected by Gert Hatschbach and O. Guimarães (no. 24621) on a campo at Terenos, Mato Grosso, Brazil, on August 13, 1970, and is deposited in my personal herbarium at Plainfield, New Jersey. Its general aspect is much like that of some species of *Hyptis*.

STACHYTARPHETA ANDERSONII Moldenke, sp. nov.

Fruticulus, caule solitario gracile dense puberulento; foliis oppositis crassiusculis firmis ellipticis undique puberulentis ad apicem argute acutis vel breviter acuminatis, ad basin attenuatis, margine integerrimis vel minutissime serrulatis; inflorescentiis spicatis, spicis densissime multifloris angustis; bracteis lanceolatis perspicuis; corollis caeruleis hypocrateriformibus.

Single-stemmed low shrub, to 60 cm. tall; stems slender, obtusely tetragonal, very densely brownish-puberulent throughout, with a few short and erect branches at or near the apex which are similar to the stem in texture and puberulence; principal internodes rather uniform, about 4 cm. long, each with a pair of leaves; leaves de-

cussate-opposite, the blades very firm or even subcoriaceous in texture when dry, probably fleshy when fresh, uniformly green on both surfaces, elliptic, 6--8 cm. long, 3--4 cm. wide, very sharply acute or short-acuminate at the apex, entire or with a few very minute teeth occasionally above the middle, attenuate into the petiole at the base, very minutely but rather densely puberulent on both surfaces, often with a few scattered circular glands beneath, the venation obscure above, only the midrib and lower portions of the 4 or 5 secondaries somewhat prominulous beneath; inflorescence terminal, spicate, the spikes 22--35 cm. long or longer, slender, very densely many-flowered; peduncles short, 1.5--2 cm. long, resembling the stems and branches in size, texture, and puberulence; rachis slender but quite deeply sculptured beneath each flower; bracts lanceolate, very conspicuous, closely imbricate, 1--1.5 cm. long, about 1.5 mm. wide, long-acuminate or aristate at the apex, minutely puberulent on the outside, rather conspicuously scarious-margined from the base to the apex; corolla hypocrateriform, blue, its tube about 1 cm. long, the limb about 1 cm. wide.

The type of this distinctive species was collected by William R. Anderson (no. 7105) -- in whose honor it is named -- in the cerrado in an area of cerrado and grassy campo traversed by a small stream, at about 600 meters altitude, 2--4 km. by road north of Funil and the Rio Paraná on the Planalto do Brasil, Goiás, Brazil, on March 14, 1973, and is deposited in the herbarium of the Universidade de Brasilia in Brasilia, Brazil.

STACHYTARPHETA JAMAICENSIS f. PARVIFLORA Moldenke, f. nov.

Haec forma a forma typica speciei corollis dimidium brevioribus recedit.

This form differs from the typical form of the species in having its corollas much shorter, usually only about half as long.

The type of the form was collected by F. R. Fosberg & D. R. Stoddart (no. 54896) on greatly disturbed coral gravel in the area back of the docks on Canton Island, Phoenix Islands, Central Pacific, on June 10, 1973, and is deposited in the United States National Herbarium as sheet no. 2680407. My wife and I found the same form in one very large roadside colony in Ceylon earlier this year, its small flowers making it quite distinctive.

STACHYTARPHETA LACUNOSA var. ATTENUATA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum ad basin attenuato-acutis vel subcuneatis recedit. This variety differs from the typical form of the species in having its leaf-blades attenuate acute or subcuneate at the base.

The type of the variety was collected by H. S. Irwin, R. Reis dos Santos, R. Souza, & S. F. de Fonseca (no. 22157) on rocky slopes with soil-filled pockets and crevices about 12 km. southwest of Diamantina, at 1370 m. altitude, on the Planalto do Brasil, Minas Gerais, Brazil, on January 18, 1969, and is deposited in the Britton Herbarium of the New York Botanical Garden; shrub 1 m., locally common.

BOOK REVIEWS

Alma L. Moldenke

"ROCKY MOUNTAIN TREES — A Handbook of the Native Species with Plates & Distribution Maps" by Richard J. Preston Jr., lxxi & 284 pp., illus., Replication Edition by Dover Publications Inc., New York, N. Y. 10014. 1968. \$3.00 paperbound.

This unabridged revised replication of the second and revised edition of 1947 from the Iowa State College Press can now become again a popular companion in the field because the drawings came through excellently, the keys are just as workable, and the descriptions are easy to follow, yet well detailed.

"THE FUNGUS-GROWING ANTS OF NORTH AMERICA" by William Morton Wheeler, ix & 136 pp. & plates, illus., Replication Edition by Dover Publications Inc., New York, N. Y. 10014. 1973. \$2.50 paperbound.

This is an unabridged republication of this famous paper which first appeared as article XXXI in the Bulletin of the American Museum of Natural History, Volume XXIII, in 1907. A new detailed Table of Contents has been added. The 65 figures, including both photographs and drawings, reproduced reasonably well.

These many and varied Attii are mostly neotropical even though some are found south into Argentina and north into New Jersey. They all "have developed a complex of instinctive activities which enables them to draw upon an ever-present inexhaustible food-supply through utilizing the foliage of plants as a substratum for the cultivation of edible fungi. No wonder therefore, that, having emancipated themselves from the precarious diet of other ants which subsist on insects, the sweet exudations of plants and the excrement of phytophthorous Rhynchota, the Attii have become the dominant invertebrates of tropical America."

How good for the upcoming students -- formal or informal -- in entomology, biology, ecology, etc. to have this wonderful study now so easily available!

"ARISTOCRATS OF THE TREES" by Ernest H. Wilson, xxi & 279 pp., illus., Replication Edition by Dover Publications Inc., New York, N. Y. 10014. 1974. \$3.50 paperbound.

This aristocrat of books which was originally published in 1930 and is here republished unabridged except for the omission of the colored frontispiece, is definitely to be welcomed. Many people from many walks of life besides arborists have been and now can

continue to be provided with pleasure and information through the reissuance of this splendid book.

"INTRODUCTION TO MUSHROOM HUNTING" by Vera K. Charles, 60 pp., illus., Replication Edition by Dover Publications Inc., New York, N. Y. 10014. 1974. \$1.25 paperbound.

This is an unabridged republication of the U. S. Department of Agriculture Circular No. 143 entitled "Some Common Mushrooms and How to Know Them" in its 1946 revision.

This work has long appealed primarily to amateur fungiphiles and general naturalists. Its textual descriptions are still good today in comparison with those of more recent books. Its 49 photographic figures suffer somewhat in comparison with those in more recent works which also have the advantage of revised nomenclature. Consequently this amazingly inexpensive book can best be recommended as an 'extra' rather than a 'prime' guide for mushroom hunting.

"SEASONS" text by Hal Borland & photographs by Les Line, 126 pp., illus., J. B. Lippincott, Inc., Philadelphia, Pennsylvania 19105. 1973. \$14.95.

Among the world's many naturalists and persons of related scientific interests — amateur and professional — past and present — there are those who have contributed much valuable work, but there are so very few who are able to share with their fellowmen their thoughts and observations, and by the certain succession of words and camera clicks can produce as wonderful a publication as this one!

The exquisite color photographs by themselves portray beautifully the grand succession of the seasons. The pleasurable personal expectations of repeated experiences throughout the progression of the seasons are described beautifully. Either of these approaches alone would have been well worthy of publication, but their integration into this oversized book of excellent printing is so much the better.

What a lovely gift this would make to share with friends!

"THRIPS: Their Biology, Ecology and Economic Importance" by Trevor Lewis, xv & 349 pp., illus., Academic Press, London N.W1 & New York, N. Y. 10003. 1973. £ 10.55 or \$22.00.

"Thrips" complements "the hitherto largely descriptive works on the order Thysanoptera, by presenting thrips as living animals, stressing the behaviour of individuals and populations, their varied and complex relationships with plants, other animals, and the physical components of their environment, their abundance in

undisturbed and in cultivated habitats, and their economic importance as pests [about 1/10 of known species widely recognized the world over] and beneficial insects [a smaller proportion that prey on harmful thrips and other arthropod pests and a few phytophagous species exploited to control weeds, and the pollinators]...

"To encourage general entomologists, ecologists and agriculturists to use the book, non-specialist terminology has been used wherever possible, and to stimulate a wide academic and applied interest illustrative examples have been chosen from a great variety of countries, habitats and crops."

This is an excellent reference work with a huge bibliography, indexes, and appendices on specimen preservation, thrip predator-parasite and thrip predator-prey lists, chemical control, and synonymy and common names.

"MAINE PARADISE: Mount Desert Island and Acadia National Park" by Russell D. Butcher, 96 pp., illus., A Studio Book by Viking Press, New York, N. Y. 10022. 1972. \$10.95.

"May this book created with such love, beauty, and understanding, become a vade mecum for all fortunate enough to visit or live on Mount Desert Island" writes Carl Buchheiser in his Prelude.

The author describes the area through the telling of its history, seasonal accommodations, listing of its wildlife, and programming within Acadia National Park which now occupies about half of Mount Desert Island and parts of some satellite islands. The author also has provided some of the 55 beautiful color photographs. The others and some attractive line drawings are provided by the artist, Marie Ivey Menziatti.

"WILDFLOWERS OF LOUISIANA and Adjoining States" by Clair A. Brown, xl & 247 pp., illus., Louisiana State University Press, Baton Rouge, Louisiana 70803. 1972. \$10.00.

For this popularly oriented and yet professionally prepared work over 500 flowering plants are attractively photographed in color by the author and simply and effectively described so that the book can be used in the field by several kinds and levels of students, amateurs and quick visiting botanists. They are chosen from a known flora of 3,000 species in a suspected flora of 4,500 species. For every illustration there are at least three voucher specimens deposited in the herbaria of the local university, the Smithsonian Institution and the New York Botanical Garden. The nomenclature employed follows that of H. Rickett's "Wild Flowers of the United States", Volume 2, "The Southeastern States". Blooming times, habitats, and appearance in neighboring Texas, Arkansas and Mississippi are noted. There is even space left below the descriptions for personal observations.

Surely this book is headed for much successful usage.

"THE FRUITS OF THE HOLY LAND" by Asaph Goor & Max Nurock, iii & 293 pp., illus., Israel Universities Press, London, New York & Jerusalem P. O. Box 7145, Israel. 1968.

From the Old Testament, Mishna, Talmud particulatly, and from other valid sources the authors trace interestingly the horticultural and religio-cultural history of these edible plant products.

"The Land of Israel is acknowledged to be within two principal centres of the origin of cultivated plants, namely, the Mediterranean Basin and the Middle East. It has probably given birth itself to some of them, such as the carob, olive, azarole, jujube and almond.

"In the Bronze Age [Chalcolithic 4000--1200 B.C.]...from India and Egypt [came] the fig and pomegranate, the citron [or etrog] and date. From the north and north-east came the vine, the apple, the pear and peach, the pistachio, the plum, the mulberry, the quince and the walnut. During the six hundred years of the Israelite period, coinciding roughly with the Iron Age [1200--600 B.C.], and through the twelve centuries of the Persian and Greek, the Roman and Byzantine periods, this 'immigration' went on". The banana, apricot and almond are also discussed. Additional research may provide more surety in these matters in the future.

There are excellent documentaries, black/white illustrations that come from ancient woodcuts, hieroglyphics, mosaics, etc.

This work certainly should appeal to readers with many different interests from botany to history to fructiculture to Zionism.

"PLANT NAMES: COMMON AND UNCOMMON" 2nd Edition compiled by Sonia Wedge, i & 31 pp., New York Botanical Garden Library, Bronx Park, New York, N. Y. 10458. 1974. \$1.50 paperbound.

This enlarged and improved new edition of over 1,000 entries grew, as did the first one, at the telephone-reference desk of the New York Botanical Garden library in answer to questions from returning tourists, editors, cross-word puzzle fans, gardeners, etc.

Space between entries makes for clean format and for easy reading as well as for adding one's own newly acquired entries. The bibliography gives further and collaborating information.

"ANNUAL REGISTER OF GRANT SUPPORT 1973-74" 7th Edition edited by Deanna Sclar & Staff, xiii & 828 pp., Academic Media, Orange, New Jersey 07050, or Sherman Oaks, California 91403. 1973. \$39.40.

That is a big price for a book without colored pictures, but this is a very big book with obviously no need for such chromatic illustrations but with well organized information about gold mines instead. It is a "must" for academic and project libraries. It is a great time-saver and a directory of possibly unknown, little

known, as well as well known sources of non-repayable financial aid from 1,581 granters controlling several thousand opportunities in the humanities, the social sciences, the pure and applied sciences (biology, chemistry, physics, engineering, physiography), the health and medical sciences, geographical and other area studies, and the burgeoning and ramifying environmental studies. The material is again reorganized topically in four different indexes.

This compilation renders a great service.

"THE PHYLOGENY AND CLASSIFICATION OF THE FERNS" edited by A. C. Jermy, J. A. Crabbe & B. A. Thomas, xiv & 284 pp., illus., Academic Press, London NW1 & New York, N. Y. 10003. 1973 [1974]. £12.00 or \$25.00.

This book includes the 18 papers with relevant additional references offered to the Symposium on the Phylogeny and Classification of the Filicopsida held jointly by the British Pteridological Society and the Linnean Society of London in April 1972 and is published as Supplement I to the Botanical Journal of the Linnean Society, Volume 67, 1973, but actually not appearing until February 1974.

The papers reflect historical review (Pichi Sermolli), orientation (Holttum), present thought trends in fern evolution and systematics (the Tryons) and also point to future developments (Wagner). Stomatal types, gametophytic types, spore types, biochemical types, etc., are considered systematically as are also such groups as Aspidiaceae, Aspleniaceae, Dennstaedtiaceae and Cheilantheaceae.

There is a great deal of valuable material, well written and well indexed, between these book covers.

"GRASSES OF THE SOUTHWESTERN UNITED STATES" by Frank W. Gould, 352 pp., illus., University of Arizona Press, Tucson, Arizona 85722. 1973 Reprint. \$3.95 paperbound.

Because of the relatively recent "demand outrunning supply", this valuable work has been reprinted with a flexible paper cover. So now the same fine keys, descriptions, almost a hundred many-parted clear drawings by I. B. Hamilton, bibliography, glossary and index are all freshly available to the many who will want and need this book as a guide for their study and/or enjoyment.

"RESEARCH EXPERIENCES IN PLANT PHYSIOLOGY: A Laboratory Manual" by Thomas C. Moore, xi & 462 pp., illus., Springer Verlag Inc., Heidelberg, Berlin & New York, N. Y. 10010. 1974. \$9.50 paperbound & with 3-holed removable "lab" sheets.

planned for advanced undergraduate and graduate plant physiolo-

gy courses by the author who has taught many such and who is strongly convinced that "each exercise should be sufficiently comprehensive in design and include adequate replication to be realistically instructive about the principle or process under study or the technique being practiced...." yet allowing for "a diversity of exercises adequate to cover the most major topics."

Typical of the 25 exercises is "Induction of an Amylase in Aleurone Cells of Barley Grains by Gibberellin" and typical of the questions in the Report is "What specific and unequivocal conclusions can be made about the effects of actinomycin D and cycloheximide which were observed?" It is well supported with directions and bibliography and it can be adapted effectively to a wide range of professors, texts and equipment.

"A FLORA OF SOUTHERN ILLINOIS" by Robert H. Mohlenbrock & John W. Voigt, ix & 390 pp., illus., Southern Illinois University Press, Carbondale, Illinois 62901 or Edwardsville, Illinois 62025. 1974. \$3.95 paperback.

This is just the paperback Arcturus Books Edition, copied by offset from the original 1959 form that has been much used, especially locally, by almost a generation of botany classes and related ones in conservation, forestry, etc., botanists and amateurs, or visiting naturalists. It is good to have this fine work so readily and inexpensively available again.

"TROPICAL CROPS: Monocotyledons" Volume I by J. W. Purseglove, x & 234 pp., illus., Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10016. 1973. \$12.00.

The author, who has spent his professional life in various tropical posts, has herein provided the basic information on the botany, origin, distribution, and agronomy for the alphabetically arranged monocot crop plants from the Agavaceae through the Gramineae. There are 32 pages of fine quality drawings made from living materials by M. Wong.

"One of the great difficulties experienced in many parts of the tropics is the lack or scarcity of library facilities. It is hoped that this work [which is really excellent, will provide]....some basic information which is not readily accessible elsewhere."

"PHILODENDRONS" by Jack Kramer, ii & 87 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1974. \$5.95.

This is a small, attractively illustrated and arranged, descriptive book on the many kinds of vining and self heading (misspelled in Contents) philodendrons now horticulturally available as house and patio plants. Planting directions and care are explicit. Even mail-order suppliers are listed from five very different sections

of the country.

"UNDERWATER GARDENS: Planning and Planting Your Aquarium" by Jack Kramer, iv & 85 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1974. \$6.95.

This oversized attractive book may prove to be a happy deterrent to the growing fad of aquaria serviced by huge pumps, several types of fish foods and unrealistic plastic "plants".

This book advocates the "natural biotope aquarium" with listed and described plants chosen to match the natural habitats of the fishes displayed. "From Malaysia, Indonesia, Java, Sumatra, Borneo, New Guinea and Ceylon come most of our aquarium plants and fish....from lakes, rivers, and swamps in these tropical lands". But then, it is distressing to read of them as "seascapes" with nothing marine about them! Directions for care, as well as sources, of both plants and fish are given.

"FRESHWATER ECOLOGY" Second Edition by T. T. Macan, viii & 343 pp., illus., Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10016. 1974. \$10.95 paperbound.

Modernly updated in content and with a thorough bibliography, this new edition still hardly ever mentions any plants that have to be in the environments of the discussed animals!

The price is outrageously high.

"25 VEGETABLES ANYONE CAN GROW" by Ann Roe Robbins, viii & 216 pp., illus., Replication Edition by Dover Publications, Inc., New York, N. Y. 10014. 1974. \$2.00 paperbound.

This work was first presented in 1942 expressedly for the amateur at a time when "Victory Gardens" sprang with seeds, green thumbs, aching backs, great zeal, and such guidance as this book offered in city lots, in lieu of flower gardens and on front lawns.

Now with inflation and the return to the soil (mostly by folks who have never been there) movements simple sound directions such as these should be very helpful. Academics who are so often asked "How to..." questions can safely recommend this work as a dependable guide.

"STRUCTURE AND FUNCTION OF PLANT CELLS IN SALINE HABITATS: New Trends in the Study of Salt Tolerance" by Boris Petrovich Stroganov & edited by B. Gollek, vi & 284 pp., illus., Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10016, 1973. \$30.00.

The book was translated in 1970 by A. Mercado from the original Russian under the auspices of the Israel Program for Scientific Translations.

Because this is a relatively new interdisciplinary field dependent upon advanced precise physiochemical procedures, complex equipment and quite new approaches that are now available, much new information and subsequent ideas should be forthcoming soon.

The book considers salt tolerance in cells, tissues, and whole plants in vivo and in vitro in connection with nitrogen, carbohydrate, organic acids, nucleic acid, and protein metabolisms, with plastid and soluble pigments, with sulfur conversion, and with the chemistry of necrosis.

There is a very full bibliography and a long index which is faulted because it includes very few scientific names and even these few are not distinctively italicized. From consulting it one cannot be sure whether and mangrove genera, for instance, are even considered! Figure 87 is a fascinating, and possibly still partly biochemically fanciful chart of a Scheme of Toxic and Protective Mechanisms in Plant Cells under Saline Conditions.

"HISTORY OF ENTOMOLOGY" edited by Ray F. Smith, Thomas E. Mittler & Carroll N. Smith, viii & 517 pp., illus., Entomological Society of America cooperating with Annual Reviews, Inc., Palo Alto, California 94306. 1973. \$12.00 U.S.A. prepaid and \$12.50 elsewhere prepaid.

What a storehouse of valuable and interestingly presented information this is!

The 20 papers by 25 authors of worldwide range and renown survey first early entomology in East Asia, the Middle East, and the Western World; later the early naturalists, anatomists with their lenses, and systematists; and then, more modernly, morphology, physiology, paleontology, ecology, genetics and ethology. So little attention is given to the insect role in pollination! There is a treatise on biological, but not chemical, control. There are also surveys on applied entomology: agricultural, forest, medico-veterinary, and apiculture.

Inevitably some basic ideas are repeated but very few details are presented repetitiously. Each paper has a carefully compiled bibliography and items are well indexed.

This reasonably priced book is surely a "must" for academic and biologically professional libraries. Many entomologically interested folks will surely want personal copies.

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NOTEWORTHY GRASSES FROM MEXICO II¹

Alan A. Beetle, Range Management Section, University of Wyoming,
University Station, P. O. Box 3354, Laramie, Wyoming, 82071.

The first paper with this title can be found in *Phytologia* 27(6):441-444, Jan., 1974. All the Beetle collections mentioned hereafter are in the Range Management Herbarium at the University of Wyoming.

ARISTIDA ADSCENSIONIS L. In 1842, Trinius and Ruprecht used the name *Aristida dispersa* Trin. & Rupr. to combine all the New World material of *A. adscensionis* and to distinguish this material from all the Old World material which was treated as *A. vulgaris* Trin. & Rupr. They confined *A. adscensionis* to its type locality on the Island of Ascension.

In the Chase "Index to Grass species *A. dispersa*" is annotated "a group name including 5 varieties Henrard takes *humilis* as type of the group." *A. vulgaris* is a similar "group name" but no mention of this is made in the Chase Index. Although all 5 of the varieties listed under *A. dispersa* in Trin. & Rupr. are given varietal status in the Chase Index no mention is made of the 15 names given varietal status under *A. vulgaris*. Henrard gives *A. canariensis* Willd. as the type for *A. vulgaris* and both names, *A. vulgaris* and *A. canariensis*, become synonyms of *A. adscensionis*.

Many collections of the *adscensionis* complex from North America, South America, the Old World and the type locality show the lateral awns to be not less than 10 mm. long, and the central awn usually not more than 15 mm. long, and to agree additionally in the upright habit, narrow and elongate inflorescence, and the generally smooth lemma except for the scabrosity on the keel. These plants represent *A. adscensionis* var. *adscensionis* as now recognized by Henrard (Monograph of the genus *Aristida*. Med. Van's Rijks Herb. Leiden 54A Vol. II. pgs. 331-335. 1932) and other authorities. Apparently *A. adscensionis* is native throughout its range since there is nearly equal development of geographic varieties in both the New World and the Old World.

From the comparisons below, it is easy to imagine that something similar to the widespread var. *adscensionis* achieved the original dispersal of the species and that since, in three different geographical areas, there has been a segregation of

¹ Published with approval of the director, Wyoming Agricultural Experiment Station as Journal Article No. 678.

varieties which tend to parallel each other because they are arising from similar gene pools.

New World		Old World
North America	South America	
var. <u>adscensionis</u>	var. <u>adscensionis</u>	var. <u>adscensionis</u>
var. <u>modesta</u>	var. <u>modesta</u>	var. <u>pumila</u>
var. <u>coarctata</u>	var. <u>bromoides</u>	var. <u>guineensis</u>
var. <u>interrupta</u>	var. <u>condensata</u>	var. <u>festucoides</u>

Key to the Mexican varieties of Aristida adscensionis

Plants tall, the branching often above the base, the panicle open or if elongate, then interrupted

Panicle not markedly elongate or markedly interrupted

Panicle more or less compact, the branches short and erect

Panicle green to purplish, the awns flexuous

var. adscensionis

Panicle often very dark purple, the awn stiff and strongly reflexed

var. decolorata

Panicle very open, loose, the branches long and flexuous

var. coarctata

Panicle markedly narrow, elongate (about 20 cm. long) and conspicuously interrupted with dense fascicles

Awns 10-15 cm long, plants usually greenish

var. interrupta

Awns 15-20 cm long, plants often dark purple

var. nigrescens

Plants short, the branching primarily basal, the panicles single, dense, spikelike, with overlapping fascicles

Awns varying from 6mm. to 15 mm. long, the short-awned form; common

var. modesta

Awns obsolete; rare

var. abortiva

ARISTIDA ADSCENSIONIS L. var. ABORTIVA var. nov.

A. adscensionis var. modesta Hack. similis sed setae lemmae abortivas.

Type: Beetle M - 2403, Mexico, Baja California Sur, 5 miles south of El Coyote on Baja Concepcion.

In California and northern Mexico, well within the total range of var. modesta occurs a plant which is similar in all respects except for the striking reduction of the lateral awns of the lemma. This plant was noted by Johnston (Journ. Arnold Arboretum 24:of page 401. 1943) as follows: "three collections cited above have the lateral awns minute or nearly wanting, but otherwise they agree closely with the specimens associated with them." The three collections mentioned are Pringle 390, Johnston 8252 and Johnston 8415.

Aside from the type collection, the following have been seen: California: 11 miles west of Needles, Numz and Harwood 3621. A collection of Wiggins, his number 9676, from the south end of the Coxcomb Mts., 8 miles n.e. of Desert Center is intermediate between var. abortiva and var. modesta. Mexico: Baja California Sur, Beetle M - 2662, near La Paz at Coromul is intermediate between var. abortiva and var. modesta.

Mexico: Durango, 8 miles north of Lerdo, Beetle M-1323.

ARISTIDA ADSCENSIONIS L. var. ADSCENSIONIS

Partial synonymy:

A. adscensionis L. Sp. Pl. 82. 1753.

A. canariensis Willd. Enum. Pl. 99. 1809.

Chaetaria adscensionis (L.) Beauv. Ess. Agrost. 30. 1812.

A. divaricata Willd. misapplied by Jacq. Eclog. Gram. 7.pl.6.

1814, not A. divaricata Humb. & Bonpl.

A. humilis H.B.K. Nov. Gen. & Sp. 1:121. 1815.

Chaetaria humilis (H.B.K.) R. & S. Syst. 2:396. 1817.

A. fasciculata Torr. Ann; Lyc. N.Y. 1:154. 1824.

Chaetaria fasciculata (Torr.) Schult. Syst. Veg. 2:Mant. Addit. 1:578. 1827.

Aristida vulgaris Trin. & Rupr. var. canariensis (Willd.) Trin.

& Rupr. Mem. Acad. St. Petersburg. VI. Sci. Nat. 5:132. 1842.

Aristida vulgaris Trin. & Rupr. Mem. Acad. Sci. Petersburg. VI. Sci. Nat. var. mongholica Trin. & Rupr.

5:133. 1842, a syn of A. adscensionis L. acc. to J.

Malata Beliz. Gramineas de Ilha de Maio. Bot. Soc.

Broteriana 44 (second Ser.) 266. 1970.

A. dispersa Trin. & Rupr. Mem. Acad. St. Petersburg. VI. Sci. Nat. 5:129. 1842.

- A. adscensionis L. var. canariensis (Willd.) Dur. & Schinz.
Consp. Fl. Afr. 5:799. 1894.
- A. adscensionis L. var. typica Stapf. in Hook. Fl. Brit. India
VII. 224. 1897.
- A. adscensionis L. var. normalis Kuntze and f. viridis Kuntze,
Rev. Gen. Pl. 3:340. 1898. Also f. violascens Kuntz, op.
cit. 1898.
- A. adscensionis L. var. humilis (HBK) Kuntz Rev. Gen. Pl. 3:340.
1898.
- A. adscensionis L. var. modesta Hack. in Stuck. Anal. Mus. Nac.
Buenas Aires 11:89. 1904.

This is the type of Aristida adscensionis which is both common and widespread. It occurs in North America from Missouri, Kansas, and Colorado, south to Arizona, New Mexico and Texas, throughout Mexico, where it is the most common variety, and in Guatemala, Venezuela and Argentina. Mexican collections include: Sonoro, Beetle M - 2344; Baja California Sur, Beetle M - 2407; Nuevo Leon, Beetle M - 425; Zacatecas, Beetle M - 1790; Sinaloa, Beetle M - 2672; Queretaro, Beetle M - 1703; Morelos, Beetle M - 1645; Oaxaca, Beetle M - 1515.

ARISTIDA ADSCENSIONIS L. var. MODESTA Hack.

Synonymy:

- Aristida festucoides Stend. & Hochst. Abh. Bohm. Ges. Wiss.
3:550. 1845, nomen nudum, Chile (non A. festucoides Poir.,
1810).
- Aristida americana var. bromoides (HBK) Scribn. & Merr. U. S.
Dept. Agr. Div. Agrost. Circ. 32:5. 1901, sensu Scribn.
& Merr., non A. bromoides HBK.
- Aristida adscensionis var. modesta Hack. in Stuckert, An. Mus.
Nac. Bs. Aires 11:89. 1904.
- Aristida adscensionis var. coerulescens (Desf.) Hack. in
Stuckert, op.cit., sensu Hackel non A. coerulescens Desf.

A collection, Beetle 596, Prov. of Mendoza, 8 kil. s. of Villavicencia on first slopes breaking out of the Mendoza Plain, dry rocky site, April 25, 1953, from Argentina, agrees exactly with North American desert habitat and material from California, Arizona and Mexico. Many early floras including Hitchcock's treatment of grasses for Jepson's Flora of California, accepted var. bromoides either as a species or as a variety and this practice should continue, but the name changed since Henrard has redefined the limits of var. bromoides based on examination of the type which is from Ecuador.

The common variety in California and Arizona is var. modesta. It has apparently also been reported for Texas by Silveus in his "Texas Grasses" for he says (cf. page 333), "The author collected in the Hueco Mountains some plants with spikelets 5-7 mm. long,

central awn 4-8 mm. long, and the lateral 2-5 mm. long." It is very common in Baja California Sur, and rarer in continental Mexico, also occurring in central South America. Mexican collections include: Baja California Sur, Beetle M - 2587 and M-2496; Baja California Norte, Beetle M - 1876 and M - 1867; Nuevo Leon, Beetle M - 2891 and M - 390; S.L.P., Beetle M - 1764; Zacatecas, Beetle M - 1812; Mexico, Beetle M - 2922.

ARISTIDA ADSCENSIONIS L. var. COARCTATA (HBK) Kuntze

Synonymy:

Aristida coarctata HBK. Nov. Gen. 1:100(122). 1815.

Chaetaria coarctata (HBK) R. & S. Syst. 2:396. 1817.

Aristida dispersa var. coarctata (HBK) Trin. & Rupr. Mem. Acad. St. Petersburg. VI. Sci. Nat. 5:130. 1842.

Aristida laxa Willd. ex Trin. & Rupr. Mem. Acad. St. Petersburg. VI. Sci. Nat. 5:130. 1842, as syn., not A. laxa Cav. 1799.

Aristida maritima Steud. Syn. Pl. Glum. 1:137. 1854.

Aristida adscensionis L. var. coarctata (HBK) Kuntze, Rev. Gen. Pl. 3:340. 1898.

Aristida debilis Mez, Repert. Sp. Nov. Fedde 17:151. 1921.

This variety is characterized by its open inflorescence, the panicle lax and loose, somewhat spreading. The central awn is usually markedly longer. This variety has been described many times from many places and occurs mostly on the east coast of Mexico but also on various islands of the Caribbean and in Venezuela. In Mexico the grass has been reported for Jalisco, Tamaulipas, Yucata (Beetle M - 999) and Campeche (Beetle M - 922). Although the name implies a dense panicle, Henrard says of the type "The plant is the somewhat open-panicled form of the common Aristida adscensionis, a form not uncommon in Mexico."

ARISTIDA ADSCENSIONIS L. var. DECOLORATA (Fourn.) comb. nov.

Based on Aristida grisebachiana Fourn. var. decolorata Fourn. Mex. Pl. 2:78. 1886.

This plant is characterized by its striking habit of producing whorled vegetative branching well above the base of the plant as well as by its stiff, straight awns which are often rigidly divaricate. The lemmas and awns are sometimes very dark purple as the name implies.

This variety is most common in Mexico, in Baja California Sur but has also been collected in Oaxaca (whence the type) and on the Yucatan Peninsula. Collections include Yucatan, Beetle M - 852; Oaxaca, Beetle M - 3103 and M - 3227; Baja California Sur, Beetle M - 2609, M - 2390, and M - 2429.

ARISTIDA ADSCENSIONIS L. var. INTERRUPTA (Cav.) Comb. nov.

Based on Aristida interrupta Cav. Icon. Pl. 5:45 pl. 471, fig. 2. 1799 and A. adscensionis L. subvar. interrupta (Cav.)
Henr. Monogr. of the genus Aristida. 325. 1932.

Synonymy: Aristida schaffneri Fourn. Mex. Pl. 2:78. 1886
Aristida grisebachiana Fourn. Mex. Pl. 2:78. 1886
Aristida adscensionis var. mexicana Hack. ex Henr.
Med. Rijks Herb. Leiden 54A:265. 1927, as syn. of
A. adscensionis, name only.

This variety has the usual awn measurements between 10 mm. and 15 mm. in length but the inflorescence is 20 cm. long in a narrow but interrupted panicle. In Mexico, it occurs along the eastern edge of the high plateau as follows: Coahuila, Almeida, Julian and Beetle no. 124; Nueve Leon, Beetle M - 1084, Tamaulipas, Beetle M - 1210 and Veracruz (type locality for Fournier's species).

ARISTIDA ADSCENSIONIS L. var. NIGRESCENS (Presl) Comb. nov.

Based on Aristida nigrescens Presl. Rel. Haenk. L:223. 1830 and
on A. dispersa Trin. & Rupr. var. nigrescens (Presl) Trin.
& Rupr. Mem. Acad. St. Petersburg. VI. Sci. Nat. 5:130. 1842.

This variety is very similar to var. interrupta (Cav.) Beetle but has much longer awns (always more than 15 mm. long, and frequently 20 mm. long) and the sometimes very dark purple spikelets, and its geographically distinct range, apparently occurring along the western coast of Mexico both in Baja California Sur and on the mainland. Collections include Baja California Sur, s. of La Paz, Beetle M - 2567 and 5 miles e. of San Antonio, Beetle M - 2648 and Beetle M - 2642; Sonora, west of El Coyote, Beetle M - 2024; and Nagales, Beetle M - 21; Guerrero, near Acapulco, Beetle M - 276; Oaxaca, near Tehuantepec, Beetle M - 2476 and Beetle M - 1462.

PASPALUM CONJUGATUM f. TRISTACHYA (Vanderz) comb. nov.

Based on P. conjugatum var. tristachya Vanderz, Bull. Agricol.
Congo Belge 9:245. 1918 from Africa

Synonymy: Paspalum sieberianum Steud. Syn. Pl. Glum. 1:17. 1854.
Paspalum longissimum Hochst. ex Steud. Syn. Pl. Glum. 1:19

Collected in the state of Tabasco near La Venta at the archeological pyramid, Dec. 30, 1973, Beetle M-3081, first report for Mexico.

NOTES ON BROMELIACEAE, XXXVI

Lyman B. Smith

VRIESEA

SUPPLEMENT II

This supplement to my provisional key to Vriesea (Phytologia 13: 84. 1966) is organized on the same plan as the preceding one on Tillandsia. It is intended as final before the completion of the manuscript of the genus for my monograph. As before, species marked with asterisk are to be added or substituted in the key.

Subkey I

- 6(1). Floral bracts (25-) 35 mm long; (add:) 2-3 times as long as the internodes.
- 6a. Leaf-sheaths merging with blades, castaneous only near base; floral bracts glabrous except the pruinose margin; sepals 20-25 mm long; scape about equaling the leaves. Peru.
V. cereicola
- 6a. Leaf-sheaths contracted at junction with blades, almost wholly castaneous; floral bracts evenly lepidote at first; sepals 15-20 mm long; scape usually much shorter than the leaves. Costa Rica to Venezuela and Bolivia, Greater Antilles.....*V. incurva
- 6(2). Floral bracts 40 (-60) mm long, (add:) 3-5 times as long as the internodes, glabrous; scape stout.
- 6b. Scape mostly erect and exceeding the leaves; floral bracts 4-5 times as long as the internodes. Colombia, Venezuela.
V. robusta
- 6b. Scape mostly decurved and shorter than the leaves; floral bracts 3-4 times as long as the internodes. Peru.
*V. patula
- 11(1). Floral bracts distinctly and densely lepidote; spikes oblong or linear; petals crenulate or lacerate.
- 11a. Spikes distinctly complanate; floral bracts nerved.
Colombia to Venezuela and Bolivia.....V. heterandra
- 11a. Spikes subterete; floral bracts even except the keel. Peru
*V. appenii
- 12(2). Delete V. lacera, a synonym of V. heterandra.
- 16(1). Floral bracts nearly all convex and ecarinate, 24 (-25) mm long.
- 16a. Primary bracts obscurely lepidote, exposing much of the spikes. Colombia, Ecuador.....V. cylindrica
- 16a. Primary bracts densely and conspicuously lepidote, completely covering the lower spikes. Peru..*V. sagasteguii

Subkey II

- 4(1). Delete V. sulcata from this subkey. The leaf-blade is not triangular.
- 3(2). Leaf-blades cinereous from a complete covering of scales.
4. Sepals 10-12 mm long; floral bracts 16-25 mm long.
5. Floral bracts carinate; plant lacking stolons. Nicaragua to Peru.....V. chontalensis
5. Floral bracts convex, ecarinate; plant spreading by long, slender stolons. Ecuador, Peru.....*V. espinosae
4. Sepals 15-30 mm long; floral bracts 18-60 mm long.
6. Floral bracts 45-60 mm long; sepals 24-30 mm long.
7. Rhachis soon exposed by the narrow floral bracts. Ecuador, Peru.....V. patula
7. Rhachis wholly covered by the broad, densely imbricate floral bracts. Ecuador.....*V. petraea
6. Floral bracts 18-35 mm long; sepals 15-25 mm long.
8. Spike-rhachis densely lepidote, broadly winged and enfolding the bases of the flowers; scape erect, stout. Ecuador.....V. barclayana
8. Spike-rhachis nearly or quite glabrous, narrowly winged; scape decurved.
9. Leaf-sheaths merging with the blades, castaneous only near base; scape about equaling the leaves. Peru. V. cereicola
9. Leaf-sheaths contracted at junction with blades, almost wholly castaneous; scape usually much shorter than the leaves. Costa Rica to Venezuela and Bolivia, Greater Antilles.....*V. incurva

Subkey III

- 4(1). Lower spikes covered by the primary bracts; sepals 10-16 mm long.
- 4a. Lower primary bracts broadly rounded and apiculate. Lesser Antilles, Venezuela.....*V. cowellii
- 4a. Lower primary bracts long-laminate. Peru, Bolivia. Tillandsia fusco-guttata
- 5(2).floral bracts ecarinate, 25 (-30) mm long.
- 5a. Sepals more than half exerted above the lax floral bracts. V. sincorana
- 5a. Sepals but slightly exerted above the floral bracts. *V. vidalii
- 15(2). Floral bracts sharply carinate toward apex.
19. Primary bracts (add:) covering more than half of each lower spike.
- 19a. Lower spikes completely covered by the primary bracts. West Indies, Mexico, Central America and Andean South America.....Tillandsia spp.

- 19a. Lower spikes somewhat exerted; inflorescence densely cylindrical; spikes broadly ovate. Guayana Highland of Brazil.....*V. maguirei
- 24(1). Change Tillandsia dubia to *Vriesea dubia.
- 27(1). Change Tillandsia zamorensis to *Vriesea zamorensis.
- 34(1). V. egregia is a synonym of *V. cowellii.
- 41(1). Sepals 9-10 mm long.
- 41a. Floral bracts strongly nerved.....Tillandsia spp.
- 41a. Floral bracts even or nearly so. Costa Rica....*V. umbrosa
- 43(2). Sepals not over 18 mm long, much exceeding the floral bracts; pedicels short.
- 43a. Upper scape-bracts densely imbricate; inflorescence slenderly cylindrical.....V. thyrsoidea
- 43a. Upper scape-bracts barely imbricate; inflorescence ellipsoid.....*V. cacuminis

Subkey IV

- 15(2). Vriesea minarum is a synonym of *V. atro-purpurea.

Subkey V

- 3(1). Inflorescence many-flowered (15-) 27 cm long, exceeding the leaves.
- 3a. Floral bracts sharply carinate toward apex. Brazil.
*V. rubyae
- 3a. Floral bracts scarcely or not at all carinate.
- 3b. Floral bracts rugose when dry, sparsely punctate-lepidote. Mexico.....*V. malzinei
- 3b. Floral bracts coriaceous, smooth and glabrous when dry. Brazil.....V. gradata
- 11(2). Floral bracts with evenly curved margins, (30-) 50 mm long; inflorescence usually lanceolate or elliptic.
- 11a. Sepals acute; floral bracts 30 mm long, inflated.
*V. rubyae
- 11a. Sepals obtuse; floral bracts 40-50 mm long.
12. Inflorescence very dense; each floral bract more than half covered by the one below it, red with yellow or green margins, its keel slightly curved.....V. inflata
12. Inflorescence subdense; each floral bract less than half covered by the one below it, its keel strongly curved.
13. Sepals 38 mm long. (V. petropolitana)...*V. heterostachys
13. Sepals 27 mm long.....V. pinottii
- 15(1). Change Tillandsia monstrum to *Vriesea monstrum.
-

- 17(1). Change Tillandsia dubia to *Vriesea dubia.
- 26(1). V. pachyspatha is a synonym of *V. gladioliflora.
- 30(2). Scape-bracts bracteiform; none of the floral bracts acuminate.
- 30a. Posterior sepals carinate.....Tillandsia fendleri
- 30a. Posterior and anterior sepals all ecarinate and alike.
- 30b. Sepals lance-ovate, 15 mm long. Trinidad, Colombia, Peru.
*V. chrysostachys
- 30b. Sepals narrow, 27-40 mm long.....Tillandsia spp.

Subkey VI

- 6(1).floral bracts ecarinate.
- 6a. Leaf-blades rounded and long-apiculate, 13 mm wide; floral bracts even. Costa Rica.....V. apiculata
- 6a. Leaf-blades acuminate, 30 mm wide; floral bracts sulcate. Venezuela.....*V. sulcata
- 6(2).floral bracts carinate. Brazil.
- 6b. Leaf-blade acute; inflorescence acute.....V. biguassuensis
- 6b. Leaf-blade broadly rounded and apiculate; inflorescence rounded at apex.....*V. pallidiflora
- 19(1). Leaf-blades concolorous.
- 19a. Floral bracts about equaling the sepals. Cuba, Puerto Rico, Venezuela.....V. macrostachya
- 19a. Floral bracts much exceeding the sepals. Brazil.
*V. tijuana
- 28(2). Vriesea minarum is a synonym of *V. atro-purpurea.

Subkey VII

- 6(1). Floral bracts laterally compressed, sharply carinate. Brazil.
- 6a. Sepals slightly exerted.....V. retroflexa
- 6a. Sepals much shorter than the floral bracts...*V. agostiniana

Subkey VIII

- 8(1). Delete V. tuerckheimii from this part of the key because its scape-bracts are all imbricate.
- 21(2). Primary bracts much shorter than the sterile bases of the branches.
- 21a. Sepals thin, strongly nerved, especially when dry.
- 22a. Sepals 24 mm long. Colombia, Ecuador.....Tillandsia mima
- 22a. Sepals 10-12 mm long. Ecuador.
*Tillandsia marnier-lapostollei
- 21a. Sepals coriaceous, even.

- 23a. Floral bracts to 25 mm long, even. Trinidad, Guiana, Amazonian Brazil.....*V. amazonica
- 23a. Floral bracts 7-15 mm long, faintly nerved. Hispaniola.
V. tuerckheimii
- 29(1). Sepals acute. Brazil.
- 29a. Leaf-blades broadly rounded and apiculate; floral bracts 30-80 mm long, pale and slightly rugulose near apex.
V. longicaulis
- 29a. Leaf-blades attenuate; floral bracts to 23 mm long, concolorous.....*V. pereirae
- 30(1). Floral bracts about equaling or exceeding the sepals of at least the lowest flowers.
31. Floral bracts sharply carinate toward apex.
32. Sepals attenuate, 25-35 mm long; rhachis verrucose below each node; floral bracts acuminate. Costa Rica to Colombia, West Indies.....*V. ringens
32. Sepals obtuse or broadly rounded, 15-24 mm long.
33. Sepals nearly as broad as long; floral bracts 35-45 mm long. Salvador.....*V. cornus-cervi
33. Sepals narrow, about twice as long as wide. Brazil.
34. Floral bracts bright purple; primary bracts shorter than the bracteate sterile bases of the branches.
V. brusquensis
34. Floral bracts green; primary bracts exceeding the naked sterile bases of the branches.....*V. pabstii
31. Floral bracts obscurely if at all carinate.
35. Sterile bases of the branches naked; floral bracts scarcely if at all secund.
36. Sepals obovate, 25 mm long. Ecuador..*Tillandsia cucullata
36. Sepals elliptic, 17 mm long. Costa Rica....*V. camptoclada
35. Sterile bases of the branches bracteate.
37. Floral bracts thin, nerved. Colombia, Ecuador.
Tillandsia secunda
37. Floral bracts coriaceous or subcoriaceous, even.
38. Leaves subrounded and apiculate, finely purple-spotted toward base. Mexico.....*V. breedloveana
38. Leaves attenuate at apex.
39. Floral bracts obscurely carinate, more or less secund with the flowers, mostly broadly ovate. Mexico to Costa Rica.....*V. werckleana
39. Floral bracts broadly and evenly convex, ecarinate, not at all secund, suborbicular.
40. Primary bracts much larger than the floral bracts; inflorescence much branched. Costa Rica.
V. kupperiana
40. Primary bracts scarcely larger than the floral bracts; inflorescence few-branched. Colombia.....*V. confusa
- 40(1). Branches with naked sterile bases, 5-8-flowered. Brazil.
- 40a. Leaves broadly acute and apiculate; sepals little exceeding

- the floral bracts.....V. penduliflora
 40a. Leaves attenuate at apex; sepals much exceeding the floral
 bracts.....*V. quarteaana
 42(1). contradicts 30(2). Therefore delete V. werckleana and V.
kupperiana which are inserted above under 30(1).
 47(2). Leaves covered on both sides with appressed brown-centered
 scales.
 47a. Sheaths green, concolorous with the blades.....V. cearensis
 47a. Sheaths dark castaneous.....*V. saxicola

Subkey IX

- 4(1). Floral bracts acute.
 4a. Leaf-blades ligulate, acuminate, over 30 mm wide. Guatemala
V. pectinata
 4a. Leaf-blades very narrowly triangular, 12 mm wide. Amazonian
 Brazil.....*V. mitoura
 8(1). Floral bracts becoming secund with the flowers.
 8a. Sepals 35 mm long, twice as long as wide. Guyana.
V. pachychlamys
 8a. Sepals 22 mm long, broadly elliptic. Costa Rica.
*V. burgeri
 23(2). Sepals to 35 mm long.
 23a. Leaf-blades ligulate, acuminate; sepals coriaceous. Cuba.
V. haplostachya
 23a. Leaf-blades very narrowly triangular; sepals chartaceous,
 nerved. Venezuela.....*V. wurdackii
 28(1). Scape-bracts, or at least the upper ones, shorter than
 the internodes; sepals much exceeding the floral bracts.
 29. Leaf-blades narrowly triangular, attenuate; floral bracts
 rounded, obtuse or apiculate.
 30. Leaf-sheaths small, pale, scarcely distinct, strongly
 nerved. Venezuela.....V. fibrosa
 30. Leaf-sheaths large, castaneous, conspicuous, even. Brazil.
 31. Rhachis flexuous, 2 mm thick; floral bracts much shorter
 than the internodes.....*V. lima
 31. Rhachis geniculate, 3-4 mm thick; floral bracts equaling
 or exceeding the internodes.
 32. Upper scape-bracts much shorter than the internodes;
 floral bracts 1-1.5 times as long as the internodes.
V. brassicoides
 32. Upper scape-bracts but slightly shorter than the inter-
 nodes; floral bracts nearly 2 times the internodes.
*V. goniorachis
 29. Leaf-blades ligulate, acute or rounded and apiculate.
 33. Sepals to 40 mm long, suboblong; leaf-blades 60-70 mm wide;
 floral bracts ecarinate. Colombia.....V. socialis

33. Sepals 18-28 mm long, elliptic; leaf-blades 25-35 mm wide. Brazil.
34. Leaf-blades ligulate, 25 mm wide, broadly rounded and apiculate.....V. platzmannii
34. Leaf-blades narrowly lance-triangular, 35 mm wide, subacute and long-apiculate.....*V. lancifolia
- 36(1). Floral bracts fleshy-coriaceous. Brazil.
- 36a. Rhachis flexuous, slender.....V. oligantha
- 36a. Rhachis geniculate, 3-4 mm thick.....*V. goniorachis
- 39(1). Leaf-blades broadly rounded and apiculate.
- 39a. Floral bracts remaining erect or nearly so; leaf-blades obscurely punctulate-lepidote beneath. Brazil. V. unilateralis
- 39a. Floral bracts becoming secund with the flowers; leaf-blades strikingly white-lepidote beneath. Costa Rica. *V. dodsonii

Subkey X

- 7(2). Branches elongate, the lower ones 2-flowered. Costa Rica.
- 7a. Primary bracts very broadly ovate.....V. crassiflora
- 7a. Primary bracts long-attenuate from an ovate base. *V. hainesiorum
- 28(1). Scape erect; sepals....., 12-20 mm long.
- 28a. Sepals narrow, fleshy, dark and finely rugose when dry. Costa Rica.....*V. sarcolepis
- 28a. Sepals broadly elliptic. Guatemala, Honduras.....V. montana
Costa Rica.....V. irazuensis
- 32(1). V. attenuata is a synonym of *V. gladioliflora.
- 34(2). Sepals 17 mm long, suborbicular or elliptic.
- 34a. Leaf-sheaths pale; inflorescence dense; sepals suborbicular Costa Rica.....V. viridis
- 34a. Leaf-sheaths dark castaneous; inflorescence lax; sepals elliptic. Colombia.....*V. orjuelae
- 35(2). Delete V. hainesiorum from this part of the key because its branches are elongate. Cf. above under 7(2).

AGOSTINIANA E. Pereira, Bradea 1: 33. 1971.

AMAZONICA (Baker) Mez. Floral bracts much shorter than the sepals.

APPENII Rauh, Bromel. Soc. Bull. 19: 111, fig. (p. 110). 1969.

ATRO-PURPUREA Alv. Silv. Fl. Montium 2, Add.: 3, pl. 131, fig. 1. 1931. Tillandsia citrina Baker, Handb. Bromel. 224.

1889, non Burchell ex Baker, 1879. Vriesea citrina E. Morr. ex

Baker, Handb. Bromel. 224. 1889, nomen in synonym.; *ibid* (?), hortus, Rev. Hort. 77: 127. 1905, nomen. *V. minarum* L. B. Smith, Arq. Bot. S. Paulo II. 1: 118, pl. 126. 1943. *V. citrina* (Baker) L. B. Smith, Phytologia 21: 93. 1971.

BREEDLOVEANA L. B. Smith, sp. nov. A *V. werckleana* Mez, cui affinis, foliorum laminis subrotundatis apiculatisque base purpureo-maculatis differt.

PLANT known only from fragments but probably flowering nearly 2 m high. LEAVES to 38 cm long, laxly vestite with minute dark appressed scales throughout; sheaths ample, nearly concolorous with the blades; blades ligulate, subrounded and apiculate, 45 mm wide, green above, pale green beneath, finely purple-maculate toward base. SCAPE straight, 12 mm thick at apex, glabrous at least with age; scape-bracts (upper) erect, imbricate, broadly ovate. INFLORESCENCE laxly bipinnate, glabrous at least with age; primary bracts like the upper scape-bracts, cuspidate-acuminate, shorter than the bracteate sterile bases of the branches; branches curved-spreading, to 45 cm long, densely secund-flowered; rachis flexuous, narrowly alate. FLORAL BRACTS secund with the flowers, broadly ovate-triangular, obtuse, obtusely carinate, 3 cm long, exceeding the sepals and more than twice as long as the internodes, coriaceous, even, pale brown; pedicels stout. SEPALS broadly elliptic, obtuse, 2 cm long, coriaceous, even, ecarinate. CAPSULE stout, acute, beaked, 25 mm long. Pl. I.

MEXICO: Chiapas: Mun. Zinacantan: Steep cliff along Mexican Highway 190 in the Zinacantan paraje of Navenchank, alt. 2100 m, 29 August 1966, D. E. Breedlove 15438 (US, type).

BURGERI L. B. Smith, sp. nov. A *V. pachychlamyde* Mez, cui valde affinis, sepalis multo minoribus late ellipticis differt.

PLANT flowering 45 cm high. LEAVES 25 cm long, covered on both sides with bright white, dark-centered scales; sheaths broadly elliptic, ca. 9 cm long; blades ligulate, broadly rounded and apiculate, 3 cm wide, green above, more or less tinged with purple beneath. SCAPE erect, stout; scape-bracts tightly imbricate, elliptic, broadly acute and apiculate, coriaceous, rugulose when dry. INFLORESCENCE simple, dense, few-flowered, 10 cm long. FLORAL BRACTS distichous, becoming secund with the flowers, broadly ovate, subacute and cucullate, 35 mm long, exceeding the sepals and more than twice as long as the internodes, ecarinate, coriaceous, obscurely punctulate, rugulose when dry. SEPALS broadly elliptic, rounded at apex, 22 mm long, coriaceous; petals and stamens unknown. Pl. II.

COSTA RICA: Puntarenas: Epiphytic, forested land between Río Coton and Río Negro (about 15 km from Sabalito) near Las Alturas lumber camp, 8° 53' N, 82° 54' W, alt. 1200-1300 m, 17-18 January 1967, W. Burger & G. Matta U. 4583 (US, type; F, isotype).

CACUMINIS L. B. Smith, Phytologia 16: 79, pl. 1, fig. 25, 26. 1968.

CHRYSOSTACHYS E. Morr. Inflorescence simple or compound.

COWELLII (Mez & N. L. Britton) L. B. Smith, Phytologia 16: 80.

1968. Tillandsia cowellii Mez & N. L. Britton, Bull. Herb. Boiss. II. 3: 225. 1903. Vriesea egregia L. B. Smith, Phytologia 4: 355, pl. 1, fig. 4-6. 1953.
- DODSONII L. B. Smith, Phytologia 16: 80, pl. 2, fig. 1, 2. 1968.
- DUARTEANA L. B. Smith, Phytologia 16: 80, pl. 2, fig. 3-5. 1968.
- DUBIA (L. B. Smith) L. B. Smith, Phytologia 15: 197. 1967. Tillandsia dubia L. B. Smith, Phytologia 5: 284, pl. 2, fig. 4, 5. 1955.
- ESPINOSAE (L. B. Smith) Gilmartin, Phytologia 16: 163. 1968. Tillandsia espinosae L. B. Smith, Contr. U. S. Nat. Herb. 29: 498, fig. 65d, e. 1951.
- GLADIOLIFLORA (Wendland) Antoine, Wiener, Ill. Gart. 5: 98, pl. 1. 1880. Tillandsia gladioliflora Wendland, Hamb. Gartenzeit. 19: 31. 1863. Vriesea pachyspatha Mez & Wercklé, Bull. Herb. Boiss. II. 4: 867. 1904.
- GONIORACHIS (Baker) Mez. Flowers tardily secund.
- HAINESIORUM L. B. Smith. Branches with naked, slender, sterile base 8 mm long.
- HETERANDRA (André) L. B. Smith, Contr. U. S. Nat. Herb. 29: 443. 1951. Tillandsia heterandra André, Enum. Bromel. 7. 13 Dec 1888; Rev. Hort. 60: 567. 16 Dec 1888. T. lacera L. B. Smith, Fieldiana Bot. 28: 150, fig. 22 d-f. 1951. Vriesea lacera (L. B. Smith) L. B. Smith, Fieldiana Bot. 28: 831. 1957.
- HETEROSTACHYS (Baker) L. B. Smith, Phytologia 19: 289. 1970. Vriesea incurvata sensu E. Morr. Belg. Hortic. 32: 52, pl. 2. 1882, non Gaud. 1843, based on Binot s n. Tillandsia inflata Baker, Bot. Mag. 112: pl. 6882. 1886, as to Binot material but not as to basionym of Wawra. T. heterostachys Baker, Journ. Bot. 26: 106. Mar 1888. Vriesea petropolitana L. B. Smith, Arq. Bot. S. Paulo II. 1: 120, pl. 130. 1943.
- INCURVA (Grisebach) R. W. Read, Phytologia 16: 458. 1968. Tillandsia incurva Grisebach in Nachr. Ges. Wiss. Goett. "1864": 15. 1865.
- KUPPERIANA Suessenguth. Floral bracts about equaling the sepals.
- LANCIFOLIA (Baker) L. B. Smith. Flowers becoming secund.
- LIMAE L. B. Smith, Phytologia 20: 181, pl. 2, fig. 17, 18. 1970.
- MAGUIREI L. B. Smith, Mem. N. Y. Bot. Gard. 18, pt. 2: 32, fig. 5 f-h. 1969.
- MALZINEI E. Morr. var. DISTICHA L. B. Smith, Phytologia 22: 87, fig. 8. 1971. Flowers distichous.
- MITOURA L. B. Smith, Mem. N. Y. Bot. Gard. 18, pt. 2: 32, fig. 5 i-k. 1969.
- MONSTRUM (Mez) L. B. Smith, Phytologia 16: 81. 1968. Tillandsia monstrum Mez, Fedde Rep. Spec. Nov. 16: 78. 1919.
- ORJUELAE L. B. Smith, Phytologia 16: 81, pl. 2, fig. 6-8. 1968.
- PABSTII McWilliams & Smith, Bromel. Soc. Bull. 20: 54, fig. 1-5. 1970.

PALLIDIFLORA E. Pereira, *Rodriguesia* 26, no. 38: 117, pl. 7, 8. 1971.

PATULA (Mez) L. B. Smith. Inflorescence also digitate.

PEREIRAE L. B. Smith, *Phytologia* 16: 82, pl. 2, fig. 9-11. 1968.

PETRAEA (L. B. Smith) L. B. Smith, *Phytologia* 20: 168. 1970.

Tillandsia petraea L. B. Smith, *Contr. U. S. Nat. Herb.* 29: 497, fig. 65 a-c. 1951.

RUBYAE E. Pereira, *Rodriguesia* 26, no. 38: 115, pl. 5. 1971.

SAGASTEGUII L. B. Smith, *Phytologia* 16: 82, pl. 2, fig. 12, 13. 1968.

SARCOLEPIS L. B. Smith, sp. nov. A V. montana (L. B. Smith) L. B. Smith & Pittendrigh et V. irazuensis (Mez & Wercklé) L. B. Smith & Pittendrigh, quibus affinis, sepalis angustis carnosis ex sicco atris et minute rugosis differt.

PLANT flowering 7 dm high. LEAVES numerous, rosulate, suberect, over 25 cm long, obscurely lepidote; sheaths elliptic, ca. 10 cm long, dark castaneous toward base; blades subligulate, acute, ca. 25 mm wide, marked with fine wavy transverse lines. SCAPE erect, slender; scape-bracts erect, closely involute, exceeding the internodes, ovate, acute. INFLORESCENCE laxly bipinnate, 13 cm long; axis slender, nearly straight; primary bracts spreading, broadly ovate, acute and apiculate, to 5 cm long; branches aborted; flowers 2 at each node. FLORAL BRACTS elliptic, obtuse, ca. 1 cm long. SEPALs slightly asymmetric, elliptic, obtuse, 20 mm long, fleshy, dark and minutely rugulose when dry; petals elliptic, obtuse, 45 mm long; stamens included. Pl. III.

COSTA RICA: Alajuela: Terrestrial, wet montane forest, Volcán Poas, alt. 2525 m, 13 Aug 1964, M. F. Tessene 1580 (WIS, type).

SAXICOLA L. B. Smith, *Phytologia* 16: 83, pl. 2, fig. 14-15. 1968.

STENOPHYLLA (Mez & Wercklé) L. B. Smith & Pittendrigh, *Journ. Wash. Acad. Sci.* 43: 403. 1953. Thecophyllum stenophyllum Mez & Wercklé, *Bull. Herb. Boiss.* II. 4: 875. 1904. T. acuminatum L. B. Smith, *Contr. Gray Herb.* 117: 30, pl. 2, fig. 28, 29. 1937, not Vriesea acuminata Mez & Wercklé, 1904. V. attenuata L. B. Smith & Pittendrigh, *Journ. Wash. Acad. Sci.* 43: 401. 1953, nom. nov.

SULCATA L. B. Smith. Leaf-blade narrowly subtriangular, the sides slightly outcurved.

TIJUCANA E. Pereira, *Rodriguesia* 26, no. 38: 116, pl. 6. 1971.

TUERCKHEIMII (Mez) L. B. Smith. Scape-bracts all imbricate.

UMBROSA L. B. Smith, sp. nov. A V. ranifera L. B. Smith, cui affinis, foliorum laminis angustioribus omnino viridibus, scapi bracteis attenuatis, bracteis florigeris sepalisque multo minoribus differt.

PLANT flowering over 7 dm high. LEAVES over 7 dm long, dark green; sheaths elliptic, covered with white appressed dark-centered scales; blades ligulate, acute, cuspidate-thickened, 5 cm wide, soon glabrous. SCAPE erect, slender; scape-bracts

Imbricate, the lower subfoliaceous, the upper ovate, attenuate. INFLORESCENCE narrowly cylindrical, 15 cm long, laxly bipinnate; axes slender, obscurely lepidote; primary bracts broadly ovate, acuminate with a thickened apex, about equaling or shorter than the axillary branches, obscurely lepidote; branches suberect, lax, to 5-flowered with the terminal one usually much reduced, slender, geniculate, the sterile base short, naked. FLORAL BRACTS suborbicular, 10 mm long, ecarinate, coriaceous, even, glabrous; pedicels obconical, 5 mm long. SEPALS suborbicular, 12 mm long, coriaceous, even, glabrous; petals 30 mm long, pale greenish white; stamens included. Plate IV.

COSTA RICA: San José: on Inga in deep shade, wooded area near the escarpment with frequent wind and rain from the Caribbean, La Palma area, northeast of San Jeronimo, above the La Hondura valley, 10° 2' N, 84° 0' W, alt. 1500 m, 27 May - 1 June 1968, W. C. Burger & R. G. Stolze 5333 (US, type; F, isotype).

VIDALII L. B. Smith & Handro, *Phytologia* 19: 289, pl. 1, fig. 22-24. 1970.

WERCKLEANA Mez. Floral bracts about equaling the sepals.

WURDACKII L. B. Smith, *Phytologia* 16: 83, pl. 2, fig. 16, 17. 1968.

ZAMORENSIS (L. B. Smith) L. B. Smith, *Phytologia* 20: 174. 1970. Tillandsia zamorensis L. B. Smith, *Phytologia* 4: 213, pl. 1, fig. 3-5. 1953.

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

Plate I



2186-22

Vriesea breedloveana L. B. Smith

Plate II



45-3 COSCA RICA
Vriesea burgeri L. B. Smith
 Epiphyte on a fallen tree probably about 10m
 high at first, fruit becoming brown.

2566197

NATIONAL HERBARIUM

Vriesea burgeri L. B. Smith

Plate III



Vriesea sarcolepis L. B. Smith

Plate IV



TYR.

COSTA RICA

533

Vriesea pedicellata (Weber) Smith

428 x 1.5 mm 1963

Epiphytic, on tree in open place, with
rain forest on edge, stream by forest

UNITED STATES
2566199
NATIONAL HERBARIUM

Vriesea umbrosa L. B. Smith

New Combinations in the Lichen Genus *Parmotrema* Massalongo

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One of the first generic segregates of the large genus *Parmelia*, *Parmotrema* Massalongo, typified by *P. perforatum* (Jacq.) Mass., includes all of the species now classified in *Parmelia* subgenus *Amphigymnia* (Hale, M. E., Contr. U.S. Nat. Herb. 36:193-358. 1965). It is characterized by broad, apically rotund lobes, usually with a distinct bare rim below at the margins. Rhizines are simple and often sparse. Apothecia are usually substipitate to stalked and rather frequently perforate. All species have palisade plectenchyma in the upper cortex and a pored epicortex (Hale, M. E., Smithsonian Contr. Bot. 10:9. 1973). Given this circumscription we are probably justified in including here also the species now classified in *Parmelia* subgenus *Parmelia* section *Irregulares*, the *P. reticulata* group, which while broad lobed, have more dense, simple to rarely squarrose rhizines to or very near the margins below.

- Parmotrema abessinicum* (Krempf.) Hale, comb. nov. Basionym: *Parmelia abessinica* Krempf. Linnaea 41:140. 1877.
- Parmotrema abnuens* (Nyl.) Hale, comb. nov. Basionym: *Parmelia abnuens* Nyl. Flora 68:610. 1885.
- Parmotrema affluens* (Hale) Hale, comb. nov. Basionym: *Parmelia affluens* Hale, Phytol. 22:141. 1971.
- Parmotrema aldabrense* (Dodge) Hale, comb. nov. Basionym: *Parmelia aldabrensis* Dodge, Ann. Mo. Bot. Gard. 46:160. 1959.
- Parmotrema amboimense* (Dodge) Hale, comb. nov. Basionym: *Parmelia amboimensis* Dodge, Ann. Mo. Bot. Gard. 46:158. 1959.
- Parmotrema andinum* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia andina* Müll. Arg., Rev. Mycol. 1:169. 1879.
- Parmotrema appendiculatum* (Fée) Hale, comb. nov. Basionym: *Parmelia appendiculata* Fée, Ess. Crypt. Suppl. 118. 1837.
- Parmotrema araucariarum* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia araucariarum* Zahlbr., Denkschr. Akad. Wiss. Math. Naturw. Wien 83:179. 1909.
- Parmotrema argentinum* (Krempf.) Hale, comb. nov. Basionym: *Parmelia argentina* Krempf., Flora 61:476. 1878.

- Parmotrema arnoldii* (DR.) Hale, comb. nov. Basionym: *Parmelia arnoldii* DR., *Nyt Mag. Naturv.* 62:80. 1924.
- Parmotrema austrosinense* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia austrosinensis* Zahlbr., *Symb. Sin.* 3:192. 1930.
- Parmotrema bangii* (Vain.) Hale, comb. nov. Basionym: *Parmelia bangii* Vain. *Bot. Tidsskr.* 29:104. 1909.
- Parmotrema breviciliatum* (Hale) Hale, comb. nov. Basionym: *Parmelia breviciliata* Hale, *Contr. U.S. Nat. Herb.* 36:282. 1965.
- Parmotrema cetratum* (Ach.) Hale, comb. nov. Basionym: *Parmelia cetrata* Ach. *Syn. Lich.* 198. 1814.
- Parmotrema chiapense* (Hale) Hale, comb. nov. Basionym: *Parmelia chiapensis* Hale, *Contr. U.S. Nat. Herb.* 36:323. 1965.
- Parmotrema commensuratum* (Hale) Hale, comb. nov. Basionym: *Parmelia commensurata* Hale, *Phytol.* 22:31. 1971.
- Parmotrema compositum* (Hale) Hale, comb. nov. Basionym: *Parmelia composita* Hale, *Phytol.* 23:343. 1972.
- Parmotrema conformatum* (Vain.) Hale, comb. nov. Basionym: *Parmelia conformata* Vain. *Acta Soc. Faun. Fl. Fenn.* 7(7):36. 1890.
- Parmotrema coralliforme* (Hale) Hale, comb. nov. Basionym: *Parmelia coralliformis* Hale, *Contr. U.S. Nat. Herb.* 36:324. 1965.
- Parmotrema corniculans* (Nyl.) Hale, comb. nov. Basionym: *Parmelia corniculans* Nyl. *Flora* 68:607. 1885.
- Parmotrema cornuta* (Lyng.) Hale, comb. nov. Basionym: *Parmelia cornuta* Lyng., *Ark. Bot.* 13(13):76. 1914.
- Parmotrema crassescens* (Stirt.) Hale, comb. nov. Basionym: *Parmelia crassescens* Stirt., *Royal Phil. Soc. Glasgow Proc.* 10:161. 1877.
- Parmotrema cristatum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia cristata* Nyl. *Flora* 52:291. 1869.
- Parmotrema cristiferum* (Tayl.) Hale, comb. nov. Basionym: *Parmelia cristifera* Tayl. *London Journ. Bot.* 6:165. 1847.
- Parmotrema crocoides* (Hale) Hale, comb. nov. Basionym: *Parmelia crocoides* Hale, *Contr. U.S. Nat. Herb.* 36:244. 1965.
- Parmotrema cryptoxanthum* (des Abbayes) Hale, comb. nov. Basionym: *Parmelia cryptoxantha* des Abbayes, *Mem. Inst. Sci. Madagascar* 10:115. 1961.
- Parmotrema defectum* (Hale) Hale, comb. nov. Basionym: *Parmelia defecta* Hale, *Contr. U.S. Nat. Herb.* 36:244. 1965.
- Parmotrema delicatulum* (Vain.) Hale, comb. nov. Basionym: *Parmelia delicatula* Vain. *Acta Soc. Faun. Fl. Fenn.* 7(7):35. 1890.
- Parmotrema diacidulum* (Hale) Hale, comb. nov. Basionym: *Parmelia diacidula* Hale, *Contr. U.S. Nat. Herb.* 36:287. 1965.
- Parmotrema diffractaicum* (Essl.) Hale, comb. nov. Basionym: *Parmelia diffractaica* Essl. *Bryol.* 75:80. 1972.
- Parmotrema dilatatum* (Vain.) Hale, comb. nov. Basionym: *Parmelia dilatata* Vain. *Acta Soc. Faun. Fl. Fenn.* 7(7):33. 1890.
- Parmotrema direagens* (Hale) Hale, comb. nov. Basionym: *Parmelia direagens* Hale, *Contr. U.S. Nat. Herb.* 36:288. 1965.

- Parmotrema disparile* (Nyl.) Hale, comb. nov. Basionym: *Parmelia disparilis* Nyl. Syn. Lich. 1:381. 1860.
- Parmotrema diversum* (Hale) Hale, comb. nov. Basionym: *Parmelia diversa* Hale, Phytol. 27:1. 1973.
- Parmotrema dolosum* (des Abbayes) Hale, comb. nov. Basionym: *Parmelia dolosa* des Abbayes, Mem. Inst. Sci. Madagascar, ser. B, 10:115. 1961.
- Parmotrema dominicanum* (Vain.) Hale, comb. nov. Basionym: *Parmelia dominicana* Vain. Journ. Bot. Brit. & For. 34:32. 1896.
- Parmotrema eborinum* (Hale) Hale, comb. nov. Basionym: *Parmelia eborina* Hale, Contr. U.S. Nat. Herb. 36:249. 1965.
- Parmotrema eciliatum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia crinita* var. *eciliata* Nyl. Flora 52:291. 1869.
- Parmotrema endosulphureum* (Hillm.) Hale, comb. nov. Basionym: *Parmelia tinctorum* var. *endosulphurea* Hillm. Repert. Sp. Nov. Fedde 48:8. 1940.
- Parmotrema erasmi* (Hale) Hale, comb. nov. Basionym: *Parmelia erasmia* Hale, Contr. U.S. Nat. Herb. 36:290. 1965.
- Parmotrema eunetum* (Stirt.) Hale, comb. nov. Basionym: *Parmelia euneta* Stirton, Scot. Nat. 4:298. 1877-78.
- Parmotrema eurysacum* (Hue) Hale, comb. nov. Basionym: *Parmelia eurusaca* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:194. 1899.
- Parmotrema explanatum* (Hale) Hale, comb. nov. Basionym: *Parmelia explanata* Hale, Journ. Jap. Bot. 40:199. 1964.
- Parmotrema fasciculatum* (Vain.) Hale, comb. nov. Basionym: *Parmelia fasciculata* Vain. Hedwigia 38:122. 1899.
- Parmotrema flavescens* (Krempfh.) Hale, comb. nov. Basionym: *Parmelia glaberrima* var. *flavescens* Krempfh. Flora 52:223. 1869.
- Parmotrema flavotinctum* (Hale) Hale, comb. nov. Basionym: *Parmelia flavotincta* Hale, Contr. U.S. Nat. Herb. 36:291. 1965.
- Parmotrema fractum* (Hale) Hale, comb. nov. Basionym: *Parmelia fracta* Hale, Contr. U.S. Nat. Herb. 36:292. 1965.
- Parmotrema glaucocarpoides* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia glaucocarpoides* Zahlbr. Cat. Lich. Univ. 6:167. 1929.
- Parmotrema grayanum* (Hue) Hale, comb. nov. Basionym: *Parmelia grayana* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:184. 1899.
- Parmotrema hababiana* (Gyel.) Hale, comb. nov. Basionym: *Parmelia hababiana* Gyel. Repert. Sp. Nov. Fedde 29:298. 1931.
- Parmotrema haitiense* (Hale) Hale, comb. nov. Basionym: *Parmelia haitiensis* Hale, Bryol. 62:20. 1959.
- Parmotrema hanningtonianum* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia hanningtoniana* Müll. Arg. Flora 73:339. 1890.
- Parmotrema hololobum* (Hale) Hale, comb. nov. Basionym: *Parmelia hololoba* Hale, Contr. U.S. Nat. Herb. 36:293. 1965.
- Parmotrema homotomum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia homotoma* Nyl. Flora 68:613. 1885.
- Parmotrema hypoleucinum* (Stein.) Hale, comb. nov. Basionym: *Parmelia hypoleucina* Stein. Öster. Bot. Zeitschr. 67:282. 1918.

- Parmotrema hypotropum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia hypotropa* Nyl. Syn. Lich. 379. 1860.
- Parmotrema inexpectatum* (des Abb.) Hale, comb. nov. Basionym: *Parmelia inexpectata* des Abb. Bull. Inst. Fr. Afr. Noire 20:16. 1958.
- Parmotrema insuetum* (Kurok.) Hale, comb. nov. Basionym: *Parmelia insueta* Kurok. Bull. Nat. Sci. Mus. Tokyo 10:371. 1967.
- Parmotrema latissimum* (Fée) Hale, comb. nov. Basionym: *Parmelia latissima* Fée, Ess. Crypt. Suppl. 119. 1837.
- Parmotrema leucosemohetum* (Hue) Hale, comb. nov. Basionym: *Parmelia leucosemoheta* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:192. 1899.
- Parmotrema lobulascens* (Stein.) Hale, comb. nov. Basionym: *Parmelia lobulascens* Stein. Verh. Zool. Bot. Gesell. Wien 53:234. 1903.
- Parmotrema lophogenum* (des Abb.) Hale, comb. nov. Basionym: *Parmelia lophogena* des Abb. Bull. Inst. Fr. Afr. Noire 20:19. 1958.
- Parmotrema louisianae* (Fée) Hale, comb. nov. Basionym: *Parmelia louisianae* Hale, Phytol. 22:92. 1971.
- Parmotrema maclayanum* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia maclayana* Müll. Arg. Flora 74:376. 1891.
- Parmotrema macrocarpum* (Pers.) Hale, comb. nov. Basionym: *Parmelia macrocarpa* Pers. in Gaudichaud, Voy. Uranie, 197. 1826.
- Parmotrema madagascariacea* (Hue) Hale, comb. nov. Basionym: *Parmelia caperata* var. *madagascariacea* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:181. 1899.
- Parmotrema margaritatum* (Hue) Hale, comb. nov. Basionym: *Parmelia margaritata* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:193. 1899.
- Parmotrema melanothrix* (Mont.) Hale, comb. nov. Basionym: *Parmelia urceolata* var. *melanothrix* Mont. Ann. Sci. Nat. Bot ser. 2, 2:372. 1834.
- Parmotrema mellissii* (Dodge) Hale, comb. nov. Basionym: *Parmelia mellissii* Dodge, Ann. Mot. Bot. Gard. 46:134. 1959.
- Parmotrema merrillii* (Vainio) Hale, comb. nov. Basionym: *Parmelia merrillii* Vainio, Phil. Journ. Sci. 4:658. 1909.
- Parmotrema mesogenes* (Nyl.) Hale, comb. nov. Basionym: *Parmelia mesogenes* Nyl. Flora 68:609. 1885.
- Parmotrema mestropum* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia mesotropa* Müll. Arg. Rev. Mycol. 10:55. 1888.
- Parmotrema michauxianum* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia michauxiana* Zahlbr. Cat. Lich. Univ. 244. 1929.
- Parmotrema mirandum* (Hale) Hale, comb. nov. Basionym: *Parmelia miranda* Hale, Contr. U.S. Nat. Herb. 36:273. 1965.
- Parmotrema mordenii* (Hale) Hale, comb. nov. Basionym: *Parmelia mordenii* Hale, Smithsonian Contr. Bot. 4:19. 1971.
- Parmotrema myelochroum* (Hale) Hale, comb. nov. Basionym: *Parmelia myelochroa* Hale, Contr. U.S. Nat. Herb. 36:256. 1965.
- Parmotrema natalense* (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia natalensis* Stein. & Zahlbr. Bot. Jahrb. Engler 60:515. 1926.

- Parmotrema nilgherrense* (Nyl.) Hale, comb. nov. Basionym: *Parmelia nilgherrensis* Nyl. Flora 52:291. 1869.
- Parmotrema ochroglaucum* (Hale) Hale, comb. nov. Basionym: *Parmelia ochroglauca* Hale, Contr. U.S. Nat. Herb. 36:274. 1965.
- Parmotrema ornatulum* (Hale) Hale, comb. nov. Basionym: *Parmelia ornatula* Hale, Contr. U.S. Nat. Herb. 36:299. 1965.
- Parmotrema pachysporum* (Hale) Hale, comb. nov. Basionym: *Parmelia pachyspora* Hale, Contr. U.S. Nat. Herb. 36:299. 1965.
- Parmotrema pancheri* (Hue) Hale, comb. nov. Basionym: *Parmelia pancheri* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:202. 1899.
- Parmotrema paradoxum* (Hale) Hale, comb. nov. Basionym: *Parmelia paradoxa* Hale, Phytol. 27:1. 1973.
- Parmotrema parahypotropum* (Culb.) Hale, comb. nov. Basionym: *Parmelia parahypotropa* Culb. Bryol. 76:29. 1973.
- Parmotrema paulense* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia paulensis* Zahlbr. Denkschr. Akad. Wiss. Naturw. Wien 83:175. 1909.
- Parmotrema peralbidum* (Hale) Hale, comb. nov. Basionym: *Parmelia albidula* Hale, Contr. U.S. Nat. Herb. 36:257. 1965.
- Parmotrema permutatum* (Stirt.) Hale, comb. nov. Basionym: *Parmelia permutata* Stirt. Scot. Nat. 4:252. 1877-78.
- Parmotrema planatilobatum* (Hale) Hale, comb. nov. Basionym: *Parmelia planatilobata* Hale, Journ. Jap. Bot. 40:200. 1964.
- Parmotrema praesorediosum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia praesorediosa* Nyl. Sert. Lich. Trop. Labuan Singapore 18. 1891.
- Parmotrema preperforatum* (Culb.) Hale, comb. nov. Basionym: *Parmelia preperforata* Culb. Bryol. 76:27. 1973.
- Parmotrema procerum* (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia procera* Stein. & Zahlbr. Bot. Jahrb. Engler 60:537. 1926.
- Parmotrema pseudocrinitum* (des Abb.) Hale, comb. nov. Basionym: *Parmelia pseudocrinita* des Abb. Bull. Inst. Fr. Afr. Noire 20:19. 1958.
- Parmotrema pseudoreticulatum* (Tavares) Hale, comb. nov. Basionym: *Parmelia pseudoreticulata* Tavares, Acta Port. Biol. 1B:138. 1945.
- Parmotrema pseudotinctorum* (des Abb.) Hale, comb. nov. Basionym: *Parmelia pseudotinctorum* des Abb. Bull. Inst. Fr. Afr. Noire 13:973. 1951.
- Parmotrema rampoddense* (Nyl.) Hale, comb. nov. Basionym: *Parmelia rampoddensis* Nyl. Acta Soc. Sci. Fenn. 26(10):7. 1900.
- Parmotrema ramusculum* (Hale) Hale, comb. nov. Basionym: *Parmelia ramuscula* Hale, Contr. U.S. Nat. Herb. 36:261. 1965.
- Parmotrema recipiendum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia recipienda* Nyl. Flora 68:609. 1885.
- Parmotrema rigidum* (Lyng.) Hale, comb. nov. Basionym: *Parmelia rigida* Lyng., Ark. Bot. 13(13):50. 1914.
- Parmotrema rimulosum* (Dodge) Hale, comb. nov. Basionym: *Parmelia rimulosa* Dodge, Ann. Mo. Bot. Gard. 46:133. 1959.
- Parmotrema robustum* (Degel.) Hale, comb. nov. Basionym: *Parmelia robusta* Degel. Goth. Kungl. Vet. Vitterh. Samh. Handl. ser B, 7:33. 1941.

- Parmotrema rubifaciens* (Hale) Hale, comb. nov. Basionym: *Parmelia rubifaciens* Hale, Contr. U.S. Nat. Bot. Herb. 36:261. 1965.
- Parmotrema saccatilobum* (Tayl.) Hale, comb. nov. Basionym: *Parmelia saccatiloba* Tayl. London Journ. Bot. 6:174. 1847.
- Parmotrema sancti-angelii* (Lynge) Hale, comb. nov. Basionym: *Parmelia sancti-angelii* Lynge, Ark. Bot. 13(13):35. 1914.
- Parmotrema setchellii* (Vainio) Hale, comb. nov. Basionym: *Parmelia setchellii* Vainio, Univ. Calif. Publ. Bot. 12:5. 1924.
- Parmotrema simulans* (Hale) Hale, comb. nov. Basionym: *Parmelia simulans* Hale, Phytol. 22:32. 1971.
- Parmotrema soyouxii* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia soyouxii* Müll. Arg. Linnaea 9:32. 1880.
- Parmotrema spilotum* (Hale) Hale, comb. nov. Basionym: *Parmelia spilota* Hale, Phytol. 27:3. 1973.
- Parmotrema stuppeum* (Tayl.) Hale, comb. nov. Basionym: *Parmelia stuppea* Tayl. London Journ. Bot. 6:175. 1847.
- Parmotrema subarnoldii* (des Abb.) Hale, comb. nov. Basionym: *Parmelia subarnoldii* des Abb. Mem. Inst. Sci. Madagascar, ser. B, 10:113. 1961.
- Parmotrema subcaperatum* (Krempfh.) Hale, comb. nov. Basionym: *Parmelia subcaperata* Krempfh. Nat. For. Kjoeb. Vid. Medd. 1873:10. 1873.
- Parmotrema subcoloratum* (Hale) Hale, comb. nov. Basionym: *Parmelia colorata* Hale, Contr. U.S. Nat. Herb. 36:340. 1965.
- Parmotrema subcorallinum* (Hale) Hale, comb. nov. Basionym: *Parmelia subcorallina* Hale, Journ. Jap. Bot. 37:345. 1962.
- Parmotrema subisidiosum* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia cetrata* var. *subisidiosa* Müll. Arg. Bot. Jahrb. Engler 20:256. 1894.
- Parmotrema subrugatum* (Krempfh.) Hale, comb. nov. Basionym: *Parmelia subrugata* Krempfh. Verh. Zool. Bot. Gesell. Wien 18:320. 1868.
- Parmotrema subschimperii* (Hale) Hale, comb. nov. Basionym: *Parmelia subschimperii* Hale, Phytol. 23:345. 1972.
- Parmotrema subtinctorium* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia subtinctoria* Zahlbr. Symb. Sin. 3:193. 1930.
- Parmotrema sulphuratum* (Nees & Flot.) Hale, comb. nov. Basionym: *Parmelia sulphurata* Nees & Flot. Linnaea 9:501. 1835.
- Parmotrema tinctorum* (Nyl.) Hale, comb. nov. Basionym: *Parmelia tinctorum* Nyl. Flora 55:547. 1872.
- Parmotrema uberrimum* (Hue) Hale, comb. nov. Basionym: *Parmelia uberrima* Hue, Bull. Soc. Bot. Fr. Mem. 63:9. 1916.
- Parmotrema uruguense* (Krempfh.) Hale, comb. nov. Basionym: *Parmelia uruguensis* Krempfh. Flora 61:461. 1878.
- Parmotrema viridiflavum* (Hale) Hale, comb. nov. Basionym: *Parmelia viridiflava* Hale, Contr. U.S. Nat. Herb. 36:274. 1965.
- Parmotrema wainii* (A.L. Smith) Hale, comb. nov. Basionym: *Parmelia wainii* A.L. Smith, Journ. Linn. Soc. London Bot. 46:85. 1922.
- Parmotrema xanthinum* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia proboscidea* var. *xanthina* Müll. Arg. Flora 67:616. 1884.
- Parmotrema zollingeri* (Hepp) Hale, comb. nov. Basionym: *Parmelia zollingeri* Hepp in Zoll. Syst. Verz. 9. 1854.

Delimitation of the Lichen Genus *Hypotrachyna* (Vainio) Hale

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The genus *Hypotrachyna*, here proposed as new*, is an extremely homogeneous group of mainly tropical lichens formerly classified under *Parmelia* subgenus *Parmelia* section *Hypotrachyna* (Hale, M. E. and S. Kurokawa, Contr. U.S. Nat. Herb. 36:160. 1964). It is characterized by sublinear, often elongate, apically subtruncate lobes, adnate to rarely substipitate imperforate apothecia, and dichotomously branched rhizines uniformly distributed over the black lower surface. The upper cortex consists of palisade plectenchyma with a pored epicortex (Hale, M. E. Smithsonian Contr. Bot. 10:9. 1973). As so delimited the genus contains about 110 species occurring mainly at higher elevations in tropical regions. Seventy-seven species are known from tropical America and new combinations for these species are being made elsewhere (Hale, M. E. Smithsonian Contr. Bot., in press). Following are the species known from Africa and Asia and temperate America and Europe.

- Hypotrachyna addita* (Hale) Hale, comb. nov. Basionym: *Parmelia addita* Hale, Phytol. 22:433. 1971.
Hypotrachyna adducta (Nyl.) Hale, comb. nov. Basionym: *Parmelia adducta* Nyl. Flora 68:610. 1885.
Hypotrachyna adjuncta (Hale) Hale, comb. nov. Basionym: *Parmelia adjuncta* Hale, Phytol. 22:434. 1971.
Hypotrachyna bostrychodes (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia bostrychodes* Zahlbr. Ann. Crypt. Exot. 1:203. 1928.
Hypotrachyna citrella (Kurok.) Hale, comb. nov. Basionym: *Parmelia citrella* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:168. 1964.

**Hypotrachyna* (Vainio) Hale, stat. & comb. nov. Basionym: *Parmelia* section *Hypotrachyna* Vainio, Acta Soc. Fauna Flora Fenn. 7(7):38. 1890. Lectotype species: *Hypotrachyna brasiliiana* (Nylander) Hale (Basionym: *Parmelia brasiliiana* Nyl. Flora 68:611. 1885).

- Hypotrachyna crenata* (Kurok.) Hale, comb. nov. Basionym: *Parmelia crenata* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:168. 1964.
- Hypotrachyna exsecta* (Tayl.) Hale, comb. nov. Basionym: *Parmelia exsecta* Tayl. Lond. Journ. Bot. 6:166. 1847.
- Hypotrachyna fissicarpa* (Kurok.) Hale, comb. nov. Basionym: *Parmelia fissicarpa* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:175. 1964.
- Hypotrachyna flexilis* (Kurok.) Hale, comb. nov. Basionym: *Parmelia flexilis* Kurok. in Hara, The Flora of Eastern Himalaya, 607. 1966.
- Hypotrachyna incognita* (Kurok.) Hale, comb. nov. Basionym: *Parmelia incognita* Kurok. in Hara, The Flora of Eastern Himalaya, 608. 1966.
- Hypotrachyna ikomae* (Asah.) Hale, comb. nov. Basionym: *Parmelia ikomae* Asah. Journ. Jap. Bot. 28:134. 1953.
- Hypotrachyna infirma* (Kurok.) Hale, comb. nov. Basionym: *Parmelia infirma* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:179. 1964.
- Hypotrachyna keitauensis* (Asah.) Hale, comb. nov. Basionym: *Parmelia keitauensis* Asah. Journ. Jap. Bot. 26:293. 1951.
- Hypotrachyna kinabalensis* (Hale) Hale, comb. nov. Basionym: *Parmelia kinabalensis* Hale, Journ. Jap. Bot. 40:204. 1964.
- Hypotrachyna kingii* (Hale) Hale, comb. nov. Basionym: *Parmelia kingii* Hale, Journ. Jap. Bot. 43:324. 1968.
- Hypotrachyna leiophylla* (Kurok.) Hale, comb. nov. Basionym: *Parmelia leiophylla* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:179. 1964.
- Hypotrachyna longiloba* (Magn.) Hale, comb. nov. Basionym: *Parmelia longiloba* Magn. Ark. Bot. 30B(3):7. 1942.
- Hypotrachyna lividescens* (Kurok.) Hale, comb. nov. Basionym: *Parmelia lividescens* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:181. 1964.
- Hypotrachyna lythgoeana* (Dodge) Hale, comb. nov. Basionym: *Parmelia lythgoeana* Dodge, Ann. Mo. Bot. Garden 46:100. 1959.
- Hypotrachyna majoris* (Vainio) Hale, comb. nov. Basionym: *Parmelia majoris* Vainio, Hedw. 37:(33). 1898.
- Hypotrachyna massartii* (Hue) Hale, comb. nov. Basionym: *Parmelia massartii* Hue, Nouv. Arch. Mus. Paris, ser. 3, 1:168. 1899.
- Hypotrachyna nodakensis* (Asah.) Hale, comb. nov. Basionym: *Parmelia nodakensis* Asah. Journ. Jap. Bot. 34:266. 1959.
- Hypotrachyna orientalis* (Hale) Hale, comb. nov. Basionym: *Parmelia orientalis* Hale, Phytol. 22:435. 1971.
- Hypotrachyna revolutella* (Nyl.) Hale, comb. nov. Basionym: *Parmelia revolutella* Nyl. in Crombie, Journ. Linn. Soc. 16:222. 1878.
- Hypotrachyna rigidula* (Kurok.) Hale, comb. nov. Basionym: *Parmelia rigidula* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:184. 1964.
- Hypotrachyna scytodes* (Kurok.) Hale, comb. nov. Basionym: *Parmelia scytodes* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:185. 1964.

- Hypotrachyna scytophylla (Kurok.) Hale, comb. nov. Basionym: *Parmelia scytophylla* Kurok. in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:185. 1964.
- Hypotrachyna taylorensis (Mitch.) Hale, comb. nov. Basionym: *Parmelia taylorensis* Mitch. Revista Biol. 2:215. 1961.
- Hypotrachyna thryptica (Hale) Hale, comb. nov. Basionym: *Parmelia thryptica* Hale, Bryol. 75:99. 1972.
- Hypotrachyna virginica (Hale) Hale, comb. nov. Basionym: *Parmelia virginica* Hale in Hale & Kurokawa, Contr. U.S. Nat. Herb. 36:186. 1964.
- Hypotrachyna xanthoparmelioides (Hale) Hale, comb. nov. Basionym: *Parmelia xanthoparmelioides* Hale, Phytol. 23:346. 1972.

ADDITIONAL NOTES ON THE GENUS VERBENA. XXII

Harold N. Moldenke

VERBENA [Dorst.] L.

Additional & emended bibliography: Breyne, Prod. Fasc. Bar. Fl., ed. 2, 2: 104. 1739; C. Gay, Hist. Fis. Chile Bot. 5: 7-24, 26, & 28-31. 1849; Twining, Fl. Northeast. Penn. 60. 1917; Braun, Ecology 2: 177. 1921; S. Moore, Journ. Linn. Soc. Lond. Bot. 45: 375-378. 1921; Hanson, Am. Journ. Bot. 9: 331. 1922; Wangerin in Just, Bot. Jahresber. 49 (1): 521 & 522. 1928; Dole, Fl. Vt., ed. 3, 223-224. 1937; Hill & Salisb., Ind. New. Suppl. 10: 33 & 242. 1947; E. J. Salisb., Ind. New. Suppl. 11: 34, 101, & 262-263. 1953; R. W. Carleton, Ind. Common Names Herb. Pl., pr. 1, 17, 42, 60-62, 64, 66, 69, 73, 31, 92, 96, 100, 104-107, 116, 120, & 125 (1959) and pr. 2, 17, 42, 60-62, 64, 66, 69, 73, 81, 92, 96, 100, 104-107, 116, 120, & 125. 1962; Fiehl, Mich. Bot. 4: 81. 1965; Duncan & Stuckey, Mich. Bot. 9: 183 & 190, table 6. 1970; Musselman, Cochrane, Rice, & Rice, Lich. Bot. 10: 183-184. 1971; R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2301-2303. 1972; Fong, Trojánkova, Trijánek, & Farnsworth, Lloydia 39: 117. 1972; Rigual Magallon, Fl. & Veg. Prov. Alicant. 341. 1972; Anon., Biol. Abstr. 56 (6): B.A.S.I.C. S.190, S.256, S.279, & S. 281. 1973; Moldenke, Biol. Abstr. 56: 3000. 1973; Barans, Castanea 39: 31. 1974; Hocking, Excerpt. Bot. A.23: 290, 291, & 293. 1974; Nohlenbrock & Voigt, Fl. South. Ill. 286-287 & 389. 1974; Moldenke, Phytologia 28: 241-264. 1974.

Breyneus (1739) describes several purported species of Verbena whose exact identity has not yet been determined. These are:

"VERBENA vulgaris folio variegato; nobis In Horto Honestissimae Sapientissimaeque Matronae, Dominae de Flines, collegimus. Verbenae Notae: 1) Flores tubulosi, in extremo vix galeati & labiati, in caulium nec non ramorum summo, vel etiam in virgulis e foliorum sede exeuntibus spicatum ut plurimum dispositi; 2) Calix foliolis constructus; 3) Semina quaterna oblonga.

"VERBENA Americana procumbens, Veronicae aquaticae folio subrotundo, flosculis ad foliorum alas; nobis. Teucrium Americanum procumbens Veronicae aquaticae foliis subrotundis; Hermannii, Catal. Hort.

"VERBENA nodiflora major Indica, flore niveo; nobis. In Horto Fageliano, nomine Teucris & Veronicae, legimus."

Bailey (1972) gives an interesting description of this genus as it occurs in garden cultivation in which he says that it is "A large genus of annuals and perennials, almost all native to the U. S." -- a statement which is untrue since at least 324 presently accepted taxa in it are not native to the United States. The rest of his description applies mostly only to xV. hybrida Voss and a few other species of the Glandularia type, but not to the genus as a whole:

"Attractive, rounded clusters of small, tubular flowers in a large color range from white through every shade of red and blue make the hardy species excellent garden plants, and the tender species useful cool-greenhouse plants. These plants are often fragrant and are in bloom all summer. Fine for the border, the rock garden, as edgings, as **ground cover in bulb beds, for cutting.** The spreading habit of most of the species, with the accompanying stem-rooting, gives a solid, matlike growth that makes a strong color contrast. Full sun and rich garden soil are required. Propagate by seeds started indoors in late March, except in very warm sections, where seeds may be sown outdoors where the plants are wanted. If a specially fine color in a plant is wanted again the following season, stem cuttings should be rooted and wintered over in a cold frame or cool greenhouse. Perennial species are hardy to Zone 5."

The Austin 4051, distributed as Verbena sp., is actually Stachytarpheta cayennensis (L. C. Rich.) Vahl.

VERBENA ABRAXSI Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.23: 290 & 291. 1974; Moldenke, Phytologia 28: 195 & 249. 1974.

VERBENA ALATA Sweet

Additional bibliography: Hocking, Excerpt. Bot. A.23: 290. 1974; Moldenke, Phytologia 28: 110. 1974.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 290 & 291. 1974; Moldenke, Phytologia 28: 241--242. 1974.

Higgins encountered this plant in oak-juniper-grassland communities and in gravelly soil of pinyon-Juniperus communities, flowering in July. Material has often been misidentified and distributed in herbaria as V. wrightii A. Gray, a very similar species as to glandular pubescence and range, but easily distinguished in most cases by its uniformly much shorter calyx-lobes.

Additional citations: TEXAS: Brewster Co.: Von Schrenk 32 (E-1111245). NEW MEXICO: Catron Co.: L. C. Higgins 7765 (N). Harding Co.: L. C. Higgins 6940 (N).

VERBENA ARISTIGERA S. Moore

Additional bibliography: Moldenke, Phytologia 28: 111. 1974.

The corollas are said to have been "violet" in color when fresh on Hatschbach 23884 and this collector found the plant growing in "campo limpo algo úmido" in Mato Grosso, Brazil.

Additional citations: BRAZIL: Mato Grosso: Hatschbach 23884 (W--2705822). ARGENTINA: Chaco: Venturi 9780 (E--980820).

VERBENA ATACAMENSIS Reich

Additional bibliography: Moldenke, Phytologia 28: 111. 1974.

The recording of this species from Formosa, Argentina, by me

in my "Fifth Summary" (1971) is an error -- the record should read "Mendoza".

VERBENA BAILEYANA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 214. 1972.

The two specimens from the Bernhardt Herbarium, cited below, are very different in appearance and are not accompanied by any easily decipherable information as to where or when they were collected. The one on sheet no. 118037 was obviously a large and vigorous plant and bears much resemblance to the type of this hybrid. The other, on sheet no. 118036, is a much smaller and more slender and delicate plant with small, deeply incised leaves. It is placed here questionably on the assumption that it represents a depauperate specimen.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: Herb. Bernhardt s.n. (E--118036, E--118037).

VERBENA BALANSÆ Briq.

Additional bibliography: Moldenke, *Phytologia* 28: 112. 1974.

Additional citations: PARAGUAY: Jørgensen 4582 (E--1006181).

VERBENA BERTERII (Weisn.) Schau.

Emended synonymy: Verbena berterii Schau. ex C. Gay, *Hist. Fis. Chile Bot.* 5: 9. 1849.

Additional bibliography: Moldenke, *Phytologia* 23: 112 & 248. 1974.

Gay (1849) comments that "Esta se halla en los mismos lugares que la que antecede [V. sulphurea D. Don] y le es igualmente muy parecida en su traza, en la forma de sus hojas, en la disposicion de sus cabezuelas, etc. Sin embargo la V. Berterii se distingue lo suficiente por la vellosidad muy corta y muy apretada que cubre sus ramas, por el color ceniciento ó rosado de sus flores y nunca amarillentas y sobretodo por el apéndice de sus anteras no visibles al exterior. El señor Schauer le da ademas como carácter propio el de tener el cáliz contornado sobre el fruto, pero esta particularidad se observa tambien en las V. sulfurea, erinoïdes, etc."

VERBENA BIPINNATIFIDA Nutt.

Additional bibliography: Fong, Trojáňkova, Trojáňek, & Farnsworth, *Lloydia* 39: 147. 1972; Moldenke, *Phytologia* 28: 242. 1974.

Higgins reports this species from sandy soil in the mesquite-Yucca-shortgrass community and in the mesquite-juniper woodland. The L. C. Higgins 6940, distributed as V. bipinnatifida, is actually V. ambrosifolia, while L. C. Higgins 6871 is V. wrightii A. Gray. The Knauz s.n. [7/2/41] collection, cited below, is a mixture with V. tenuisecta Briq.

Additional citations: LOUISIANA: Orleans Par.: Knauz s.n. [7/2/41] (E--1302083). OKLAHOMA: Harmon Co.: L. C. Higgins 7285 (N). TEXAS: Childress Co.: L. C. Higgins s.n. [4 June 1973] (N). NEW

MEXICO: Catron Co.: Eggleston 20425 (E--1024533). ARIZONA: County undetermined: Eby s.n. [June 1899] (E--131691). MEXICO: Zacatecas: Rinehart 7346 (E--2149431).

VERBENA BONARIENSIS L.

Additional bibliography: R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2301. 1972; Fong, Trojánkova, Trojánek, & Farnsworth, Lloydia 39: 147. 1972; Moldenke, Phytologia 28: 242 & 252. 1974.

Balakrishnan encountered this species "close to vegetable cultivation" in Ceylon. The corollas are said to have been "light-mauve" in color when fresh on Balakrishnan NBK.1038. Pailey (1972) refers to them as "lavender".

Additional citations: BRAZIL: Paraná: Hatschbach 28483 (W--2706790). PARAGUAY: T. Rojas s.n. [Hassler 2459] (E--1575140). ARGENTINA: Buenos Aires: A. T. Hunziker 4062 (E--1305960). CEYLON: Balakrishnan NBK.1038 (W--2760362).

VERBENA BONARIENSIS var. CONGLOMERATA Briq.

Additional bibliography: Moldenke, Phytologia 28: 196. 1974.

Additional citations: PARAGUAY: Hassler 8934 (E--1575223).

VERBENA BRACTEATA Lag. & Rodr.

Additional & amended bibliography: Fedde in Just, Bot. Jahrbuch. 49 (2): 518. 1932; Dole, Fl. Vt., ed. 3, 224. 1937; Musselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 183. 1971; Mohlenbrock & Voigt, Fl. South. Ill. 286--287 & 389. 1974; Moldenke, Phytologia 28: 242. 1974.

Higgins reports this species as a member of the pinyon-juniper and the mesquite-Yucca-shortgrass communities. Gay (1849) includes it in his work on the flora of Chile, but with the following comment: "En la quinta noticia de las plantas raras del jardin botánico de Ginebra, A. de Candolle indica esta especie como propia igualmente de Chile, lo que es muy dudoso." I have seen no material of it from Chile.

Dole (1937) records this species from fields and waste places in Caledonia and Rutland Counties, Vermont, while Musselman and his associates (1971), calling it "creeping vervain", record it as "infrequent" on dry roadsides in Rock County, Wisconsin. Hitchcock found it on alkali flats in Montana. The Engelmann s.n., cited below, consists only of floral dissections.

Additional citations: MISSOURI: Saint Louis City: Engelmann s.n. (E--117332); Fairburn & Lowenhaupt s.n. [July 8, 1938] (E--1146773). MONTANA: Wheatland Co.: C. L. Hitchcock 2427 (E--1088765). TEXAS: Childress Co.: L. C. Higgins 7041 (N). NEW MEXICO: Eddy Co.: L. C. Higgins 7356. Socorro Co.: Fleetwood 761 (W--2706238).

VERBENA BRASILIENSIS Vell.

Additional bibliography: Moldenke, Phytologia 28: 196 & 251. 1974.

Recent collectors refer to this plant as a shrub ("arbusto") 0.7--1 m. tall and have found it growing in "brejo" and at the edge of streams. The corollas are said to have been "lilac" in color on Hatschbach 33616 & 33613 and Kummrow 103. Knauz found the specimen cited below "in a cemetery", but I assume that it was not in cultivation there. The J. Steinbach collection cited below has previously been cited by me from other herbaria as V. litoralis H.B.K., but this specimen, at least, seems better placed as V. brasiliensis. Certainly it cannot be regarded as typical V. litoralis, but it could conceivably represent its var. caracasana (H.B.K.) Briq.

Additional citations: FLORIDA: Escambia Co.: Brinker 26 (E--1225020). LOUISIANA: Orleans Par.: Knauz s.n. [7/2/41] (E--1302067). BRAZIL: Paraná: Hatschbach 33615 (Ac), 33613 (Id); Kummrow 103 (Gz). BOLIVIA: Santa Cruz: J. Steinbach 6757 (E--936451). CHILE: Valdivia: Hollernmayer s.n. [Werdermann 1362] (E--940360).

VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, Phytologia 28: 197. 1974.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: Fendler s.n. (E--117597).

VERBENA CANADENSIS (L.) Britton

Additional bibliography: Braun, Ecology 2: 177. 1921; Wangerin in Just, Bot. Jahresber. 50 (1): 135. 1929; R. M. Carleton, Ind. Common Names Herb. Pl., pr. 1, 100 (1959) and pr. 2, 100. 1962; R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2301--2302. 1972; Mohlenbrock & Voigt, Fl. South. Ill. 286, 287, & 389. 1974; Moldenke, Phytologia 28: 243 & 254. 1974

Additional illustrations: R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2301. 1972.

Carleton (1962) writes the common name which he accepts for this species "Rocky-Mountain-vervain". Actually, "rose vervain" is a far better name for the plant since it is not at all a characteristic Rocky Mountain plant as the name he adopts would suggest. Bailey (1972) gives its natural distribution as "from the Southwest and Mexico", but this, also, is misleading. Its natural distribution is from Illinois to Tennessee, southern Pennsylvania, Virginia, and Florida, west to Colorado and Texas. It is not known from Mexico nor from what is usually meant by the "Southwest". Michigan and Minnesota records may be the result of introductions. It is not known from Canada. Bailey refers to the flowers as "pink or purple" and notes that the species is "Excellent for the front of the border, as stems root and produce many blossoms."

The Herb. Missouri Bot. Gard. 117739, cited below, is a mixture with V. peruviana (L.) Britton.

Additional citations: CULTIVATED: Missouri: Herb. Missouri Bot. Gard. 117739, in part (E).

VERBENA CANESCENS H.B.K.

Additional bibliography: Moldenke, *Phytologia* 28: 243, 246, 247, & 258. 1974.

Clark encountered this species on rocky mesas in Hidalgo.

Additional citations: MEXICO: Hidalgo: O. K. Clark 7059 (E--1287829).

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: Moldenke, *Phytologia* 28: 201--202. 1974.

Additional citations: TEXAS: Brewster Co.: Von Schrenk 33 (E--1111244).

VERBENA CANIUENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 202. 1974.

Additional citations: BRAZIL: Paraná: Hatschbach 20177 (W--2706489).

VERBENA CAROLINA L.

Additional bibliography: Moldenke, *Phytologia* 28: 243 & 252. 1974.

Recent collectors have encountered this species in the thorn scrub community with many Caesalpiniaceae, Mimosaceae, and Rhamnaceae.

Additional citations: MEXICO: Nuevo León: Dziekanowski, Dunn, & Bolingbroke 1712 (E--2112415).

VERBENA CHEITMANIANA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 186. 1972.

Additional citations: ARGENTINA: Province undetermined: Jørgensen 86 [El Saldillo] (E--824562).

VERBENA CILIATA Benth.

Additional bibliography: Moldenke, *Phytologia* 28: 243. 1974.

Clark encountered this species on dry mesas in Hidalgo, while Dziekanowski and his associates found it growing in an "area of thorn scrub, mesquite, and cactus; Lupinus along roadbank and shoulder of waterhole."

Additional citations: MEXICO: Guanajuato: Dziekanowski, Dunn, & Bolingbroke 1794 (N). Hidalgo: O. K. Clark 7044 (E--1287827).

VERBENA CORYMBOSA Ruiz & Pav.

Additional bibliography: Moldenke, *Phytologia* 28: 205. 1974.

Gay (1849) comments that this "Planta encontrada en el Perú y que se cria igualmente en la isla de la Laja y en la provincia de Valdivia, en Pichi, etc. Florece por enero, etc."

Additional citations: BRAZIL: Paraná: Hatschbach 28316 (W--2706775). CHILE: Valdivia: Hollermayer s.n. [Werdermann 1170] (E--938964).

VERBENA CUNEIFOLIA Ruiz & Pav.

Additional bibliography: Moldenke, *Phytologia* 23: 195--196 &

418. 1972.

Gay (1849) comments that this "Especie originaria del Perú y que se cria igualmente en las cordilleras de Chile entre Santiago y Mendoza. Florece por marzo, etc." I have as yet seen no specimens of it from Chile.

xVERBENA DEANTI Moldenke

Additional bibliography: Moldenke, Phytologia 23: 196 & 206. 1974.

The Eggert specimen cited below was originally misidentified and distributed as Salvia sp.

Additional citations: MISSOURI: Butler Co.: Eggert s.n. [Poplar Bluff, July 27, 1892] (E-2168588).

VERBENA DELTICOLA Small

Additional bibliography: Hocking, Excerpt. Bot. A. 23: 290. 1974; Moldenke, Phytologia 23: 206. 1974.

The Dunn & Dunn 19090, distributed as V. delticola, is actually V. elegans H.B.K.

VERBENA DISSECTA Willd.

Additional bibliography: Moldenke, Phytologia 23: 206 & 248. 1974.

The corollas are said to have been "violet" in color when fresh on Venturi 5264.

This species appears to be based on an unnumbered Née collection from Chile. Gay (1849) says "Née la encontró en el sur de la República", but I have seen no material from Chile and wonder if this may not be another case of a mis-labeled Née collection. The species is most common in Argentina.

Additional citations: ARGENTINA: Jujuy: Venturi 5264 (E-963112).

VERBENA ELEGANS H.B.K.

Additional bibliography: Moldenke, Phytologia 23: 243. 1974.

The Dunns encountered this species "on west [=wet?] rocky slope, much of area cultivated or grazed, many rock ferns & cacti."

Material of this species has been misidentified and distributed in some herbaria as V. delticola small and as V. pulcherrima Kort.

Additional citations: MEXICO: Hidalgo: Dunn & Dunn 19090 (N).

LOCALITY OF COLLECTION UNDETERMINED: Herb. Missouri Bot. Gard. 118557 (E).

VERBENA ELEGANS var. ASPERATA Perry

Additional bibliography: Moldenke, Phytologia 23: 206 & 208--209. 1974.

Additional citations: MEXICO: Nuevo León: Dunn, Dziemkowski, & Eolingbroke 20129 (E-2112146).

xVERBENA ENGELMANNII Moldenke

Additional synonymy: Verbena hastata x urticifolia Pepon ex Mohlenbrock & Voigt, Fl. South. Ill. 287. 1974.

Additional bibliography: Dole, Fl. Vt., ed. 3, 224. 1937; Mohlenbrock & Voigt, Fl. South. Ill. 236, 287, & 389. 1974; Moldenke, Phytologia 28: 244. 1974.

Mohlenbrock & Voigt (1974) record this hybrid from Hardin County, Illinois. Dole (1937) calls it "thread-foot vervain" and records it from Addison, Bennington, Rutland, and Windsor Counties, Vermont, citing unnumbered collections by Blanchard, Dutton, Kittredge, and Kirk. The Engelmann s.n. cited below consists of only floral dissections.

Additional citations: MISSOURI: Saint Louis City: Engelmann s. n. (E-117332).

VERBENA EPHEDROIDES Cham.

Additional bibliography: Moldenke, Phytologia 28: 209. 1974.

The corollas on Hatschbach 22316 & 32801 are said to have been "lilac" in color when fresh and this collector has found the plant growing on wet campos and in compact formations in "brejo". He refers to it as a shrub 1.5 m. tall and found it in flower and fruit in November.

Additional citations: BRAZIL: Paraná: Hatschbach 22316 (W-2705746), 32801 (Z).

VERBENA FILICAULIS Schau.

Additional bibliography: Moldenke, Phytologia 28: 209--210. 1974.

Hatschbach has collected this plant in "brejo", flowering in November. The corollas are said to have been "lilac" in color when fresh on Hatschbach 33442 and "violet" on Hatschbach 22859. The latter specimen appears to have been a most remarkably husky, apparently firmly erect plant with extra large leaves. It may represent a distinct form or variety.

Additional citations: BRAZIL: Paraná: Hatschbach 22859 (Id), 33442 (Ac); Hatschbach, Smith, & Klein 28264 (W-2706774).

VERBENA GOODDINGII Briq.

Additional bibliography: Moldenke, Phytologia 28: 204 & 210--211. 1974.

The L. C. Higgins 6278, distributed as typical V. gooddingii, is actually var. nepetifolia Tidestr.

Additional citations: ARIZONA: Gila Co.: Foster & Arnold 264 (E-1206355).

VERBENA GOODDINGII var. NEPETIFOLIA Tidestr.

Additional bibliography: Moldenke, Phytologia 28: 204 & 211. 1974.

Higgins has reported this plant as a member of the Larrea-desert shrub community in Arizona.

Additional citations: ARIZONA: Pima Co.: L. C. Higgins 6278 (N).

VERBENA GRACILESCENS (Cham.) Herter

Additional bibliography: Moldenke, Phytologia 28: 211--212. 1974.

The corollas are described as having been "clear violet" in color when fresh on Venturi 5471. In addition to months previously reported by me, this plant has been collected in fruit in October. The Lossen 466 collection is a mixture with V. montevidensis Spreng.

Additional citations: ARGENITINA: Chaco: Jørgensen 2461Y (E--931780). Corrientes: Lossen 466, in part (E--920340). Salta: Venturi 5471 (E--961393).

VERBENA GUARANITICA (Troncoso) Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.23: 290. 1974; Moldenke, Phytologia 28: 212. 1974.

VERBENA HALEI Small

Additional bibliography: Moldenke, Phytologia 28: 244 & 258. 1974.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: Herb. Chapman 6125 (E--116385).

VERBENA HASSLERANA Eriq.

Additional synonymy: Verbena basslerana Hocking, Excerpt. Bot. A.23: 293, sphalm. 1974.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 293. 1974; Moldenke, Phytologia 28: 213. 1974.

VERBENA HASSLERANA var. GLANDULOSA Moldenke

Synonymy: Verbena basslerana var. glandulosa Hocking, Excerpt. Bot. A.23: 293, sphalm. 1974.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 293. 1974; Moldenke, Phytologia 28: 213. 1974.

VERBENA HASTATA L.

Additional synonymy: Verbena americana urticae folio minore, floribus dilute purpureis minoribus Breyn., Prod. Fasc. Rar. Pl., ed. 2, 2: 104. 1739.

Additional & amended bibliography: Breyn., Prod. Fasc. Rar. Pl., ed. 2, 2: 104. 1739; Twining, Fl. Northeast. Penn. 60. 1917; Wangerin in Just, Bot. Jahresber. 49 (1): 521. 1928; Fedde in Just, Bot. Jahresber. 49 (2): 519. 1932; Dole, Fl. Vt., ed. 3, 224. 1937; R. M. Carleton, Ind. Common Names Herb. Pl., pr. 1, 15, 17, & 66 (1959) and pr. 2, 15, 17, & 66. 1962; Piehl, Mich. Bot. 4: 81. 1965; Duncan & Stuckey, Mich. Bot. 9: 183 & 190, table 6. 1970; Musselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 183. 1971; R. Bailey, Good Housekeep. Ill. En cycl. Gard. 15: 2302. 1972; Hocking, Excerpt. Bot. A.23: 290. 1974; Kohlenbrock & Voigt, Fl. South. Ill. 286, 287, & 389. 1974; Moldenke, Phytologia 28: 244. 1974.

Additional illustrations: R. Bailey, Good Housekeep. Ill. En cycl. Gard. 15: 2302. 1972.

Dole (1937) reports this species as common in waste places and pastures and along watercourses at the lower altitudes in Vermont. Duncan & Stuckey (1970) found it on Big Chicken Island in the Cana-

dian part of Lake Erie. Musselman and his associates refer to it as common in low open ground in Rock County, Wisconsin. Piehl (1965) reports that it is sometimes host to Pedicularis lanceolata as evidenced by dead haustoria and/or haustorial scars, at least in Michigan. The Engelmann s.n. cited below consists only of floral dissections.

Bailey (1972) says of this plant: "A handsome native perennial, common in fields of N. America....Grows 3 to 4 ft. high in sun or partial shade. A colorful addition to the late summer landscape. Attractive to honeybees." Carleton (1962) adopts the name "blue American vervain" for this plant and notes that "iron-weed", also often applied to it, belongs likewise [and more **advisedly**] to the genus Vernonia and to Centaurea nigra.

Additional citations: MISSOURI: Saint Louis City: Engelmann s. n. (E--117332).

VERBENA HASTATA f. ROSEA Cheney

Additional synonymy: Verbenae americanae, urticae folio, flore carneo Hort. ex Breyn., Prod. Fasc. Rar. Pl., ed. 2, 2: 104, in syn. 1739.

Additional bibliography: Breyn., Prod. Fasc. Rar. Pl., ed. 2, 2: 104. 1739; Moldenke, Phytologia 28: 217. 1974.

VERBENA HATSCHBACHI Moldenke

Additional bibliography: Moldenke, Phytologia 28: 218. 1974.

Additional citations: BRAZIL: Paraná: Hatschbach 24707 (W--2706927).

VERBENA HERTERI Moldenke

Additional bibliography: Moldenke, Phytologia 23: 268. 1972.

Additional citations: URUGUAY: Herter 979 (E--938824--isotype).

VERBENA HIRTA Spreng.

Additional bibliography: Moldenke, Phytologia 28: 218--219. 1974.

The corollas are described as having been "lilac" in color when fresh on Hatschbach 32754, 33014, & 33775. Hatschbach has encountered the species in campos, "campo limpo", and "campo seco", flowering and fruiting in January, October, and December.

Additional citations: BRAZIL: Paraná: Hatschbach 32754 (Ac), 33614 (Gz), 33775 (Ld).

VERBENA HIRTA var. GRACILIS Dusén

Additional bibliography: Moldenke, Phytologia 28: 219. 1974.

The corollas are described as "lilac" in color on Hatschbach 32852, which was collected in "faxinal".

Additional citations: BRAZIL: Paraná: Hatschbach 32852 (Ld).

VERBENA HISPIDA Ruiz & Pav.

Additional bibliography: Moldenke, Phytologia 28: 219--220. 1974.

The corollas are said to have been "blue" on Venturi 3702, "violet" on Venturi 5370, and "un poco rosadido" on Jürgensen 2638.

Additional citations: ARGENTINA: Formosa: Jürgensen 2638 (E--866618). Jujuy: Venturi 5370 (E--963120). Salta: Venturi 3702 (E--960406).

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 220. 1974.

Munziker reports this species as "frequent" in La Pampa, Argentina.

Additional citations: ARGENTINA: La Pampa: A. T. Munziker 4079 (E--1305957).

VERBENA HUMIFUSA Cham.

Additional bibliography: Moldenke, *Phytologia* 28: 220. 1974.

Additional citations: PARAGUAY: Hassler 9479 (E--1575168).

xVERBENA HYBRIDA Voss

Additional bibliography: R. Bailey, *Good Housekeep. Ill. Encycl. Gard.* 15: 2302 & 2303. 1972; Moldenke, *Phytologia* 28: 244--245 & 263. 1974.

Additional illustrations: R. Bailey, *Good Housekeep. Ill. Encycl. Gard.* 15: 2302 & 2303 (in color). 1972.

Horticultural varieties of this plant, in addition to those previously recorded by me in this series of notes, are "Dreer's Mammoth Pure White", "Dreer's Mammoth Scarlet Shade", and "White Mammoth".

My wife and I have seen this plant in outdoor garden cultivation in Japan, Hong Kong, Singapore, Thailand, India, and Pakistan, and have collected it, also in outdoor cultivation, at 7000 elevation in Ceylon, the corollas were deep-red, flowering in January. I have also personally seen it in outdoor cultivation in Egypt. The Barchet collection cited below does not have any indication on its label to the effect that it came from cultivated plants, but I am assuming that it did.

Additional citations: CULTIVATED: Ceylon: Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28291 (W--2764503). China: Barchet s.n. [Chekiang] (E--117446). Missouri: Engelmann s.n. [June 1342] (E--117330); Fendler s.n. [K. B. G. 4/6/61] (E--117596); S.C.J. 6/04 (E--116358); C. H. Thompson 150 (E--762933), 151 (E--762934). New York: W. Trelease s.n. [Ithaca, Sept. 10, 1878] (E--117793). Ohio: Luke s.n. [Chio St. Univ., Aug. 1, '99] (E--119245). Texas: J. Reverchon s.n. [Dallas, 1875] (E--118371).

xVERBENA ILLICITA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 245. 1947.

The Engelmann s.n. cited below consists solely of floral dissections.

Additional citations: MISSOURI: Saint Louis City: Engelmann s.n. (E--117332).

VERBENA INCISA Hook.

Additional bibliography: Moldenke, *Phytologia* 28: 245--246. 1974.

The Rojas specimens cited below, from the "lower Pilcomayo", could have been collected either in Paraguay or in the province of Formosa, Argentina, depending on which side of the river they were growing.

Additional citations: ARGENTINA: Chaco: Jørgensen 2466 (E--831779). PARAGUAY: T. Rojas 254 (E--1574354), 256 (E--1574352).

VERBENA INTERMEDIA Gill. & Hook.

Additional bibliography: Moldenke, *Phytologia* 28: 246--247. 1974.

In addition to the months previously reported by me, this species has been collected in fruit in March, growing at 300 m. altitude. The corollas are said to have been "violet" in color when fresh on Krapovickas 2951.

Additional citations: ARGENTINA: Buenos Aires: Krapovickas 2951 (E--1305752). Formosa: Jørgensen 3408 (E--867089).

VERBENA JORDANENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 247. 1974.

Additional citations: BRAZIL: Paraná: Hatschbach 22833 (W--2705747).

VERBENA LACINIATA (L.) Eriq.

Additional bibliography: R. Bailey, *Good Housekeep. Ill. Encycl. Gard.* 15: 2302. 1972; Moldenke, *Phytologia* 28: 247--249. 1974.

Bailey (1972) describes this as "A tender perennial of S. America, generally grown as an annual. Spreading stems, which root readily, have dense, terminal clusters of lavender flowers."

VERBENA LIPOZYGIOIDES Walp.

Additional bibliography: Moldenke, *Phytologia* 23: 288. 1972.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: Herb. Bernardi 136 (E--118051).

VERBENA LITORALIS H.B.K.

Additional bibliography: Moldenke, *Phytologia* 28: 250--252. 1974.

J. Steinbach 6757 has been cited by me from various herbaria as V. litoralis; however, the Missouri Botanical Garden sheet of this number seems to be better placed as V. brasiliensis Vell. Certainly it is not typical V. litoralis. The other sheets of this collection should be reexamined.

Gay (1849) says that this "Planta muy comun en los campos, las huertas de la Serena, Santiago, etc. Contra la opinion de Hooker y Walpers, la miramos, lo mismo que Schauer, como especie bien distinta de la V. bonariensis, que no se encuentra en Chile; se diferencia sobretodo por sus hojas pecioladas y no amplexicaules,

ni tampoco irregularmente dentadas, por sus peciolos mas delgados y sus flores inferiores apartadas."

Additional citations: VENEZUELA: Aragua: Fendler 352 (E--117594). GALAPAGOS ISLANDS: Indefatigable: Lévesque 132 ("--2670433).

VERBENA LITORALIS var. CARACASANA (H.B.K.) Briq.

Additional bibliography: Moldenke, Phytologia 28: 252. 1974.

Recent collectors describe this plant as a prostrate shrub ["arbusto"] along roadsides, common in patches, at altitudes of 700 to 4200 meters. Edwin & Schunke Vigo found it flowering and fruiting in July. The corollas are described as having been "purple" on Edwin & Schunke Vigo 3383.

Additional citations: PERU: Junin: Edwin & Schunke Vigo 3383 (Ld).

VERBENA LOBATA Vell.

Additional bibliography: Moldenke, Phytologia 28: 253. 1974.

The corollas are said to have been "lilac" in color when fresh on Hatschbach 32034 and the plant was found growing at the edge of a stream.

Additional citations: BRAZIL: Paraná: Hatschbach 32034 (Ld).

VERBENA LOBATA var. SESSILIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 296. 1972.

The corollas are described as having been "violet" in color when fresh on Hatschbach 33474 and this collector describes the plant as procumbent, growing in "brejo" at the edge of "corrego".

Additional citations: BRAZIL: Paraná: Hatschbach 33473 (Ld).

VERBENA MACDOUGALII Heller

Additional bibliography: Fong, Trojánkova, Trojánek, & Farnsworth, Lloydia 39: 147. 1972; Moldenke, Phytologia 28: 253--254 & 258. 1974.

Higgins found this species growing in the sandy soil of Salix-Juniperus communities in Arizona.

Additional citations: ARIZONA: Apache Co.: L. C. Higgins 7803 (N).

VERBENA MEGAPOTAMICA Spreng.

Additional bibliography: Moldenke, Phytologia 28: 255. 1974.

Additional citations: URUGUAY: Herb. Bernhardtii s.n. [Montevideo] (E--118046).

VERBENA MENTHAEFOLIA Benth.

Additional bibliography: Moldenke, Phytologia 28: 255--256. 1974.

The corollas are said to have been "light-purple" when fresh on H. S. Gentry 1493.

Additional citations: MEXICO: Chihuahua: H. S. Gentry 1542 (E--1102371). Sonora: H. S. Gentry 1493 (E--1102364).

VERBENA MICROPHYLLA H.B.K.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 290. 1974; Moldenke, Phytologia 28: 256. 1974.

VERBENA MINUTIFLORA Briq.

Additional bibliography: Moldenke, Phytologia 28: 252 & 256--257. 1974.

Hatschbach found this plant growing in "brejo" and describes the color of the corollas on his no. 33586 as "lilac".

Additional citations: BRAZIL: Paraná: Hatschbach 25327 (W--2706935), 33586 (Id).

xVERBENA LOECHINA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 257. 1974.

The Engelmann s.n. cited below consists only of floral dissections.

Additional citations: MISSOURI: Saint Louis City: Engelmann s.n. (E--117332).

VERBENA MONACENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 371. 1972.

The Moldenke collection, cited below, from an altitude of 1550 feet, had its corollas rose-pink in color when fresh and was flowering in January. The bractlets are shortly triangular and the calyx pubescence is appressed and sparse. It has been confused with V. tenera Spreng. and I suspect that much of the cultivated material now going under that name is actually V. monacensis.

Additional citations: CULTIVATED: Ceylon: Collector undesignated s.n. [Dickapitiya, August 23, 1958] (Pd); Moldenke, Moldenke, & Jayasuriya 28150 (W--2764425).

VERBENA MONTEVIDENSIS Spreng.

Additional bibliography: Moldenke, Phytologia 28: 252 & 257. 1974.

Lossen 466, cited below, is a mixture with V. gracilescens (Cham.) Herter.

Additional citations: BRAZIL: Paraná: Hatschbach 28464 (W--2706626). ARGENTINA: Corrientes: Lossen 466, in part (E--930340).

VERBENA NEOMEXICANA (A. Gray) Small

Additional bibliography: Moldenke, Phytologia 28: 258--259. 1974.

The L. C. Higgins 7317, distributed as V. neomexicana, is actually V. perennis Wooton.

VERBENA NEOMEXICANA var. HIRTELLA Perry

Additional bibliography: Moldenke, Phytologia 28: 258--259. 1974.

Dressler encountered this plant in wash bottoms. The corollas are said to have been "blue" when fresh on Dressler 648.

Additional citations: N.M. MEXICO: Socorro Co.: Fleetwood 670 (W--2706257). MEXICO: Baja California: Dressler 648 (E--1718037).

VERBENA NIVEA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 376. 1972.

Additional citations: ARGENTINA: Salta: Venturi 10014 (E--930806--isotype).

VERBENA OFFICINALIS L.

Additional bibliography: Wangerin in Just, Bot. Jahresber. 50 (1): 237. 1930; R. M. Carleton, Ind. Common Names Herb. Pl., pr. 1, 42, 60--62, 64, 69, 81, 92, 96, 105, 107, 116, 120, & 125 (1959) and pr. 2, 42, 60--62, 64, 69, 81, 92, 96, 105, 107, 116, 120, & 125. 1962; Fong, Trojánek, Trojánek, & Farnsworth, Lloydia 39: 147. 1972; Rigual Magallon, Fl. & Veg. Prov. Alicant. 341. 1972; Hocking, Excerpt. Bot. A.23: 291. 1974; Moldenke, Phytologia 28: 241 & 259--264. 1974.

The corollas on Grant 16081 are said to have been "pale-lavender" when fresh. Carleton (1959) records the additional vernacular names "holy-plant", "hyssop", "pigeon-grass", and "setywall" for this plant, noting that "pigeon-grass" is applied also to the genus Setaria and "hyssop" is applied also to Gratiola, Hyssopus, and Teucrium pseudohyssopus. The name, "Herb-Grace", previously recorded for Verbena officinalis, is applied also to Ruta graveolens.

Hartwell (1971) records the following uses for V. officinalis: as a plaster in the treatment of parotid tumors; the juice in a cerate for parotid tumors and for tumors in general; in China in the treatment of tumors, first recommended in the King-i-pie-lu in 502 A.D.; as a poultice for tumors in the neck; in Wales as an ingredient of "The Grace of God" remedy for morbid granulations; according to O. Brunfels in the treatment of indurated veins; in Mexico for tumors; in China for tumors and cancer; as a cataplasm according to Loureiro for tumors of the scrotum and spleen in Indochina; triturated for tumors of the abdominal viscera; in Sicily in the treatment of polypus; in Brazil as a poultice for tumors; and in Argentina as a decoction for tumors. He records it as a Chinese herb medicine in the treatment of malignant tumors.

Watt & Breyer-Brandwijk (1962) give another lengthy discussion of its chemistry and medicinal uses: "used overseas as a popular medicine for fever, anaemia, dropsy, pleurisy and scrofula, as a bitter, aphrodisiac, antineuralgic and antirheumatic and for wounds....It has also been used for chronic eczema, chronic bronchitis and menstrual disorders and as a diaphoretic.....We have not heard of the plant being used as a household remedy in Southern and Eastern Africa. The plant has a diuretic action in the rat and is also anthelmintic....as well as being irritant.... Quisumbing....gives details of many uses. The plant has been used in the past as a charm and has been regarded as a holy object.... The flowering top contains a bitter crystalline l-rotatory glucoside verbenalin $C_{17}H_{25}O_{10}$ mp 180.3-181.5° and soluble in water and

alcohol. It is said to be non-toxic.....Invertin and emulsin are also present and the sugar of the glucoside is d-glucose..... Cheymol.....has made an extensive study of the glucoside and carbohydrates of the plant. The flower contains 13.28 per cent of reducing sugars. The glucoside verbenaloid increases in amount in the stem, diminishes during seed formation and accumulates in the root in autumn along with stachyose. Holste....has isolated 0.244 per cent of verbenalin from the plant and gives the melting point as 178°, while Asano et al.....have found 0.364 per cent with the formula $C_{17}H_{24}O_{10}$ mp 179°. Hydrolysis of verbenalin yields 40 per cent of verbenalol $C_{10}H_{14}O_4$ mp 134° and glucose..... Karrer et al.....also suggest the formula $C_{17}H_{24}O_{10}$ mp 180-1° for verbenalin, their product yielding 60 per cent of the aglycone verbenalol $C_{11}H_{14}O_5$ mp 124°. Verbenalol yields a viscid oil, possibly $C_{13}H_{20}O_6$ bp 110-5°. Verbenalin is identical with cornin isolated from Cornus florida.....

"Another glucoside verbenin, which resembles verbenalin chemically and pharmacologically, has been isolated and tested...In small doses it stimulates and in large doses inhibits the sympathetic nerve endings of the epidermal mucous glands of the heart and blood vessels and of the intestines and salivary glands...In the mammal it produces a vigorous and lengthy secretion of milk.. The root yields 23.2 per cent of crystalline stachyose and the stem 13.7 per cent....The effect of dessication on the constituents of the plant has been studied.....A volatile oil has also been isolated.

"Verbenalin produces stimulation of the motor activities of the central nervous system in the frog, followed in the case of large doses by stupor, clonic and tetanic convulsions and finally paralysis.....In mammals it produces little effect apart from stimulation of the uterus, causing an increase of tonus and a strengthening of the contractions.....Pammel...states that the plant is irritant but this is open to doubt. Verbenalin hastens blood coagulation.. The plant has been suspected of causing the death of cattle in New South Wales....Antibiotic tests have proved negative....." Rimpler & Schafer (1973) have recently isolated a chemical substance which they call hastatocid from this species and V. hastata L.

Grieve (1967) summarizes the historic aspects of the plant as follows: "The name Vervain is derived from the Celtic ferfaen, from fer (to drive away) and faen (a stone), as the plant was much used for affections of the bladder, especially calculus. Another derivation is given by some authors from Herba veneris, because of the aphrodisiac properties attributed to it by the Ancients. Priests used it for sacrifices, and hence the name Herba Sacra. The name Verberna was the classical Roman name for 'altar-plants' in general, and for this species in particular. The druids included it in their lustral water, and magicians and sorcerers employed it largely. It was used in various rites and incantations, and by ambassadors in making leagues. Bruised, it was worn around the neck as a charm against headaches, and also against snake and other venomous bites

as well as for general good luck. It was thought to be good for the sight. Its virtues in all these directions may be due to the legend of its discovery on the Mount of Calvary, where it staunch-ed the wounds of the crucified Saviour. Hence, it is crossed and blessed with a commemorative verse when it is gathered. It must be picked before flowering, and dried promptly.....

"The plant appears to contain a peculiar tannin, but it has not yet been properly analysed [see the preceding paragraphs!]...It is recommended in upwards of thirty complaints, being astringent, diaphoretic, antispasmodic, etc. It is said to be useful in inter-mittent fevers, ulcers, ophthalmia, pleurisy, etc., and to be a good galactagogue. It is still used as a febrifuge in autumn fevers. As a poultice it is good in headache, ear-neuralgia, rheumatism, etc. In this form it colors the skin a fine red, giving rise to the idea that it has the power of drawing the blood outside. A decoction of 2 oz. to a quart, taken in the course of one day, is said to be a good medicine in purgings, easing pain in the bowels. It is often applied externally for piles. It is used in homoeo-pathy. Fluid extract, 1/2 to 1 drachm." Grieve actually attrib-utes all these properties to both V. officinalis and/or V. hastata.

Beals (1917) gives us more fascinating detail of this plant's folk history. She begins by quoting E. B. Browning (in "Aurora Leigh"):

" You enchant me
Sweet verbena! which being brushed against,
Will hold you three hours after by the smell,
In spite of long walks on the windy hills.

"Verbena was an old Latin name for the flower that was later known throughout Europe as vervain. Both names mean a green bough. As an holy herb, it was held in the highest veneration by both Greeks and Romans, and marvelous qualities were attributed to it, not the least of which was the power of reconciling the bitterest enemies. It bore a prominent part in the official life of both nations. When the Romans felt that they had been treated discourteously by any of their neighbors, it was their custom to select four heralds from the members of the fetiales, whose duty it was to maintain the forms of international relationship, act as guardians of the public faith, and demand redress. These four selected one of their number to act as spokesman, who was sometimes the pater patratus or president of the college, but more generally he was merely a member and known as the verbenarius. Clothed in their priestly robes, wearing the insignia of their office, and preceded by the verbenarius, who in addition to his other vestments wore a white woolen band around his head, together with a wreath of the sacred verbena, gathered within the enclosure of the Capitoline Hill, and all bearing boughs of the same sacred plant, they advanced to the place where their negotiations were to be conducted. If war was decided upon, the verbenarius and his colleagues, wearing wreaths of verbena, approached the confines of the hostile territory. Throwing across the boundary a spear tipped with iron, and having a sprig of the holy herb bound upon its point, a solemn

declaration of war was announced, and Jupiter was called upon to witness the justice of their cause. All treaties were approved by the college before they became effective and war was not declared until the demand for redress had first been made.

"It was with water, in which this plant had been steeped, that the festal table of Jupiter was cleansed just before the feasts, which were prepared in the capitol by the septemviri in his honor. If the water was also used to sprinkle the banqueting couches before a feast, the merriment and hilarity was said to be thereby greatly promoted. Fletcher, in the 'Faithful Shepherdess', wrote:

And those light vervain, too, thou must go after,
Provoking easy souls to mirth and laughter.

"It was likewise used to cleanse houses in the belief that it kept away evil spirits. It was known as Juno's tears. A few leaves were worn on the person as a protection from harm. Romulus and Tatius, the Sabine, who rules with him for seven years, are reported to have ordered that branches of the plant should be sent to them as a New Year's offering to insure their good fortune during the ensuing year. It was a favorite bridal flower. Roman brides were considered fortunate who wore a wreath which they gathered themselves. This tradition is doubtless the origin of a custom which has, until recently, been in vogue in some parts of Germany, where a bride is presented with a hat made of the blossoms, which she must wear during the ceremony.

"In Persia it was held in scarcely less veneration than among the Greeks and Romans. The priests of the temples of the sun always wore branches of it in their hands when they approached the altar, and the gathering of the plants was attended with much solemnity. It must take place at a time when neither the sun nor the moon was visible. The roots were carefully cut below the surface and honey from the comb was poured into the place thus left vacant to appease the earth for robbing it of so precious a possession.

"The magicians of the East also used it as a symbol of enchantment. They were responsible for the belief that if one smeared the body all over with the juice of the herb he would obtain whatever he might desire. He would also be enabled to cure any disease and reconcile those who were at enmity.

"Among the Druids of ancient Briton the plant was known by the name of vervain or holy herb. Almost the same ceremonies were observed in cutting it as were in vogue among the Persians, but with the restriction that the left hand only must be used. The leaves, stocks, and flowers were dried separately, and when mixed with wine were considered a certain cure for serpents' bites. At the time of gathering of the mistletoe, a herald, clothed in white and bearing in his hands verbena branches, encircled by serpents, accompanied the druidic procession. When performing their daily task of feeding the never-dying fires in the temple, the priests spent half an hour in prayer, before the altar, holding in their hands branches of the sacred herb. One writer on antiquities

states that the verbena was as especially holy to the priestesses as the mistletoe was to the priests. No one was allowed to touch it with the hand, and when it was gathered it must be at the full moon. A string was looped over the plant and then fastened to the toe of a young maid, who pulled until it was uprooted. The oldest druidess then threw a cloth over it and gathered it up. It was used in the sacred rites for offerings to the gods and medicinally as a cooling remedy.

"During the Middle Ages the plant still retained its popularity. It was prescribed as a remedy for thirty different ailments, and for this reason was known as simples [=simplers'] joy. In spite of the fact that it was used by witches for working their spells it was also used to combat the enchantments. Aubrey quotes the old English proverb: 'Vervain and dill hinder witches in their will'. Dill is a flowering plant used in medicine. On Christmas Eve great bonfires were built, and the young men and maidens danced around them, wearing wreaths and garlands of vervain. Any young woman who gave to her lover a garland gathered and woven by her own hands insured his fidelity for at least all that year. Even now the superstition of its efficacy as a love-philter has not entirely died out in some parts of England. A knot of vervain tied with white satin ribbon is still worn as a preventive of ague. French peasants gather the plant under certain phases of the moon, hoping with its magical assistance to charm those whose affection they desire. The Hungarian gipsies call it the lock-opening herb, saying that if a small incision is made in the palm of the hand, and a tiny piece of the leaf placed in the cut, the wound being allowed to heal over, one will be able to open all bolts and bars with a single touch. It is confidently asserted that therein lay the secret of the success of all the most famous brigands of old.

"The plant is not without religious association. As late as the seventeenth century it was known in Brittany as the herb-of-the-cross. The Reverend John White, in 1624, wrote of it:

'Hallowed be thou, vervain, as thou growest in the ground,
For on the Mount of Calvary thou first wert found.'

"Ben Jonson referred to the sacredness of the plant when he wrote: 'Bring your garlands and with reverence place the vervain on the altar.'"

She then follows with a description of xVerbena hybrida Voss and its period of popularity in cultivation, but implies that this is still the same classical verbena about which she previously wrote so well. This, of course, is not true. Then she returns again to the classical species, saying "It has never held a prominent place in literature. Virgil refers to it as a symbol of enchantment. The earlier English writers made frequent allusions both to its classical associations and to the superstitions connected with it during their own time. Dr. Johnson says that Satan has no power over a maiden who wears vervain and St. Johnswort about her. But elsewhere it appears that when it is gathered a cross must first be made over it and then a prayer said.

Thereupon it is said to have been 'crossed and blessed'.

"Another old book says that to prepare a magic staff there must be put into a hollow place in it seven leaves of vervain, which must have been gathered on the eve of St. John the Baptist, and a stone of divers colors, which must be found in the nest of a bird called the lapwing. The hollow must be stopped up with boxwood. The staff, among other things, will preserve him who carries it from robbers, wild animals, and mad dogs. It does not seem to have attracted modern writers."

Irwin & Wills (1961) tell us that V. officinalis is "a garden plant sometimes escaped in Texas, formerly of great repute as a remedy for eye diseases, its 'bright-eyed' corolla supposedly indicating its virtues in that direction." Although I have to date examined 225,000 specimens of this group from 307 herbaria, I have not yet seen a specimen of it from Texas, either wild or cultivated. **xVerbena hybrida Voss is the one with the bright "eye!"**

Grant found it growing on disturbed archeological mounds in Iran. Rigual Magallon (1972) reports it as a member of the so-called Brachypodium phoenicoides ecologic community.

It should probably be noted here that the Angely (1971) reference in the synonymy and bibliography of Verbena officinalis was previously cited by me -- as it has been by other writers -- as "1970". This is the title-page date, but the work was apparently not actually published until 1971. The illustration given by Woodward (1931 & 1969) as V. officinalis actually represents V. supina L. instead.

In the Fuchs (1542) work the text relating to V. officinalis is on p. 591; the plate on p. 592 represents Sisymbrium officinale but is labeled "Verbenaca recta sive mas", while the plate on p. 593 really represents V. officinalis but is labeled "Verbenaca supina sive foemina". This is a mis-application of both pre-linean names -- the former should apply to V. officinalis and the latter to V. supina.

The Repton 715, distributed as V. officinalis, is actually V. brasiliensis Vell., while J. T. Curtis s.n. [July 27, 1944] is V. domingensis Urb.; Godfrey 56533a and Thomas & al. 13501 are V. halei Small; Dress & Hansen 914 is V. halei f. roseiflora (Benke) Moldenke; Lake 2999 is V. hispida Ruiz & Pav.; Hoover 4161 is V. lasiostachys Link; E. K. Balls 13802 is V. lasiostachys var. septentrionalis Moldenke; Contreras 6152, Krapovickas, Cristóbal, Arbo, Maruffak, Maruffak, & Irigoyen 16634, and Rodin 3917 are V. litoralis H.B.K.; Pringle 9534 is V. menthaefolia Benth.; Norman s.n. [1.7.1960] is V. officinalis var. prostrata Gren. & Godr.; Boules 2014, Constable 5199, Faure s.n. [5 Mai 1911], and V. Täckholm s.n. [Spring 1949], s.n. [2/4/1961], and s.n. [Merseh Matruh] are V. supina f. erecta Moldenke; Abedin 2643 is V. tenuisecta Briq.; and Drar & Mahdi 1667, Hilli 31, and Imam, Ibrahim, Mahdi, & Sisi s.n. [16/8/1971] are not verbenaceous.

Additional citations: MARYLAND: Cecil Co.: Steele s.n. [July 21,

1396] (W--364233); Jard s.n. [June 23, 1373] (W--147534). Charles Co.: Leonard & Phillip 307 (W--1220045). VIRGINIA: Alexandria City: Norton s.n. [9-3-15] (W--643001); Collard s.n. [July 15, 1396] (W--307209); Vasey & Coville s.n. [July 22, 1333] (W--260946, W--2761254). DENMARK: Lindhardt s.n. [19-3-1934] (Gz). FRANCE: Letacq 163 (L1--171200); Ljungström s.n. [1379/21/7] (Gz, Gz); Zetterstedt 1050 (L1--147533). SPAIN: Stud. Biol. Meno-Trai. 64-201 (Gz). PORTUGAL: Rainha 2079 (Ba). GERMANY: Degener & Degener 32912 (Ac, Ld); Hupke s.n. [31.7.1968] (Gz); H. G. Simons s.n. [29 Juli 1893] (E1--261935). LICHTENSTEIN: Degener & Degener 33253 (Ac, Ld). CZECHOSLOVAKIA: Bohemia: Sommer s.n. [15.VII.1910] (Ba). ITALY: Löve & Löve 721 (L1--268589). CYPRUS: Casey 1620 (Ba). SICILY: Todaro 697 (Gz). UNION OF SOCIALIST SOVIET REPUBLICS: Armenia: Mulkijanian & Aslanian s.n. [29.VII.1959] (Ba). Terek: Cordiagin s.n. [15.VII.1912] (Ba). EGYPT: Ascherson & Schweinfurth 809 (Gz, Gz); Batanouy s.n. [10/8/1956] (Gz, Gz); Eoulos 2450 (Gz), s.n. [8/9/1952] (Gz), s.n. [2.8.1954] (Gz), s.n. [17/7/1959] (Gz); Collector undetermined s.n. (Gz); El-Megid s.n. [16/11/1929] (Gz, Gz, Gz); Padeel s.n. [27/3/1953] (Gz); Fawzi s.n. [27/3/1953] (Gz); Hadidi s.n. [10/2/1952] (Gz), s.n. [13.8.1967] (Gz); Hadidi, Kassas, & Chruk s.n. [17.3.1967] (Gz); Hadidi & Khattab s.n. [31/8/1967] (Gz); Hadidy s.n. [25/1/1952] (Gz); P. Hartmann s.n. [16.8.07] (Gz), s.n. [3-V-1911] (Gz); Hassib s.n. [20/7/1929] (Gz, Gz, Gz), s.n. [25/7/1929] (Gz, Gz), s.n. [11/2/1931] (Gz, Gz, Gz), s.n. [Feb. 1931] (Gz, Gz, Gz); Ibrahim, Mahdi, Sisi, & Aziz s.n. [22/6/1973] (Gz); Imam s.n. [13.9.1971] (Gz, Gz), s.n. [14.9.1971] (Gz); Imam, Ibrahim, & Mahdi s.n. [21/8/1970] (Gz), s.n. [4/9/1970] (Gz, Gz), s.n. [5/4/1972] (Gz, Gz); Imam, Ibrahim, Mahdi, & Sisi s.n. [18/9/1971] (Gz, Gz); Loufty, Imam, Ibrahim, Mahdi, & Sisi s.n. [22/9/1971] (Gz); Mustafa & Sabat s.n. [28/8/1928] (Gz, Gz); E. S. s.n. [23 June 1880] (Gz); Sabat s.n. [22/4/1927] (Gz, Gz); Samir, Chabbouy, Ibrahim, & Mahdi s.n. [25/9/1970] (Gz, Gz); Sisi s.n. [24/5/1973] (Gz); G. Täckholm s.n. [24/10/1926] (Gz), s.n. [22/11/1926] (Gz); V. Täckholm s.n. [25/3/1949] (Gz), s.n. [30.3.1961] (Gz, Gz), s.n. [14/7/1962] (Gz); Täckholm & Elsayed s.n. [19/11/1961] (Gz, Gz); Täckholm, Imam, & Hadidi s.n. [3/11/1967] (Gz); Täckholm & Kassas 17 (Gz); Täckholm, Nabil, Ibrahim, & Mahdi s.n. [10/11/1968] (Gz). SUDAN: Drar & Mahdi 2032 (Gz), 2394 (Gz). SOUTH AFRICA: Natal: J. E. Wood 473 (Pd). ARAFIA: Hedjaz: Khattab K.445 (Gz), K.1515 (Gz). Yemen: Erydolf s.n. [24/5/1972] (Gz); Khattab K.334 (Gz). JORDAN: V. Täckholm s.n. [14/7/1962] (Gz). IRAN: Grant 15081 (E--2144213). AFGHANISTAN: Koelz 13246 (W--2193793). PAKISTAN: Baluchistan: Ali 1111 (Kh), 1222 (Kh). Sind: Abedin 2735 (Kh), 7522 (Kh), 7740 (Kh), 8202 (Kh); Farooqi 6 (Kh), 14 (Kh), 2161 (Kh);

Parooqi & Jaiser 2769 (Kh), 2797 (Kh), 3421 (Kh); S. Khan 893 (Kh); Jaiser 24 (Kh), 259 (Kh), 343 (Kh, Kh); Jaiser & Ghafoor 1659 (Kh), 1674 (Kh), 1351 (Kh), 4392 (Kh); Qureshi 263 (Kh), s.n. [25-5-1963] (Kh). SIKKIM: J. D. Hooker s.n. [alt. 6000 ped.] (Pd). INDIA: Khasi States: Hooker & Thomson s.n. [5-6000 ped.] (Pd). Manipur: G. Watt 7368 (Pd). Uttar Pradesh: Wallich 1825/4 (Pd, Pd). BURMA: Khalil s.n. [Fort Stedman, 1893] (Pd). CHINA: Kiangsu: Chang 2922 (Pa). JAPAN: Honshu: Ohwi s.n. [Jul. 25, 1928] (Ba); Okamoto s.n. [Oct. 18, 1938] (Ba). Kyushu: Oldham 619 (Pd). RYUKYU ISLAND ARCHIPELAGO: Irabu & Shimoji: Okuhara & Sunagawa 81 (W--2628874). Ishigaki: F. R. Fosberg 37244 (W--2628875). Miyako: F. R. Fosberg 38169 (W--2628870), 38374 (W--2628871), 38613 (W--2628872). Taketomi: F. R. Fosberg 37559 (W--2628876). AUSTRALIA: New South Wales: J. G. Smith s.n. [Courke, Aug. 24, 1891] (E--118054). CULTIVATED: India: Collector undetermined s.n. [Botanical Garden] (Pd). LOCALITY OF COLLECTION UNDETERMINED: Collector undetermined s.n. [Baparua, 9th March 1902] (Pd), s.n. [Baparua, 1902] (Pd), s.n. (Pd); McGunn s.n. [Port Philly] (Pd).

VERBENA OFFICINALIS var. *DENSIFLORA* Regel & Winkler ex B. Fedtsch. in O. A. & B. A. Fedtsch., *Consp. Fl. Turkest.* 5: 122, hyponym. 1913.

Bibliography: B. Fedtsch. in O. A. & B. A. Fedtsch., *Consp. Fl. Turkest.* 5: 122. 1913; Fedde & Schust. in Just, *Bot. Jahresber.* 60 (2): 575. 1941; Moldenke, *Phytologia* 25: 231. 1973.

Fedtschenko (1913) cites, probably as the type of this variety, O. A. Fedtschenko s.n., collected on August 2, 1869, in Turkestan.

VERBENA OFFICINALIS var. *GAUDICHAUDII* Eriq.

Additional bibliography: Moldenke, *Phytologia* 24: 26. 1972.

Additional citations: SOUTH AFRICA: Transvaal: Burke 55 (Pd).

VERBENA OFFICINALIS var. *PROSTRATA* Gren. & Godr.

Additional bibliography: J. Torr., *Fl. N. Y.* 2: 52. 1843; Moldenke, *Phytologia* 24: 27 (1972) and 28: 264. 1974.

It seems rather obvious, judging from the description which he gives and the common name which he proposes, that the "*Verbena souria*, Linn." of Torrey (1843) is actually *V. officinalis* var. *prostrata*. He speaks of the stem as prostrate and divaricately branched and calls the plant "Procumbent Vervain". He says that he found it in "Sandy fields in the suburbs of New-York, and near Albany", flowering from August to November. The former locality is most probably on Long Island in what is now Queens County.

Additional citations: SWITZERLAND: Norrman s.n. [1.7.1960] (Cz).

VERBENA OFFICINALIS-*VENOSA* Paxt., *Pock. Bot. Dict.*, ed. 1, 328. 1840.

Bibliography: Paxt., *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed.

2, 328. 1849; Moldenke, *Phytologia* 25: 234. 1973.

Paxton (1840) apparently intended this designation for a supposed garden hybrid between V. officinalis L. and V. rigida Spreng. which he says was introduced into English gardens in 1837 from Oxford and which he describes as an herb having bluish flowers, blooming in August.

xVERBENA OKIAHOIENSIS Moldenke

Additional synonymy: "Glandularia canadensis x G. bipinnatifida" Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 33. 1963. "Verbena bipinnatifida Nutt. x V. canadensis (L.) Britton" ex Moldenke, *Phytologia* 26: 373 & 376, in syn. 1973.

Additional bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 33. 1963; Moldenke, *Phytologia* 24: 27 (1972) and 26: 373 & 376. 1973.

VERBENA ONCUTTIANA Perry

Additional bibliography: Fedde & Schust. in Just, *Bot. Jahresber.* 60 (2): 575. 1941; Moldenke, *Phytologia* 24: 28. 1972.

VERBENA ORIGENES R. A. Phil.

Additional bibliography: Moldenke, *Phytologia* 24: 28--29. 1972.

The corollas on Morrison 17271 are described as having been "white-lilac" when fresh.

Additional citations: CHILE: Coquimbo: Morrison 17271 (Ba).

xVERBENA OSTENI Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 29. 1972.

The corollas on Krapovickas, Cristóbal, & Quarín 22777 are said to have been "white-lilac" when fresh and these collectors describe the plant as prostrate, growing in rocky campos.

Additional citations: BRAZIL: Rio Grande do Sul: Krapovickas, Cristóbal, & Quarín 22777 (Z).

VERBENA OVATA Cham.

Additional bibliography: Moldenke, *Phytologia* 24: 29 (1972) and 25: 230. 1973.

Recent collectors have found this plant growing in "brejo", in "pajonal", and "en vega, borde de arroyo", describing it as growing 1.2--2 m. tall, flowering and fruiting (in addition to months previously reported by me) in March. The corollas on Hatschbach, Smith, & Klein 28218 are said to have been "lilac" in color when fresh and those on Krapovickas, Cristóbal, Arbo, Maruñak, Maruñak, & Irigoyen 17069 were "blue".

Additional citations: BRAZIL: Paraná: Hatschbach, Smith, & Klein 28218 (Ld, N, W--2706776). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Arbo, Maruñak, Maruñak, & Irigoyen 17069 (Ws, Ws). Misiones: Krapovickas, Cristóbal, & Maruñak 15726 (Ws).

VERBENA PARAGUARIENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 29. 1972.

Additional citations: PARAGUAY: T. Rojas s.n. [Hassler 9751] (E--1575069--isotype).

VERBENA PARODII (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 21 & 30 (1972) and 28: 256. 1974.

Vervoorst encountered this plant growing at 3700 meters altitude, in fruit in March. The corollas are said to have been "pale rosy-blue" on Jürgensen 1613 & 1737. Material has been misidentified and distributed in some herbaria as V. microphylla H.B.K.

Additional citations: ARGENTINA: Catamarca: Jürgensen 1613 (E--808173), 1737 (E--823769); Vervoorst 3197 (Ba).

VERBENA PARVULA Hayek

Additional citations: R. C. Foster, *Contrib. Gray Herb.* 184: 171. 1958; Moldenke, *Phytologia* 24: 30--31. 1972.

Ruíz-Teran & López-Figueiras describe this plant as a "hierba sufruticulosa inerme, 20--30 cm., erecta hasta decumbente; flores moradas; escasa" and found it flowering and fruiting in July. Johnson found it fruiting in October.

Additional citations: VENEZUELA: Trujillo: Ruíz-Teran & López-Figueiras 2327 (N). PERU: Cuzco: E. L. Johnson 6309 (E1--55079). BOLIVIA: Cochabamba: J. Steinbach 8729 (E--989726).

VERBENA PAULENSIS Moldenke

Additional & emended bibliography: Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 340 & xix, map 1395. 1971; Moldenke, *Phytologia* 24: 32. 1972.

The Angely (1971) reference cited above was previously erroneously cited by me as "1970", the title-page date, but the work was not actually published until 1971.

VERBENA PEDICELLATA Moldenke

Bibliography: Moldenke, *Phytologia* 25: 431--432. 1973; Moldenke, *Eiol. Abstr.* 56: 3000. 1973.

Citations: BRAZIL: Mato Grosso: Hatschbach 30513 (W--2705730--isotype, Z--type).

VERBENA PERAKII (Covas & Schnack) Moldenke

Additional bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 89. 1968; Moldenke, *Phytologia* 24: 32. 1972.

In addition to the months previously recorded by me, this species has been collected in fruit in March.

Additional citations: ARGENTINA: Salta: Venturi 10301 (E--987939).

VERBENA PERENNIS Wooton

Additional bibliography: Kearney, *List Citations Place Publ. Spp. Ariz. Fl.* 112 [thesis]. 1951; Moldenke, *Phytologia* 24: 32--33 & 257.

1972.

Recent collectors have found this plant growing in mesquite grasslands, on limestone with oak, juniper, and sotol, and in gravelly soil of the pinyon-juniper ecologic community.

Additional citations: TEXAS: Brewster Co.: Warnock 21827 (E1-50033). Culherson Co.: Marcks & Marcks 1310 (M1, Ws). NEW MEXICO: Eddy Co.: Cutak & Christ 67 (E-1286438), 94 (E-1286438); L. C. Higgins 7317 (N); Spellenberg & Spellenberg 3656 (N); Weber & Cronquist 11477 (B1--172023).

VERBENA PERENNIS var. JOHNSTONI Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 33. 1972.

Additional citations: MEXICO: Nuevo León: H. Hernández s.n. [18/V/1965] (Ws).

xVERBENA PERRIANA Moldenke

Additional & emended bibliography: Rydb., *Fl. Prairies & Plains*, pr. 1, 678. 1932; Fell, *Fl. Winnebago Co.* 122. 1955; Rydb., *Fl. Prairies & Plains*, pr. 2, 2: 673. 1971; Moldenke, *Phytologia* 24: 33--34 & 250 (1972) and 28: 196. 1974.

Fell (1955) says of this plant in Winnebago County, Illinois: "A hybrid on the C. & N. W. Ry. track near U. S. Rt. No. 51 tends to be more upright, the bracts are short and the leaves less divided (X perriana)." Kuehlenbach describes the plant as having its stems more or less procumbent, and found it growing along railroad tracks in St. Louis, Missouri, flowering and fruiting in July. The Engelmann collection cited below consists solely of floral dissections of this hybrid, its parental species, and related taxa.

Additional citations: MISSOURI: Saint Louis City: Engelmann s. n. (E--117332); Kuehlenbach 3754 (Z). LOCALITY OF COLLECTION UNDETERMINED: Collector undetermined 6114 (E--118387).

VERBENA PERUVIANA (L.) Britton

Additional & emended synonymy: Verbena chamaedryoides Hort. ex Fedde in Just, *Bot. Jahresber.* 57 (2): 909. 1938. Verbena peruviana Moldenke ex Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 840, sphalm. 1971.

Additional & emended bibliography: Paxt., *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed. 2, 323. 1849; Dupuis, *Nouv. Fl. Usuel. & Méd.* 2: 158. 1860; Fournier, *Quat. Fl. France* 807, fig. 3352 (2). 1861; Gibert, *Enum. Pl. Montevid.* 42. 1873; Wangerin in Just, *Bot. Jahresber.* 58 (1): 845 [275]. 1938; Fedde in Just, *Bot. Jahresber.* 57 (2): 909 (1939) and 58 (2): 668. 1939; Fedde & Schust. in Just, *Bot. Jahresber.* 59 (2): 417 (1939) and 60 (2): 573. 1941; Rambo, *An. Bot. Herb. Barb. Rodr.* 1: 126. 1949; Reitz, *Sellowia* 6: 254. 1954; R. C. Foster, *Contrib. Gray Herb.* 184: 171. 1958; Uraga, *Fl. Nordest.*, ed. 2, 476. 1960; Reitz, *Sellowia* 13: 67 & 110. 1961; Graf, *Exotica* 3: 1482 & 1733. 1963; Burkill, *Dict. Econ. Prod. Malay Penins.* 2: 2266. 1966; Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 86--89 & 92. 1968; Reitz, *Sellowia* 22: 145. 1970; Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 840 & xix. 1971; Amaral Franco in Tutin & al., *Fl.*

Eur. 3: 122. 1972; R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2303. 1972; Encke & Buchheim in Zander, Handwörterb. Pflanzennam., ed. 10, 520. 1972; P. Perry, Fls. World 303 & 320. 1972; Skinner, Ornament. Fl. Coastal Northw. 75. 1972; Moldenke, Phytologia 24: 34-39, 48, 49, 137, 140, 147, & 234 (1972) and 25: 234 & 244. 1973; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 45 & 143. 1973; Tutin in Tutin & al., Fl. Eur. 3: 369. 1973; Moldenke, Phytologia 28: 116, 200, 208, 221, & 258. 1974.

Additional illustrations: Fournier, Quat. Fl. France 807, fig. 3352 (2). 1861; Graf, Exotica 3: 1482. 1963.

Additional vernacular names recorded for this species are "formosa sem dote", "jurujuba", and "verveine à feuilles de Chamaedrys". Recent collectors describe the plant as a semiprostrate, decumbent, or low mat-forming herb. Hatschbach & Koczicki found it "encostas graminosas de morro". The corollas are described as having been "red" on Krapovickas, Cristóbal, Lroginski, & Fernandez 22283 and Rosengurtt & Gallinal 5694, "bright-red" on Dress 7294, and "vermillion" on Hatschbach & Koczicki 27219; on E. M. Bates 96 and J. V. Pancho 81 they are described as "corolla-lobes RHS [Royal Horticultural Society] Orient Red 819".

Paxton (1840) avers that the species was introduced into cultivation in England in 1827.

Graf (1963) describes the cultivar "Chiquita" as a "pretty, trailing plant with small foliage, and numerous clusters of flowers gayly striped lavender with white, reminding [one] of a peppermint stick" and the cultivar "Flame" as a "low carpet-forming prostrate perennial, in its original form, with crimson flowers, at home in Peru, Uruguay, and So. Brazil; the first creeping and rooting, then ascending branches with crenate, rough leaves 1--2 in. long, and showy clusters of salver-form flowers 1/2 inch wide; brilliant scarlet in this color-form, and nearly everblooming, especially in summer." Dupuis (1860) gives cultural directions: "juin-octobre. Semer sur couche en mars et avril, ou bien aussitôt après la maturité des graines. Boutures et marcottes, faites d'août en octobre, relevées en automne, et mises en pots que l'on hiverne sous châssis, pour mettre en pleine terre à la fin de mai. Pincer l'extrémité des rameaux."

Solbrig (1963) informs us that V. stellarioides Cham. and V. peruviana will not hybridize where they grow together in the wild, but will cross with individuals brought in from populations outside the particular area. He avers that the normal pollen fertility in V. peruviana is 93 percent.

It should be noted here that the Angely (1971) reference cited in the above bibliography was previously erroneously cited by me as "1970", the title-page date, but the work was not actually issued until 1971. The photograph of Stafford s.n. in the herbarium of the L. H. Bailey Hortorium, cited below, is of a sheet preserved in the United States National Herbarium in Washington. The Commerson 72 specimens of which there is also a photograph in the Bailey Hortorium herbarium, also cited below, are deposited in the

Paris herbarium, the Gay s.n. specimen is in the Britton Herbarium at the New York Botanical Garden, and the others are at Kew.

Dr. T. Sprague, in notes to Dr. L. H. Bailey dated 9/6/24, says "V. chamaedryfolia Juss. was based on Erinus peruvianus L., which was based on Lychnidaceae Veronicaceae folio flore coccineo Feuill. Obs. iii. Hist. Pl. Med. 36, t. 25, fig. 3 (1725). The specimens (if any) collected by Feuillée do not appear to have been preserved. Hence Feuillée's figure and description should be used as standard for purposes of identification...V. Melindres Gill. ex Lindl. Bot. Mag. t. 1134 (1828). The type-specimen is presumably in Lindley's herbarium at Cambridge. A small specimen received by Bentham from Lindley in 1829 as V. Melindres, and a more complete one cultivated in Jersey in 1832 (Herb. J. Gay.) are being photographed. They are well authenticated." The Lindley specimen here referred to may actually be an isotype or clastotype of V. melindres.

For an artificial hybrid between V. peruviana and V. canadensis (L.) Britton, see under Verbena canadensis (L.) Britton x V. peruviana (L.) Britton in these notes.

The Britton & Britton 237 and the Brown & Britton 1728, distributed as V. peruviana, are actually xV. hybrida Voss, Hassler 12335 is V. incisa Hook., and Schulz & Varela 5128 is V. scrobiculata Griseb. Herb. Missouri Bot. Gard. 117739 is a mixture with V. canadensis (L.) Britton.

Additional citations: BRAZIL: Rio Grande do Sul: Hatschbach 27217 (N); Hatschbach & Koczicki 27219 (Ld). URUGUAY: Comerson 72 [Herb. Jussieu 5111, in part] (Ba--photo); C. Gay s.n. [Montevideo] (Ba--photo); Herb. Bernhardt s.n. [Montevideo] (E--118045); Rosengurt & Gallinal 5694 (Ba); Safford s.n. [La Paz, Oct. 24, 1886] (Ba--photo). ARGENTINA: Buenos Aires: Krapovickas, Cristóbal, Lroginski, & Fernandez 22238 (Ld). Catamarca: Riggs 102 (E--968110). CULTIVATED: England: Herb. Hort. Lindley s.n. [1829] (Ba--photo). Jersey: Herb. J. Gay s.n. [14e Aout 1832] (Ba--photo). Missouri: Engelmann s.n. [June 1842] (E--117331); Herb. Missouri Bot. Gard. 117739, in part (E). New York: Dress 7294 (Ba), 10502 (Ba). Pennsylvania: D. M. Bates 96 (Ba); J. V. Pancho 81 (Ba). Wisconsin: Wanderly s.n. (Ws). MOUNTED ILLUSTRATIONS: Curtis, Bot. Mag. 61: pl. 3333. 1834 (Ba--photo); Edwards, Bot. Reg. 14: pl. 1134. 1828 (Ba--photo); Lodd., Bot. Cab. 16: pl. 1514. 1829 (Ba--photo).

VERBENA PERUVIANA (L.) Britton x V. MONICOLOR Moldenke

Synonymy: Glandularia peruviana x moricolor Solbrig in Heywood, Mod. Meth. Pl. Tax. 87 & 89. 1968. "Glandularia peruviana x G. moricolor" Solbrig in Heywood, Mod. Meth. Pl. Tax. 88. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87--89. 1968; Moldenke, Phytologia 24: 38. 1972.

VERBENA PERUVIANA (L.) Britton x V. PULCHELLA Sweet

Additional synonymy: Glandularia peruviana x pulchella Solbrig in Heywood, Mod. Meth. Pl. Tax. 87. 1968.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 87. 1968; Moldenke, Phytologia 24: 48. 1972.

Solbrig (1968) reports the normal pollen fertility in this hybrid as 70 percent.

VERBENA PERUVIANA f. ROSEA Moldenke

Additional synonymy: Verbena peruviana rosea Moldenke ex Reitz, Sellowia 22: 145. 1970.

Additional bibliography: Reitz, Sellowia 22: 145. 1970; Moldenke, Phytologia 24: 39 (1972) and 25: 244. 1973.

VERBENA PHLOGIFLORA Cham.

Additional synonymy: Verbena megapota mica α phlogiflora (Cham.) Kuntze, Rev. Gen. Pl. 3 (2): 256. 1898. Verbena megapota mica β tweediana (Niven) Kuntze, Rev. Gen. Pl. 3 (2): 256. 1898. Verbena phlogiflora var. beta Troncoso, Darwiniana 16: [613]. 1971. Verbena melindres latifolia Hort. ex Moldenke, Phytologia 26: 377, in syn. 1973. Verbena tweediana latifolia Hort., in herb. Verbena tweediana superba Hort., in herb.

Additional & emended bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Gibert, Enum. Pl. Montevid. 42. 1873; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 2, 5, & 23, pl. 1, fig. 1, & text fig. 1. 1962; Reitz, Sellowia 22: 145. 1970; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 840 & xiv, map 1395. 1971; Anon., Biol. Abstr. 54 (5): B.A.S.I.C. S.106. 1972; Encke & Buchheim in Zander, Handwörterb. Pflanzennam., ed. 10, 520. 1972; Huang, Pollen Fl. Taiwan 244, pl. 163, fig. 8--11. 1972; S. K. J., Biol. Abst. 54: 2319. 1972; F. Perry, Fls. World 303 & 320. 1972; Moldenke, Phytologia 24: 39--40. 1972; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 45 & 148. 1973; Moldenke, Phytologia 28: 221 & 255. 1974.

Emended illustrations: Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 3, pl. 1, fig. 1, & text fig. 1. 1962.

Recent collectors describe this plant as decumbent or procumbent and have found it on campos with Pteridium aquilinum, along highways through secondary woods, in "brejo", and in "orla mata". The corollas are described as having been "violet" in color when fresh on Hatschbach 23670 & 26081 and Hatschbach, Smith, & Klein 23348, "dark-lilac" on Hatschbach 30788 and Hatschbach & Guimarães 24816, "purple" on Krapovickas, Cristóbal, & Marufiak 22995m and "limb purple (2,5 P 6/4), the center darker" on Lindeman & Haas 3008. It is most probable that the pollen characters enumerated by Huang (1972) for this species on the basis of material taken from Hsieh 22435 apply to xV. hybrida Voss instead (I have not as yet been able to examine the Hsieh specimen). I would be very much surprised if the true V. phlogiflora occurs on Formosa.

The Angely (1971) reference given in the bibliography above was previously erroneously cited by me as "1970", the title-page date; th work actually was not published until 1971.

According to Paxton (1840), Verbena phlogiflora was introduced into cultivation in England in 1831. The photographs cited below from the L. H. Bailey Hortorium herbarium are all of specimens deposited in the herbarium of the Royal Botanic Gardens at Kew, with the exception of that of Regnell I.311 (which is deposited in the United States National Herbarium in Washington) and that of Sellow s.n. (which was in the herbarium of the Botanisches Museum in Berlin). The Nevin s.n. specimen in the Kew herbarium is the type of V. tweediana Hook. The Herb. Bentham s.n. [Hort. Soc. Lond. hort. 1838] specimen is probably the actual type of V. melindres latifolia Hort., Dr. L. H. Bailey says of it "Calyx strigose-pubescent, sparingly glandular; sts. similar; lvs. strigose-hairy both sides" and "Rough to the finger, with stiff hairs often bulbous-based, appressed on lvs."

The Herb. Gay s.n. [Jardin du Luxembourg 10 Nov. 1842] collection is probably the type of V. buistii Gay. Dr. Bailey says of it "Rough or scabrous to the feel from many stiff hairs, those on leaves appressed" -- examination with a handlens shows the lower leaf-surface and stems densely pubescent, but not with pubescence of the type seen in V. hybrida Voss. The other Herb. Gay s.n. from the same source is inscribed "Verbena Tweediana Hook. P. L. [Bot. Mag.] t. 3541" and over the label is written in pencil "V. phlogiflora α vulgaris Schauer". Dr. Bailey notes of it "Calyx strigose-pubescent, sparingly glandular; sts. same. Lvs. strigose-hairy above and below" and "Plant scabrous or rough to the feel. Hairs stiff, some of them bulbous-based or from papillae".

The second Herb. Bentham specimen from the same source as the one referred to above is probably the actual type of V. tweediana superba Hort., and Dr. Bailey says of it "Scabrous to rough to fingers, with stiff hairs, on lvs. appressed" and examination under a handlens shows the lower leaf-surface and stems distinctly pubescent or puberulent. The third Herb. Bentham s.n., also from the same source, is probably the type of V. arraniana Fort., and Dr. Bailey, in his longhand notes on the sheet, says of it "Calyx and sts. strigose-pubescent, sparingly glandular. Lvs. strigose-hairy both sides" and "Rough or scabrous to the finger, with stiff hairs, appressed on the lf., often with bulbous bases" -- examination, again, under a handlens shows a distinct pubescence.

I have no doubt at all that all these authentic specimens referred to in the above paragraphs represent the very same taxon.

Additional citations: BRAZIL: Mato Grosso: Hatschbach 23670 (ld), 26081 (ld). Minas Gerais: Regnell I.311 [21/10/1864] (Pa-photo, Pa-photo). Paraná: Hatschbach 30788 (ld); Hatschbach & Guimarães 24816 (Ac); Hatschbach, Smith, & Klein 28348 (ld, W-2706628); Lindeman & Haas 3008 (N). Rio Grande do Sul: Krapovickas, Cristóbal, & Karuffak 22995 (ld). State undetermined: Sellow

s.n. [Macbride photos 34351] (Ba--isotype, Ba--photo of isotype).
 CULTIVATED: England: Herb. Bentham s.n. [Hort. Soc. Lond. hort. 1833; *V. arraniana*] (Ba, Ba--photo, Ba--photo), s.n. [Hort. Soc. Lond. hort. 1833; *V. melindres latifolia*] (Ba--photo, Ba--photo), s.n. [Hort. Soc. Lond. hort. 1833; *V. tweediana latifolia*] (Ba--photo, Ba--photo), s.n. [Hort. Soc. Lond. hort. 1833; *V. tweediana superba*] (Ba, Ba--photo, Ba--photo). France: Herb. Gay s.n. [Jardin du Luxembourg 10 Nov. 1842; *V. buistii*] (Ba, Ba--photo, Ba--photo), s.n. [Jardin du Luxembourg 10 Nov. 1842; *V. tweediana*] (Ba--photo, Ba--photo). Ireland: Nevin s.n. [Glasnevin Bot. Gard. Dublin] (Ba--photo). MOUNTED ILLUSTRATIONS: Curtis, Bot. Mag. 63: pl. 354l. 1836 (Ba--photo, Ba--photo, Ba--photo); Paxt., Mag. Bot. 4: pl. 5. 1838 (Ba--photo, Ba--photo, Ba--photo).

VERBENA PINETORUM Moldenke

Additional bibliography: Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [thesis]. 1951; Moldenke, Phytologia 24: 40. 1972.

VERBENA PLATENSIS Spreng.

Additional synonymy: *Verbena teucroioides* Hook. ex Dupuis, Nouv. Fl. Usuel. & Med. 2: 158. 1860. *Verbena tencrioides* Gill. ex Gibert, Enum. Pl. Montevid. 42, sphalm. 1873. *Verbena teucriodes* Roberts, Viability of Seeds 308, sphalm. 1972.

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328. 1840; Hassall, Ann. Mag. Nat. Hist. 9: 550. 1842; Paxt., Pock. Bot. Dict., ed. 2, 328. 1849; Dupuis, Nouv. Fl. Usuel. & Med. 2: 158. 1860; Gibert, Enum. Pl. Montevid. 42. 1873; R. Bailey, Good House-keep. Ill. Encycl. Gard. 15: 2303. 1972; Encke & Buchheim in Zander, Handwörterb. Pflanzennam., ed. 10, 520. 1972; Moldenke, Phytologia 24: 41--43. 1972; F. Perry, Fls. World 303 & 320. 1972; Roberts, Viability of Seeds 308. 1972; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 45 & 148. 1973; Moldenke, Phytologia 28: 221. 1974.

Dupuis (1860) describes the flowers of this species as "fleurs grandes, blanches ou rosées" and calls the plant "verveine fausse Germandrée". Paxton (1840) says that it was introduced into cultivation in England in 1837. Callinal and his associates describe the flowers as fragrant. The corollas on Callinal, Aragone, Bergalli, Campal, & Rosengurt B.81C are described as having been "white".

Bailey (1972) describes the plant as "A perennial with yellowish or pinkish fragrant flowers in terminal spikes". Gay (1849) comments that "Esta especie es muy notable por la elegancia de sus flores y el buen olor de jazmin que despiden; se halla igualmente entre Santiago y Mendoza y á una altura de diez mil piés". I have seen no material from Chile and suspect that, as in the case of *V. radicata* Moldenke, it may occur only in the Argentine portion of the route described by Gay.

The Jørgensen 1297 specimen of which there is a photograph in

the Bailey Mortorium herbarium is deposited in the United States National Herbarium in Washington; the other two Bailey Mortorium photographs cited below represent specimens in the herbarium of the Royal Botanic Gardens at Kew, the Gillies s.n. collection being the type of V. teucrioides Gill. & Hook. I have examined it and it has very long, narrow, coarsely dentate but not lobed leaves and may very well represent what we now know as var. stenodes Briq. Dr. T. A. Sprague, in a letter to Dr. Liberty Hyde Bailey dated 9/6/24, says "V. teucrioides Gill. et Hook. Bot. Misc. i. 167 (1829) I consider that the type-specimens are represented by four small pieces arranged horizontally on a sheet in Herb. Hook., with the name 'Gillies' written below. They agree with the original diagnosis, and are being photographed. Sibert llll, from Montevideo, a fine specimen of the usual lowland form of V. teucrioides is also being photographed, as the type-specimens from 10,000 ft. give a very misleading idea of the sp."

Additional citations: URUGUAY: Gallinal, Aragone, Bergalli, Campal, & Rosengurtt E.310 (Ba, Ba); Sibert llll (Ba--photo); Herb. Bernhardi s.n. (E--118052). ARGENTINA: Catamarca: Jørgensen 1297 [Herb. Osten 11350], in part (Ba--photo). Mendoza: Gillies s.n. (Ba--photo). MOUNTED ILLUSTRATIONS: Hook. in Curtis, Bot. Mag. 65: pl. 3694. 1839 (Ba--photo, Ba--photo. Ba--photo).

VERBENA PLATENSIS var. STENODES Briq.

Additional bibliography: Moldenke, Phytologia 24: 43. 1972.

The type collection of V. teucrioides Gill. & Hook., at Kew, exhibits very long, narrow, very coarsely dentate but not lobed leaves and may actually represent var. stenodes.

VERBENA PLICATA Greene

Additional bibliography: Moldenke, Phytologia 24: 43--46 & 54. 1972; Burlage, Wild Flow. Pl. Lakes Country llll. 1973; Moldenke, Phytologia 23: 258. 1974.

The corollas on C. L. Lundell 10827 & 11375 are described as having been "purple" when fresh, while those on shiners 17647 were "purple-blue".

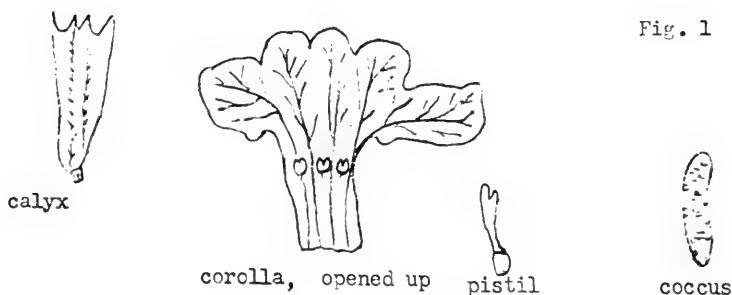


Fig. 1

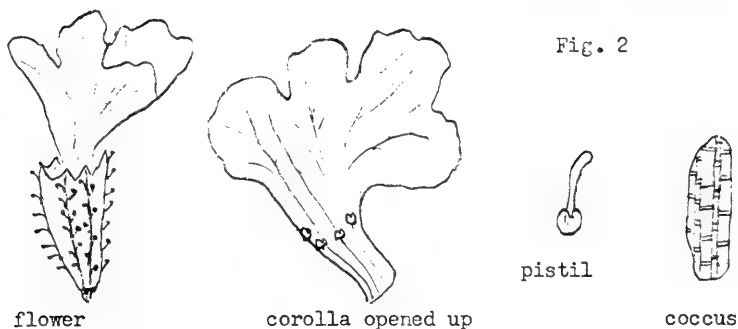


Fig. 2

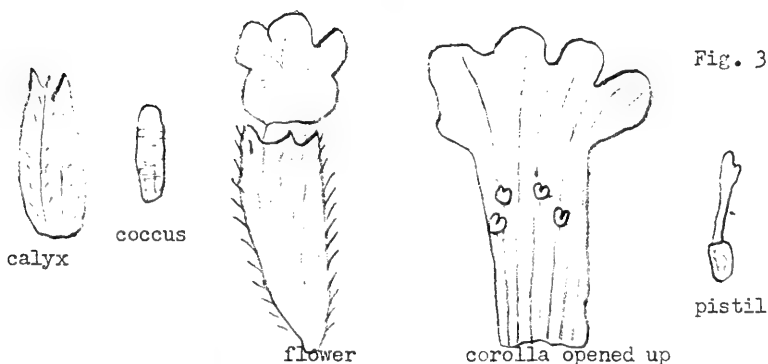


Fig. 3

Fig. 1 from Earle & Tracy 30; Fig. 2 from Earle & Tracy 41;
 Fig. 3 from Pringle s.n. [June 8]. Enlarged.

Burlage (1973) records the common names, "Large-flowered vervain" and "whitevein verbena", for this species and describes it thus: "The flowers are generally bluish-lavender but vary from white to lavender. They are 1/2 inch broad. They grow in spikes. They are perennial and with numerous stems which form erect clumps that are 1--2 feet high. These bloom from February to May." Higgins encountered it in sandy soil of mesquite-Yucca-shortgrass and the mesquite-Rhus-Yucca ecologic communities in Texas and in the Larrea community in New Mexico

Additional citations: TEXAS: Armstrong Co.: L. C. Higgins 4418 (Mi). Brooks Co.: C. L. Lundell 10827 (Mi). Childress Co.: L. C. Higgins 7065 (N). Garza Co.: A. Ruth 1289 (Ba). Hall Co.: L. C. Higgins 7183 (N). Jim Hogg Co.: Botello & Ayala 12 (Bl--210553). Mitchell Co.: Lundell & Lundell 11375 (Mi). Starr Co.: Tharp & York 51-134 (Bl--87391). Webb Co.: Shinners 17647 (Bl--91107). Zapata Co.: Arizmendi 59 (Bl--197940); Guerra, Garcia, Garcia, & Salazar 607 (Bl--210761); J. O. Perez 44 (Bl--210549). NEW MEXICO:

Chaves Co.: L. C. Higgins 7023 (N).

VERBENA PULCHELLA Sweet

Additional & amended bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Dupuis, Nouv. Fl. Usuel. & Med. 2: 104. 1860; Gibert, Num. Pl. Montevid. 43. 1873; Solbrig in Heywood, Mod. Meth. Pl. Tax. 86--89. 1963; Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 840 & xix. 1971; R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2303. 1972; Moldenke, Phytologia 24: 212, 233, 236, 238, & 239 (1972), 25: 234 & 244 (1973), and 28: 202, 247, & 255. 1974.

The Angely (1971) reference in the above bibliography was previously erroneously cited by me as "1970", the title-page date, but volume 5 of this work actually was not issued until 1971.

Dupuis (1860) regards V. tenera Spreng. as synonymous with V. pulchella, gives the common name as "verveine gentille", and describes the plant as "Vivace, cultivée comme annuelle; tiges de 15 c. [sic!], traçantes; feuilles découpées; fleurs bleu violacé; juin-octobre. Semer sur couche au commencement du printemps et repiquer sur couche, ou en pépinière, en septembre, pour repiquer et hiverner sous châssis." Paxton (1840) states that it was introduced into cultivation in England in 1827. Solbrig (1968) reports that its normal pollen fertility rate is 94 percent.

Bailey (1972) refers to V. pulchella as "moss vervain" [a name more usually applied to V. tenuisecta Briq.] and says of it: "Often listed in catalogs as V. erinoides. Perennial. Fernlike, deeply cut foliage and showy close-clustered heads of small lavender flowers." It is very possible that he is referring here to the commonly cultivated V. tenuisecta rather than to the true V. pulchella. The "Italian variety" which he mentions is a variety of V. tenera Spreng.

The Krapovickas & Cristóbal 15588, distributed as V. pulchella, is actually V. tenuisecta var. alba Moldenke.

Additional citations: ARGENTINA: Buenos Aires: A. T. Hunziker 4532 (C--1305277). MOUNTED ILLUSTRATIONS: Sweet, Brit. Flow. Card. 3: pl. 295. 1822 (Ba--photo, Ba--photo, Ba--photo).

VERBENA PULCHELLA f. COROLLA-ALBIDA Paxt., Pock. Bot. Dict., ed. 1, 328 [as "pulchella corolla-albida"]. 1840; Moldenke, Phytologia 25: 234 & 244. 1973.

Synonymy: Verbena pulchella corolla-albida Paxt., Pock. Bot. Dict., ed. 1, 328. 1840.

Bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Moldenke, Phytologia 25: 234 & 244. 1973.

Paxton (1840) states that this form was introduced into cultivation in England in 1834.

VERBENA PULCHRA Moldenke

Additional bibliography: Angely, Fl. Anal. & Fitogeogr. S. Paulo, ed. 1, 4: 840, map 1395. 1971; Moldenke, Phytologia 24: 49.

1972.

Recent collectors describe this plant as a decumbent herb, growing to 50 cm. tall, and have found it at the edge of a river and in wet places in "varzea" land [inundated campo], flowering in October and December. The corollas on Hatschbach 25733 are said to have been "lilac" in color when fresh, while those on Hatschbach 14769 were "violet".

Additional citations: BRAZIL: Paraná: Hatschbach 14769 (Ld), 25733 (Ld).

VERBENA PUMILA Rydb.

Additional synonymy: Verbena pimila Rydb., in herb.

Additional & emended bibliography: Irwin & Wills, Roadside Fls. Tex. 189--190, pl. 39. 1961; Moldenke, Phytologia 24: 49--53. 1972; Rickett, Wild Fls. U. S. 6 (3): 544, [545], & 783, pl. 196. 1973; Moldenke, Phytologia 28: 199 & 204. 1974.

Additional illustrations: Irwin & Wills, Roadside Fls. Tex. pl. 39 (in color). 1961; Rickett, Wild Fls. U. S. 6 (3): [545], pl. 196 (in color). 1973.

Recent collectors have encountered this plant in "cajetes" in cultivated alluvial valleys, in pinyon-juniper communities on rocky hillsides, and in sandy soil of the mesquite-Yucca-short-grass ecologic community, and report that the flowers are employed medicinally in the treatment of earache. The corollas are said to have been "magenta-rose" on Shinners 13556, "red-violet" on Messer 22, "rose-pink" on C. L. Lundell 10931 and Lundell & Lundell 11401, and "pinkish-purple with a minute yellow eye" on Lundell & Lundell 11435.

Additional citations: OKLAHOMA: Major Co.: Goodman & Waterfall 4204 (Bl--93126). Murray Co.: Hopkins, MacDowell, & Copeland 6390 (Ba); Hopkins, Nelson, & Nelson 159 (Ba). TEXAS: Archer Co.: Shinners 13556 (Bl--91096), Childress Co.: L. C. Higgins 7093 (N). Dallas Co.: J. Reverchon s.n. [Curtiss 1963**] (Mi). Ector Co.: Lundell & Lundell 11401 (Mi). Meberg Co.: Tharp & York 51-240 (Bl--37404). Medina Co.: C. L. Lundell 10931 (Mi, Mi). Randall Co.: Lundell & Lundell 11435 (Mi). Sutton Co.: Rohrbaugh 372 (Bl--174976). Tarrant Co.: Ruth 110 (Ba). NEW MEXICO: Eddy Co.: L. C. Higgins 6743 (N). MEXICO: Oaxaca: Messer 22 (Mi).

VERBENA PUMILA f. ALBIDA Moldenke

Additional bibliography: Moldenke, Phytologia 24: 51--53. 1972; Rickett, Wild Fls. U. S. 6 (3): 544. 1973.

VERBENA QUADRANGULATA Heller

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 402. 1938; Moldenke, Phytologia 24: 51--53. 1972.

The corollas are said to have been "pale-lavender" when fresh on C. L. Lundell 10692.

The Tharp & York 51-240, distributed as V. quadrangulata, is actually V. pumila Rydb.

Additional citations: TEXAS: Cameron Co.: C. L. Lundell 10692 (Mi). Duval Co.: M. C. Johnston 54106 (Bl--103369). Webb Co.: Fowler & Vergara 103 (Bl--177951); Gamez 80 (Bl--197932). Zapata Co.: Barrera & Laurel 90 (Bl--197936); J. R. Rodriguez 30 (Bl--197937). MEXICO: Tamaulipas: Dominguez M. & McCart 8182 (Bl--197824).

VERBENA RACEMOSA Eggert

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 88 & 89. 1968; Moldenke, Phytologia 24: 51 & 53--54 (1972) and 28: 209. 1974.

Additional citations: TEXAS: Pecos Co.: Cory 53500 (Bl--90637).

VERBENA RADICATA Moldenke

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Wangerin in Just, Bot. Jahresber. 55 (1): 834 (1935) and 56 (1): 669. 1936; R. Failey, Good Housekeep. Ill. Encycl. Gard. 15: 2303. 1972; Moldenke, Phytologia 24: 54 & 126. 1972; Anon., Biol. Abstr. 55 (10): B.A.S.I.C. S.270. 1973; Moldenke, Biol. Abstr. 55: 1287. 1973; Hocking, Excerpt. Bot. A. 23: 291. 1974.

Paxton (1840) asserts that this species was introduced into cultivation in England in 1832.

Although Gay (1849) records it as growing in the region between Santiago and Mendoza, I have seen no material of it from Chile as yet and suspect that, as in the case of V. platensis Spreng., it may be only in the Argentine section of this area that the plant occurs. Bailey (1972) describes it as having "Leaves are divided, flowers lavender and fragrant. Native to the Andes Mountains."

VERBENA RADICATA var. GLABRA (Hicken) Moldenke

Additional bibliography: Moldenke, Phytologia 24: 126. 1972; Anon., Biol. Abstr. 55 (10): B.A.S.I.C. S.270. 1973; Moldenke, Biol. Abstr. 55: 1287. 1973; Hocking, Excerpt. Bot. A. 23: 291. 1974.

VERBENA RECTA H.B.K.

Additional bibliography: Sanchez Sanchez, Fl. Val. Mex., ed. 1, 328--329, fig. 263-C. 1969; Moldenke, Phytologia 24: 126--127. 1972.

Illustrations: Sanchez Sanchez, Fl. Val. Mex., ed. 1, fig. 263-C. 1969.

Recent collectors have encountered this plant in meadows, along mountain streams, and among oaks, Agave, and many Commelinaceae, flowering in September, and fruiting in July and September. Sanchez Sanchez (1969) found it growing in the pedregal of the Valley of Mexico, where, he says, it "Florece por el mes de septiembre". The corollas on H. E. Moore 3428 are said to have been "deep-blue" when fresh.

The S. López 89, distributed as V. recta, is actually V. carolina

L.

Additional citations: MEXICO: Hidalgo: Dunn, Dzieskanowski, & Bolingbroke 20276 (E--2112526). México: Lyonnet 3373 (W--2636375). Morelos: H. E. Moore 3428 (Pa). Puebla: C. M. Clark 7348 (E--1287371).

VERBENA RECTILOBA Moldenke, *Phytologia* 26: 409. 1973.

Bibliography: Moldenke, *Phytologia* 26: 409. 1973.

Citations: BRAZIL: Rio Grande do Sul: Krapovickas, Cristóbal, & Quarín 22825 (Z--type).

VERBENA BIFOLIA Walp.

Additional bibliography: Moldenke, *Phytologia* 24: 127. 1972.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: Herb. Bernhardi 133 (E--118050).

VERBENA RIGIDA Spreng.

Emended synonymy: Verbena venosa Gill. ex Gibert, *Enum. Pl. Montevid.* 43. 1873.

Additional bibliography: *Part.*, *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed. 2, 328. 1849; Dupuis, *Nouv. Fl. Usuel. & Med.* 2: 80. 1860; Gibert, *Enum. Pl. Montevid.* 43. 1873; Trimen, *Handb. Fl. Ceylon* 3: 349. 1895; J. C. & M. Willis, *Rev. Cat. Flow. Pl. Ceyl.* [Perad. *Man. Bot.* 2:] 142. 1911; Wangerin in *Just, Bot. Jahresber.* 51 (1): 554 [520]. 1929; Alston in *Trimen, Handb. Fl. Ceylon* 6: 231. 1931; Fedde in *Just, Bot. Jahresber.* 51 (2): 382. 1933; Jex-Blake, *Gard. East Afr.*, ed. 1, 266 (1934) and ed. 2, 87 & 301. 1939; Wangerin & Krause in *Just, Bot. Jahresber.* 60 (1): 753 [371] & 823. 1941; Jex-Blake, *Gard. East Afr.*, ed. 3, 77. 1950; G. M. Barroso, *Rodriguésia* 32: 70. 1957; R. C. Foster, *Contrib. Gray Herb.* 184: 171. 1958; Abeywickrama, *Ceylon Journ. Sci. Biol.* 2: 217. 1959; Martin & Noel, *Fl. Albany & Bathurst* 92. 1960; P. Fournier, *Quat. Fl. France* 806. 1961; Mair & Rehman, *Bull. Nat. Bot. Gard. Lucknow* 76: 3--5, text fig. 4. 1962; Watt & Breyer-Brandwijk, *Med. & Poison. Pl. S. & East Afr.*, ed. 2, 1054 & 1453. 1962; Gunawardena, *Gen. & Sp. Pl. Zeyl.* 147. 1968; Angely, *Fl. Anal. & Fitogeogr. S. Paulo*, ed. 1, 4: 840 & xix, map 1395. 1971; Eastick, *Castanea* 36: 206. 1971; Aleman & al., *Fl. kulturpfl.* 19: 359--425. 1972; Amaral Franco in *Tutin & al., Fl. Eur.* 3: 123. 1972; R. Bailey, *Good Housekeep. Ill. Encycl. Gard.* 15: 2303. 1972; Beadle, Evans, Carolin, & Tindale, *Fl. Sydney Reg.* 507. 1972; C. A. Br., *Wildfls. La.* 156 & 246. 1972; Encke & Buchheim in *Zander, Handwörterb. Pflanzennam.*, ed. 10, 520. 1972; G. W. Park, *Parks Flow. Book* 1973: 86. 1972; Skinner, *Ornament. Pl. Coastal Northw.* 75. 1972; Stalter, *Castanea* 37: 225. 1972; Tutin in *Tutin & al., Fl. Eur.* 3: 369. 1972; Moldenke, *Phytologia* 24: 219--220, 224, & 237 (1972) and 25: 225, 226, & 244. 1973; Anon., *Hort. Bot. Univ. Monaster. Ind. Sem.* 1972/73: 710. 1973; Farnsworth, *Pharmacog. Titles* 8 (8): xxiii. 1973; W. A. Burpee, *Burpee Seeds* 1974: 54. 1974; Lasser, Braun, & Steyerma., *Act. Bot. Venez.* 9: 36. 1974; Moldenke, *Phytologia* 28: 116, 196, 220, & 245. 1974.

Additional illustrations: C. A. Br., Wildfls. La. 156 (in color). 1972.

Recent collectors have found this plant growing in campos, "campo sujo", roadsides, and sunny sandy-clay sloping roadsides, in brackish marshes, sunny roadside ditches, sand of dry succulent bushveld, and sandy-loam soil in oak-pine associations, and along railroad tracks, ascending to 2400 meters altitude. Payson refers to it as "semi-prostrate", but Hanscom describes it as a "perennial herb, upright"; Dress says that in cultivation it is grown as an annual. Mrs. Pracelin found a specimen "over 2 feet tall", while Balakrishnan makes the impossible assertion that it is a "1.2 m. tall shrub". It has a decided tendency to spread in and from cultivation.

The corollas are said to have been "purple" on Hanscom s.n. [May 20, 1963], Krapovickas, Cristóbal, Maruñak 25324, and Shacklette 6392, "purple (10.0 P 5/10)" on Winters & Haas 3134, "purplish" on my Cayman collection cited below, "blue" on Mueller-Dombois 63051848, "violet" on Dress 1390, Matschbach 28463, 28510, 32736, & 32787, and Hummrow 40, "mauve" on Balakrishnan M.K. 443, "deep-mauve" on Gillett 32-60-76, "dark-mauve" on Payson S. 3603, "mauve-purple" on G. L. M. Lawrence 451, "rose-purple" on Moldenke 3074, "azul-morado" on Rosengurtt E. 5301, and RHS [Royal Hort. Soc. Colour Chart] 33 on G. L. M. Lawrence s.n. [Aug. 12, 1941], while on Nikoff 1336 the collector says "corolla-lobes RHS Rose Purple, pinker toward throat". Purpee (1974) describes the plant as "Very useful mauvish-blue flowered plant. Ideal as a foil for brightly colored summer bedding plants", attaining a height of 1 foot. He offers a packet of seeds for 45 cents, one-eighth ounce for \$1.25, and a quarter ounce for \$2.25. Lasser, Barun, & Steyermark (1974) report it as cultivated in Venezuela.

T. S. Cochrane, in a letter to me dated July 19, 1972, says that the following specimens of V. rigida are in the herbarium of the University of Wisconsin: SOUTH CAROLINA: Richland Co.: Logue 276. ALABAMA: Tuscaloosa Co.: Beremus 571. MISSISSIPPI: Hancock Co.: F. H. Sargent 3356. LOUISIANA: Ascension Par.: Sauer 3024. TEXAS: Harris Co.: G. L. Fisher s.n. [14 Sept. 1913] (2 sheets). Stalter (1972) records the species from Georgetown County, South Carolina. Martin & Noel (1960) describe the flowers as "purple" and found the plant growing in grasslands and on road margins, flowering from November to March. Park (1972) calls it the "Hardy Verbena Venosa", describes it as growing 1 foot tall, with "lavender" flowers, and sells a packet of 100 seeds for 45 cents. Leadle and his associates (1972) describe the corollas as "purple", the "Plant usually 20--40 cm high with a creeping rhizome and erect or ascending stems." They refer to it as the "Veined Verbena" and assert that in the Sydney, Australia, region it is a "Weed of waste ground and railway enclosures. Introd. from S. Amer." The Gillett 32-60-76, cited below, was grown from seed received from Germany.

The Angeley (1971) work referred to in the bibliography above was

previously erroneously cited by me as "1970", the title-page date, but the volume concerned was not actually published until 1971. Angely refers to the plant as a nomophyte, growing in "varzea e postos úmidos" at 720--750 m. altitude in São Paulo, Brazil, flowering and fruiting there in December. Watt & Breyer-Brandwijk (1962) call the plant "Veined Vervein" and "morod" and comment that "The Sotho use a decoction of the root...for heartburn and colic.....Pammel....states that it is irritant. The plant has been suspected of causing sickness in stock, the symptoms being constipation, feverishness and 'swelling at throat and neck'..... The leaf contains urease and the stem a trace....The plant gives negative antibiotic tests."

Paxton (1840) avers that this species was introduced into cultivation in England as V. venosa in 1830 and as V. rugosa in 1833. Fournier (1961) reduces it to synonymy under V. chamaedryfolia [= V. peruviana (L.) Britton], which is palpably ridiculous. Dupuis (1860) calls it "Verveine veinée" and describes it as "Vivace, cultivée comme annuelle; tige de 50 à 65 cent.; feuilles lancéolées, dentées; fleurs pourpre violacé, en épi ramassé; juin-octobre."

Bailey (1972) describes the species as "An erect perennial that grows to 2 ft. It has narrow, sharply toothed leaves 2 to 3 in. long, and purple flowers in dense spikes 3 in. long. Blooms the first year from seed." Trimen (1895) refers to it as a "native of South Brazil, &c." and says that in Ceylon it "has escaped from gardens in the hills, and is often found in a wild state on roadsides and waste ground about Nuwara Eliya."

Alston (1931) separates this species from V. bonariensis L. by saying that in V. rigida the inflorescence is much-branched, the bracts equal the calyx-segments, and the corollas are violet in color, while in V. bonariensis the inflorescence is usually simple, the bracts are longer than the calyx-segments, and the corollas are pale-mauve in color. He notes that "Trimen's specimens appear to be V. bonariensis", but says that the true V. rigida (which he calls V. venosa) does occur in Ceylon in "Grassy places about Nuwara Eliya & Hakgala" where it flowers in May and September. Mucller-Dombois encountered it at Chiya in Badulla District, where it "probably escaped from cultivation."

A garden hybrid of this species with V. officinalis L. has been called xV. officinali-venosa Paxt., which see.

Material of V. rigida has been misidentified and distributed in some herbaria as xV. hybrida Voss. On the other hand, the Amaratunga 695 and Dalakrishnan MBK.1038, distributed as V. rigida, are actually V. bonariensis L., Din s.n. [29/4/1970] is V. bonariensis var. conglomerata Briq., and Lake 2999 is V. hispida Ruiz & Pav.

Additional citations: SOUTH CAROLINA: Colleton Co.: Ahles & Bell 15505 (B1--150281). GEORGIA: Baker Co.: Moldenke & Moldenke 26904 (Ac). Burke Co.: Shacklette 6892 (B1--202029). Dougherty Co.: Moldenke & Moldenke 26911 (Id, Ps--1326). Pulaski Co.: Moldenke & Moldenke 26930 (Ba). FLORIDA: Bay Co.: Moldenke & Molden-

ke 26694 (Ac, Ba, Ld, Ws). ALABAMA: Clarke Co.: Moldenke & Moldenke 26855 (Ba, Ld). MISSISSIPPI: Wayne Co.: Moldenke & Moldenke 26839 (Ac, Ba, Ld). TEXAS: Harris Co.: C. L. Fisher 51001 (E1--253597), s.n. [May 5, 1947] (E1--253599); L. C. Higgins 3930 (Li). Jefferson Co.: Lundell & Lundell 11206 (Li). Waller Co.: Cory 54253 (E1--59147, Tu--128496). BRAZIL: Paraná: Hatschbach 29463 (Ld), 28510 (Ld, W), 32736 (Gz), 32787 (Ld); Krapovickas, Cristóbal, & Jaruffiak 28324 (Ld); Rummow 40 (Ac); Lindeman & Haas 3134 (L). URUGUAY: Rosenfurt 25301 (Ba). ARGENTINA: Formosa: Jürgensen 2637 (E--366619). SOUTH AFRICA: Cape Province: Bayliss BS.3603 (Ba). CEYLON: Balakrishnan MBK.413 (P, Pd); Mueller-Dombois 62051848 (Pd). CULTIVATED: California: Bracelin 1306 (Ba), 2307 (Ba); Hanscam s.n. [May 20, 1963] (Ba); Herb. Univ. Calif. L. A. s.n. [September 7, 1943] (Ba). Canada: Cillett 39-60-76 (Ba); C. H. M. Lawrence 451 (Ba). Ceylon: Collector undetermined s.n. [Dec. 1897] (Pd); Moldenke, Moldenke, Jayasuriya, & Sumathraarachchi 28290 (Ld, Pd, W--2764509). Egypt: Foules s.n. [July 1952] (Gz); Hassib s.n. [29/4/1941] (Gz). India: Collector undetermined s.n. [Coy Gardens] (Pd). New York: Dress 1390 (Ba); D. A. Fisher s.n. [July 7, 1936] (Ba); C. H. M. Lawrence s.n. [Aug. 12, 1941] (Ba); H. N. Moldenke 3074 (Ba). Pennsylvania: Wikoff 1336 (Ba).

VERBENA RIGIDA var. LILACINA (Benard & Dodger) Moldenke

Additional synonymy: Verbena venosa var. lilacina Jex-Blake, Gard. East Afr., ed. 2, 87 & 301. 1939.

Additional bibliography: Jex-Blake, Gard. East Afr., ed. 2, 87 & 301 (1939) and ed. 3, 77. 1950; Moldenke, Phytologia 24: 132 (1972) and 25: 244. 1973.

Mrs. Bracelin (on her no. 2113) describes the color of the corollas of this variety as "635/3 Mineral Violet RHS" [Royal Horticultural Society Colour Chart]. She asserts that the plants grow 1 to 2 1/2 feet tall and flower (in California) in June.

Additional citations: CULTIVATED: California: Bracelin 2113 (Ba).

VERBENA RIPARIA Raf.

Additional bibliography: Dole, Fl. Vt., ed. 3, 224. 1937; Moldenke, Phytologia 24: 133. 1972.

The Verbena riparia Small & Heller of Dole (1937) is a synonym of V. urticifolia L., a species very different from V. riparia Raf. Rafinesque's plant is more closely related, rather, to V. officinalis L. and its various varieties.

VERBENA ROBUSTA Greene

Additional bibliography: Higgins, Occas. Pap. San Diego Nat. Hist. Soc. 8: 121. 1949; A. R. Moldenke, Stud. Sp. Divers. Calif. Pl. Comm. [dissert.] 270--275, 277, 278, 281, 284, 289, & 308--309. 1971; Moldenke, Phytologia 24: 133--134. 1972; Farnsworth, Pharmacog.

Titles 6, Cum. Gen. Ind. [121]. 1973.

Andrew Moldenke (1971) records the following insects as visitors to the flowers of this species: Diptera - Lepidanthrax lauta, L. sp., and Geron sp.; Lepidoptera - Eulonchus marginatus, Polites sakuleti, and Phycioides campestris; Coleoptera - Trichodes ornatus; and Hymenoptera - Usmia coloradensis, U. cyanella, C. cirrha, Melissothes lucina, Hoplitis producta gracilis, Mesperapis regularis, Meriades occidentalis, Chelostomopsis rubifloris, Geratina acantha, G. michneri, C. nanula, Bombus vosnesnensii, Ashmeadiella cacterum basalis and A. californica.

VERBENA RUMICONTI Moldenke

Additional bibliography: D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1397 & 1400. 1972; Moldenke, Phytologia 24: 134--135 & 257. 1972.

The corollas on C. L. Lundell 10679 & 10709 and Lundell & Lundell 11036 are said to have been "lavender" when fresh, while the Corrells (1972) describe them as "blue". These latter workers describe the distribution of the species as "Mostly in moist or wet ground, open fields, banks, mesaca bottoms, ditches and roadsides in Tex, from Hidalgo and Cameron cos. along the coast to Nueces Co.", flowering there from February to June.

Additional citations: TEXAS: Brazoria Co.: Lundell & Lundell 11036 (Mi). Cameron Co.: M. C. Johnston 253-5 (B1--92100); C. L. Lundell 10679 (Ci), 10709 (Mi), 10753 (Pa, B1--71833).

VERBENA RUMICONTI f. ROSIFLORA L. I. Davis

Additional bibliography: D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1397 & 1400. 1972; Moldenke, Phytologia 24: 135. 1972.

xVERBENA RHYDBERGII Moldenke

Additional synonymy: xVerbena rhydbergii Fell, Fl. Winnebago Co. 122, sphalm. 1955.

Additional & amended bibliography: Blewitt, Fl. Waterbury 105. 1926; Rydb., Fl. Prairies & Plains, pr. 1, 673. 1932; Fell, Fl. Winnebago Co. 122. 1955; Musselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 133. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 673. 1971; Crum, Proc. Iowa Acad. Sci. 78: 36. 1972; Moldenke, Phytologia 24: 135--136 (1972) and 23: 109, 215, 216, & 244. 1974; Mohlenbrock & Voigt, Fl. South. Ill. 286, 287, & 389. 1974.

Blewitt (1926) records this hybrid from New Haven County, Connecticut, Fell (1955) from Winnebago County, Illinois, and Crum (1972) from Black Hawk County, Iowa. The last-mentioned author found the plant to be "infrequent" on "mesic prairie", flowering in June. Horr found it "common in local colonies" and describes the color of the corollas on Horr 4691 as "blue". Wills encountered it on sandy roadsides, Thibault in sandy acid soil exposed to "open direct sunlight", and Dennis & Liesner in overgrown pastures with Aster, Gnaphalium, and Solidago, all in Wis-

consin. Pohlenbrock & Voigt (1974) record it from Jackson County, Illinois. Musselman and his associates (1971) found it in low weedy fields in Rock County, Wisconsin, and refer to it as "Lydberg's vervain".

Additional citations: IOWA: Dickinson Co.: Shimek s.n. [Aug. 8, 1916] (Bl-106543). WISCONSIN: Juneau Co.: Thibault 44 (Ws, Ws). Lafayette Co.: Dennis & Liesner s.n. [Sept. 11, 1966] (Ws). Richland Co.: D. Wills s.n. [July 27, 1957] (Ws). KANSAS: Cheyenne Co.: Horr 4691 (Bl-91135). MISSOURI: Marion Co.: J. Davis s.n. [July 13, 1913] (E-1023541).

VERBENA SAGITTALIS Cham.

Additional bibliography: Moldenke, *Phytologia* 24: 136 (1972) and 28: 256. 1974.

The Hatschbach 25327, distributed as V. sagittalis, is actually V. minutiflora Briq.

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke

Additional bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 86-89. 1968; Moldenke, *Phytologia* 24: 136-138. 1972.

Solbrig (1968) reports that the normal rate of pollen fertility in this species is 89 percent.

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke x V. PERUVIANA (L.) Britton

Additional synonymy: Glandularia santiaguensis x peruviana Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87. 1968.

Additional bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87. 1968; Moldenke, *Phytologia* 24: 137-138. 1972.

Solbrig (1968) reports the normal rate of pollen fertility in this hybrid is only 51 percent.

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke x V. PULCHELLA Sweet

Synonymy: Glandularia santiaguensis x pulchella Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87. 1968.

Additional bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87. 1968; Moldenke, *Phytologia* 24: 138. 1972.

Solbrig (1968) reports that the normal rate of pollen fertility in this hybrid is 50 percent.

VERBENA SCAEVA Vahl

Additional bibliography: Paxt., *Pock. Bot. Dict.*, ed. 1, 328 (1840) and ed. 2, 328. 1849; D. S. & H. B. Correll, *Aquat. & Wetland Pl. SW. U. S.* 1396-[1398], fig. 654 a-f. 1972; Farnsworth, *Pharmacog. Titles* 7 (10): xvi. 1972; Fong, Trojánkova, Trojánek, & Farnsworth, *Lloydia* 25: 147. 1972; Hutton, *Castanea* 37: 242 & 243. 1972; Moldenke, *Phytologia* 24: 220 (1972) and 25: 234. 1973; Anon., *Biol. Abstr.* 56 (2): B.A.S.I.C. S.280. 1973.

Additional illustrations: D. S. & H. B. Correll, *Aquat. & Wetland Pl. SW. U. S.* [1398], fig. 654 a-f. 1972.

Hutton (1972) comments that this species reaches the northernmost extension of its range in California; he gives its overall range as "Florida to Mexico and California, n. to s.e. Virginia; also West Indies, Central America, and South America". Actually, as far as I know, the species is unknown in Central and South America. The Corrells (1972) give its distribution as "Mostly rich soil of low grounds, marshes, swamps and edges of lakes and streams, Okla. (Cherokee Co.) and throughout most of Tex. except Plains Country, N. H. (Eddy Co.) and Ariz. (Gila, Pinal, Santa Cruz and Pima cos.), Mar.—Dec.; N. C. to Fla. and W. I., w. to Ariz., Calif. and n. Mex." Hutton (1972) found it in Mason County, West Virginia. Paxton (1840) asserts that it was introduced into cultivation in England in 1825.

Additional citations: FLORIDA: Lake Co.: Nash 1248 (Ba). ARIZONA: Pima Co.: Pringle s.n. [near Tucson, July 18, 1884] (Mi).

VERBENA SCABRA f. ANGUSTIFOLIA Moldenke

Additional bibliography: D. S. & H. B. Correll, *Aquat. & Wetland Pl. SW. U. S.* 1396 & 1397. 1972; Moldenke, *Phytologia* 24: 140. 1972.

xVERBENA SCHNACKII Moldenke

Additional synonymy: Glandularia peruviana x G. megapotamica Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 88. 1968.

Additional bibliography: Solbrig in Heywood, *Mod. Meth. Pl. Tax.* 87 & 88. 1968; Moldenke, *Phytologia* 24: 140. 1972.

Solbrig (1968) reports that the normal rate of pollen fertility in this hybrid is 65 percent.

VERBENA SCROBICULATA Griseb.

Additional bibliography: Moldenke, *Phytologia* 24: 140—141. 1972.

Recent collectors describe this plant as a perennial herb, 30 cm. to 1 m. tall, then prostrate, and have encountered it on hill-sides among shrubs and as "common" in shade on moist sand along riverbanks, at altitudes of 800—1640 meters, flowering in July, October, and December, and fruiting in July. The corollas are said to have been "dark-lilac" on Schulz & Varela 5128, "purple" on Eyerdam & Beetle 22626 and Venturi 5397, and "flores coloradas vivas" on Jürgensen 1298. Material has been misidentified and distributed in some herbaria under the designation Glandularia peruviana (L.) Small.

Additional citations: ARGENTINA: Catamarca: Jürgensen 1298 (E—818812). Jujuy: Venturi 5397 (E—960263). Salta: Eyerdam & Beetle 22626 (Ba); Schulz & Varela 5128 (Ws).

VERBENA SEDULA Moldenke

Additional bibliography: Hocking, *Excerpt. Bot. A.* 18: 444. 1971; Moldenke, *Phytologia* 24: 141. 1972.

VERBENA SELLOI Spreng.

Additional bibliography: Solbrig in Heywood, Mod. Meth. Pl. Tax. 89. 1968; Moldenke, Phytologia 24: 141--142 & 234 (1972) and 28: 120. 1974.

In addition to the months previously recorded by me, this plant has been collected in flower in October and December. The corollas on Krapovickas, Cristóbal, Mroginski, & Fernandez 22284 are described as having been "lilac" in color when fresh, while those on Krapovickas & Cristóbal 20536 were "whitish-violet".

The Krapovickas, Cristóbal, & Maruffak 15492, distributed as V. selloi, is actually V. calliantha Briq.

Additional citations: ARGENTINA: Buenos Aires: Krapovickas, Cristóbal, Mroginski, & Fernandez 22284 (Ld). Tucumán: Krapovickas & Cristóbal 20536 (Z).

VERBENA SESSILIS (Cham.) Kuntze

Additional synonymy: Verbena sessilis decurrens Cham. ex Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898. Verbena sessilis sessilis Cham. ex Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898.

Additional bibliography: Gibert, Enum. Pl. Montevid. 43. 1873; Moldenke, Phytologia 24: 142--143 & 148. 1972.

Recent collectors describe this plant as erect and have found it "en pastizal anegado", flowering and fruiting in October. The corollas on Krapovickas & Cristóbal 16357 are said to have been "lilac" in color when fresh.

Additional citations: ARGENTINA: Corrientes: Krapovickas & Cristóbal 16357 (Ws). Formosa: Jürgensen 2477 (E--831936).

VERBENA SETACEA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 24: 143. 1972.

VERBENA SIMPLEX Lehm.

Additional synonymy: Verbena angustifolia glabra Engelm., in herb.

Additional & emended bibliography: Willd., Enum. Pl. Hort. Berol. 2: 633. 1809; J. Torr., Compend. Fl. 238--239. 1826; Part., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; O. R. Willis, Fl. Westchester Co. 801. 1880; Baerecke, Anal. Keys Ferns & Flow. Pl. Atl. Sect. Middl. Fla. 114. 1906; W. Stone, Ann. Rep. N. J. State Mus. 1910 (2): 660 & 661. 1911; Twining, Fl. Northwest. Penn. 60. 1917; Tischler, Tabul. Biol. 4: 24 & 43. 1927; Wangerin in Just, Bot. Jahresber. 49 (1): 521. 1928; Rydb., Fl. Prairies & Plains, pr. 1, 677 & 967. 1932; Dole, Fl. Vt., ed. 3, 223. 1937; Evers, Ill. Nat. Hist. Surv. Bull. 26: 421 & 436. 1955; Fell, Fl. Winnebago Co. 122. 1955; R. McVaugh, N. Y. State Mus. Bull. 360A: 195 & 432. 1958; Musselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 183. 1971; Eilers, Univ. Iowa Stud. Nat. Hist. 21: 60, 61, & 123. 1971; Ellis, Wofford, & Chester, Castanea 36: 242. 1971; Rydb., Fl. Prair-

ies & Plains, pr. 2, 2: 677 & 967. 1971; Sipple, *Bartonia* 41: 35. 1971; Wherry, *Bartonia* 41: 79. 1971; Mazzeo, *Castanea* 37: 176. 1972; Moldenke, *Phytologia* 24: 139, 143-147, & 223 (1972) and 25: 225 & 226. 1973; Ralph, *Checklist Vasc. Pl. Coast. Pl. Comm.* 29. 1973; Rickett, *Wild Fls. U. S.* 6 (3): 544 & 783. 1973; W. Stone, *Fl. South. N. J.*, pr. 2, 660 & 661. 1973; Mohlenbrock & Voigt, *Fl. South. Ill.* 286, 287, & 389. 1974; Moldenke, *Phytologia* 28: 257. 1974.

The name that must be adopted for this species, *V. simplex*, is apparently based on a specimen cultivated in the Hamburg (Germany) Botanical Garden in or before 1825.

Mazzeo (1972) cites Mazzeo & Schaffner 2249 from dry soil in Warren County, Virginia; Ellis, Wofford, & Chester (1971) found the species in Stewart County, Tennessee, and in Lyon and Trigg Counties, Kentucky; Fell (1955) reports it as "Not uncommon on dry prairies, gravel hills, and in sandy places" in Winnebago County, Illinois, growing with the "uncommon" *xV. blanchardi* Moldenke and the "common and variable" *xV. moechina* Moldenke.

Ellers (1971) says that *V. simplex* is frequent on sandy prairies and on alluvial flats in the Cedar River drainage in Iowa, and cites it from Benton, Blackhawk, Bremer, Buchanan, Cerro Gordo, Johnson, and Linn Counties. Evers (1955) found it growing "in seven hill prairies, in either rocky soil or loess" in Illinois. Benner (1932) asserts that it is rare and local in dry fields and waste places in Bucks County, Pennsylvania, and cites collections by Fretz and Clayton from East Rockhill Township, by Brown from Tullytown, and by an unidentified collector from Pineville and Wrightstown. Stone (1911) says that in his day it was found on open ground in southern New Jersey, "occasional throughout the State, especially in the Middle district. A weed in many places, and the few Pine Barren records are all to be so regarded". He gives its flowering period as "Early June to late July and sporadically into September". Torrey (1843) found it in New York state in "Sandy fields and dry hill-sides on the island of New-York", flowering from July to August. Willis (1880) cites a collection by Fisher from Westchester County, New York. Wherry (1971) records it from Montgomery County and Twining (1917) from Monroe County, Pennsylvania.

Dole (1937) records *V. simplex* from Bennington and Windsor counties, Vermont, citing unnumbered collections by Blanchard and by Kittredge, while Musselman and his associates (1971) record it from Rock County, Wisconsin, citing a Skavlem collection in the University of Wisconsin herbarium.

The Engelmann s.n. cited below consists only of floral dissections for comparison with related species and hybrids.

Recent collectors have found the plant growing on limestone cliffs, in dry upland meadows, in prairie patches on Cedarville dolomite, and in open *Danthonia-Diodia* communities, as well as on limestone-gravelly prairies, flowering and fruiting in July. Paxton (1840) calls it "worthless" as a horticultural subject. The

corollas on Allard 3100 are described as having been "blue" when fresh, on E. H. Walker 3656 as "lavender", and on Leonard & Allard 20688 as "light purplish-blue".

The E. L. Braun s.n. [VII-22-12], cited below, is a mixture with xV. moechina Moldenke, while the Shimek s.n. [Sept. 1, 1920], distributed as V. simplex, is actually V. hastata L.

Additional citations: MARYLAND: Prince Georges Co.: Van Eseltine & Moseley 84 (W--539299). Plummer's Island: A. S. Hitchcock 12690 (W--2761258). DISTRICT OF COLUMBIA: E. C. Leonard 562 (W--2163130); Pollard s.n. [August 3, 1895] (W--307119), s.n. [July 4, 1896] (W--307195); Seaman s.n. (W--787356, W--787357); Steele s.n. [June 27, 1896] (W--364284); Ward s.n. [1876] (W--147556). VIRGINIA: Culpeper Co.: Allard 21477 (W--2177062); Leonard & Allard 20688 (W--2134498). Fairfax Co.: E. H. Walker 3656 (W--1920717). Fauquier Co.: Allard 1682 (W--1728796), 3100 (W--1734598), 6698 (W--1812902), 11285 (W--1898118), 11924 (W--1916563), 11946 (W--1916562). Loudoun Co.: Hambleton 285 (W--2345980). NORTH CAROLINA: Granville Co.: Radford 43888 (B1--182228); Radford & O'Eriant 45472 (B1--245134). OHIO: Adams Co.: E. L. Braun s.n. [June 23, 1926] (W--2712379). Hamilton Co.: E. L. Braun s.n. [VIII-15-05] (W--2712368). Highlands Co.: E. L. Braun s.n. [July 26, 1962] (W--2712378). ILLINOIS: Stony Island: E. L. Braun s.n. [VII-22-12] (W--2712369). IOWA: Muscatine Co.: Shimek s.n. [Aug. 21, 1915] (B1--106480). KENTUCKY: Jessamine Co.: E. L. Braun 921 (W--2667623), Ky. 4 (W--2667621). Wayne Co.: E. L. Braun 3083 (W--2667624). KANSAS: Douglas Co.: Horr E.76 (B1--55899). Woodson Co.: Lathrop 1350 (B1--118826). MISSOURI: Saint Louis City: Engelmann s.n. (E--117332).

VERBENA SINUATA Grieve & Leyel

Additional bibliography: Grieve & Leyel, Modern Herb., pr. 3, 2: 832. 1967; Moldenke, Phytologia 24: 147. 1972.

VERBENA SPHAEROCARPA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 24: 147. 1972.

VERBENA STELLARIOIDES Cham.

Additional bibliography: Gibert, Emm. Pl. Montevid. 43. 1873; Solbrig in Heywood, Mod. Meth. Pl. Tax. 82, 86--89, & 92. 1968; Moldenke, Phytologia 24: 142 & 148 (1972) and 28: 208. 1974.

Solbrig (1968) informs us that the normal rate of pollen fertility in this species is 98 percent. He also has determined that V. stellarioides and V. peruviana (L.) Britton will not hybridize where they grow together in the wild, but will hybridize with individuals brought in from outside their own particular local area.

VERBENA STROECLADA Briq.

Additional synonymy: Verbena steroeclada Briq., in herb.

Additional bibliography: Moldenke, Phytologia 24: 449. 1972.

The corollas are said to have been "violet" in color when fresh on Hatschbach 33603 and Hatschbach & Koczicki 27212 and "lilac" on Hatschbach 32747 & 33615, and these collectors found the plant in "brejo" and creeping in sandy soil at the base of hills, flowering in October and fruiting in December.

Additional citations: BRAZIL: Rio Grande do Sul: Hatschbach 32747 (Ld), 33603 (Gz), 33615 (Ac); Hatschbach & Koczicki 27212 (Ld, N, W--2706621).

VERBENA STRICTA Vent.

Emended synonymy: Verbena stricta Willd. ex S. Ell., Sketch, pr. 1, 2: 99. 1821.

Additional & emended bibliography: Desf., Tabl. Écol. Bot., ed. 1, 55. 1804; Willd., Enum. Pl. Hort. Berol. 2: 633. 1809; Desf., Tabl. Écol. Bot., ed. 2, 66. 1815; S. Ell., Sketch, pr. 1 & 2, 2: 99 & 743. 1821; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Twining, Fl. Northeast. Penn. 60. 1917; Braun, Ecology 2: 174--175. 1921; Hanson, Am. Journ. Bot. 9: 331. 1922; Blewitt, Fl. Waterbury 105. 1926; Clute, Am. Botanist 33: 114. 1927; Tischler, Tabul. Biol. 4: 24 & 43. 1927; Wangerin in Just, Bot. Jahresber. 49 (1): 521. 1928; Rydb., Fl. Prairies & Plains, pr. 1, 677, 678, & 967. 1932; Oertel, U. S. Dept. Agr. Circ. 554: 19. 1939; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Martin, Zim, & Nels., Am. Wildlife & Pl., pr. 1, 444. 1951; Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 449, fig. 256 A. 1952; W. A. Weber, Handb. Pl. Colo. Front Range, ed. 1, 157. 1953; Evers, Ill. Nat. Hist. Surv. Bull. 26: 392, 400, 421, & 436. 1955; Fell, Fl. Winnebago Co. 122. 1955; Martin, Zim, & Nels., Am. Wildlife & Pl., pr. 2, 444. 1961; W. A. Weber, Handb. Pl. Colo. Front Range, ed. 2, 157. 1961; Erdtman, Pollen Morph. & Pl. Tax., ed. 2, 449, fig. 256 A. 1966; W. A. Weber, Rocky Mtn. Fl., ed. 1, 306. 1967; Delorit, Illustr. Tax. Man Weed Seeds 96 & 97. 1970; Eilers, Univ. Iowa Stud. Nat. Hist. 21: 60, 61, & 123. 1971; S. Ell., Sketch, pr. 3, 2: 99 & 743. 1971; Musselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 184. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 2: 677, 678, & 967. 1971; Vallentine, Range Develop. & Improv. 95 & 459. 1971; Wherry, Bartonia 41: 79. 1971; R. C. Anderson in J. H. Zimmerm., Proc. Second Midwest Prairie Conf. 16. 1972; R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2303. 1972; Crum, Proc. Iowa Acad. Sci. 78: 86. 1972; Scharrer in J. H. Zimmerm., Proc. Second Midwest Prairie Conf. 10. 1972; W. A. Weber, Rocky Mtn. Fl., ed. 2, 306. 1972; Wilkinson & Jaques, How to Know Weeds, ed. 2, 123, 207, & 231, fig. 296. 1972; Moldenke, Phytologia 24: 220--225 & 257 (1972) and 25: 226 & 244. 1973; Lommasson, Nebr. Wild Fls. 86 & 184, pl. 174. 1973; L. P. Mill., Phytochem. 1: 329, 362, 393, & 410. 1973; Moldenke, Biol. Abstr. 55: 1287. 1973; Ralph, Checklist Vasc. Pl. Coast. Pl. Comm. 29. 1973; Rickett, Wild Fls. U. S. 6 (3): [543], 544, & 783, pl. 195. 1973; Hocking,

Excerpt. Bot. A.23: 291. 1974; Mohlenbrock & Voigt, Fl. South. Ill. 286, 287, & 389. 1974; Moldenke, Phytologia 28: 196, 206, 215, & 257. 1974.

Additional illustrations: Erdtman, Pollen Morph. & Pl. Tax., ed. 1, 449, fig. 256 A (1952) and ed. 2, 449, fig. 256 A. 1966; Delorit, Illustr. Tax. Man. Weed Seeds 97 (in color). 1970; Wilkinson & Jaques, How to Know Weeds, ed. 2, 123, fig. 296. 1972; Lomasson, Nebr. Wild Fls. pl. 174 (in color). 1973; Rickett, Wild Fls. U. S. 6 (3): [543], pl. 195 (in color). 1973.

Recent collectors have found this plant growing in sandy soil of Populus-Salix communities. Dress found it abundant in dry grazed pastures in Nebraska. Musselman and his associates (1971) refer to it as "common" on dry prairies and in fields and pastures in Rock County, Wisconsin. The Engelmann s.n., cited below, consists only of floral dissections mounted so as to be compared with those of related species and hybrids.

Additional vernacular names recorded for V. stricta are "mullien-leaved vervain" [sic!], "verveine fasciculée", and "wooly vervain" [sic!]. The corollas on Dress 9009 are said to have been "bright violet-blue" when fresh; Bailey describes them as "purple".

Delorit (1970) describes the seeds of this plant as "Oblong in outline; about the same width throughout. Dorsal side convex, its margins winged downward; ventral side granular, two-faced forming a longitudinal ridge where they join. Both ends of the seed usually bluntly rounded. Dorsal side usually with five and occasionally six longitudinal ribs which run part way or the entire length of the seed and are joined by transverse ribs in the upper one-fourth to one-third of the seed. The central veins usually are joined by transverse ribs only in the upper one-fourth of the seed. Usually about the same width throughout the seed. Seed scar oval, oblique, white. Reddish-brown. 2.4--3.1 mm long, 0.6--0.8 mm wide."

Martin, Zim, & Nelson (1951) report that the seeds of this species are eaten by such birds as the stilt sandpiper, lark bunting, cardinal grosbeak, junco, and the field, song, swamp, tree, and white-crowned sparrows and the entire plant is eaten by cottontail rabbits.

Wilkinson & Jaques (1972) describe the species as "Common in pastures and fields", flowering from June to September. Eilers (1971) found it common in sandy open areas in Iowa and records it from Benton, Blackhawk, Bremer, Cerro Gordo, Chickasaw, Delaware, Fayette, Floyd, Grundy, Hardin, Johnson, Linn, Mitchell, and Winnebago Counties in that state. Crum (1972) says that it is frequent on moist to dry prairies in Blackhawk County, Iowa, flowering there in June. Fell (1955) avers that it is a "common roadside weed [in Winnebago County, Illinois]", sometimes growing with the white- or the roseate-flowered forms. Blewitt (1926) records it from roadsides in New Haven County, Connecticut, but says that it is "Rare" there and "Adventive from the West", blooming there in July and August. Wherry (1971) records it as introduced in Montgomery County, Pennsylvania, while Twining (1917) found it in Luzerne

County. Evers (1955) found it on forty-two, or 80.6 percent, of the hill prairies of Illinois. It occurs in only 2.1 percent of the relict prairie sites in southwestern Michigan.

Certel (1939) lists V. stricta as a honey and pollen plant in Iowa. Miller (1973) reports the isolation of verbenalin, the glucoside of verbenalol, in this species. Paxton (1840) regarded it as "worthless" from a horticultural standpoint.

The J. Gunderson 264, distributed as V. stricta, is actually xV. engelmannii Moldenke, while Thibault 44 is xV. rydbergii Moldenke.

Additional citations: ONTARIO: Frontenac Co.: Garwood & Gavitz 2505 (Bl--264285). NEW YORK: Ontario Co.: Eaton s.n. [Sep. 26, 1923] (Ba). OHIO: Hamilton Co.: E. L. Braun s.n. [VII-25-05] (W--2712377). IOWA: Dickinson Co.: Shimek s.n. [Aug. 8, 1916] (Bl--106479). Harrison Co.: L. Kellogg 174 (Ba). Story Co.: Beach 78 (Ba); Hainer s.n. [July 1884] (Ba); F. C. Stewart s.n. [July 21, 1892] (Ba). KENTUCKY: Trigg Co.: E. L. Braun 4184 (W--2667620). MINNESOTA: Traverse Co.: Moore & Moore 10478 (N). SOUTH DAKOTA: Lawrence Co.: G. N. Jones 35989 (Bl--191279). KANSAS: Brown Co.: Horr 4482 (Bl--91548). Osage Co.: Horr E.33 (Bl--55961). Washington Co.: Horr 4662 (Bl--91148). Woodson Co.: Lathrop 1346b (Bl--118825). MISSOURI: County undetermined: Engelmann s.n. [Herb. Hance 5221] (Pd). Saint Louis City: Engelmann s.n. (E--117332). ARKANSAS: County undetermined: F. L. Harvey s.n. [Curtiss 1958] (M1). COLORADO: Baca Co.: Weber & Anderson 5204 (Bl--56886). Boulder Co.: W. A. Weber 5270 (Bl--57209). Denver Co.: Smith s.n. [Aug. 1871] (Bl--104117). Kit Carson Co.: Owmbey 1363 (Bl--42140). Las Animas Co.: C. M. Rogers 4967 (Bl--55578), 6076 (Bl--55576), 6956 (Bl--56442). Sedgwick Co.: W. A. Weber 6395 (Bl--29121). Yuma Co.: Swan 12917 (Bl--53675); Maslin 4271 (Bl--21200). NEBRASKA: Merrick Co.: Dress 9009 (Ba). TEXAS: Hemphill Co.: L. C. Higgins 7691 (N). Wheeler Co.: L. C. Higgins 4537 (M1).

VERBENA STRICTA f. ALBIFLORA Wadmond

Additional synonymy: Verbena stricta f. albiflora J. B. McFarlin apud Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575, sphalm. 1941.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Fell, Fl. Winnebago Co. 122. 1955; Moldenke, Phytologia 24: 225 (1972) and 25: 244. 1973.

Fell (1955), in his flora of Winnebago County, Illinois, says "On a high prairie road north of Ill. Rt. No. 70 near Meridian road we found the white form.....covering considerable areas to the exclusion of the purple form." Wallis reports that where he collected this form there were about 25 percent white-flowered plants and 75 percent deep-purple-flowered ones.

Additional citations: KANSAS: Washington Co.: Horr 4622 (Bl--91572). OKLAHOMA: Cherokee Co.: Wallis 3395 (Bl--114665).

VERBENA STRICTA f. ROSEIFLORA Benke

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Fell, Fl. Winnebago Co. 122. 1955; Moldenke, Phytologia 24: 225. 1972.

Fell (1955) reports that this color form is "very uncommon on Camp Grant prairies" in Winnebago County, Illinois.

Additional citations: KANSAS: Jewell Co.: Horr 4774 (Bl--91131).

VERBENA STRIGOSA Cham.

Additional & emended bibliography: Angely, Fl. Anal. & Fito-geogr. S. Paulo, ed. 1, 4: 340 & xix, map 1395. 1971; Moldenke, Phytologia 24: 225--226. 1972.

The Angely (1971) reference in the bibliography above was previously erroneously cited by me as "1970", the title-page date, but the volume involved was not actually issued until 1971.

xVERBENA STUPROSA Moldenke, Phytologia 28: 403--404. 1974.

Bibliography: Moldenke, Phytologia 28: 403--404. 1974.

Citations: ARKANSAS: Clay Co.: Eggers s.n. [Corning, 21 August 1896] (E--118279--type).

VERBENA SULPHUREA D. Don

Additional synonymy: Verbena kufferi Hort., in herb. Verbena sulfur-lilacina Hort., in herb.

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Moldenke, Phytologia 24: 226--227 (1972) and 25: 234. 1973.

Morrison describes this plant as a "bush 0.1--0.2 m. tall, flowers yellow, anthers chocolate-brown" and states that it is "not common" on low hills, in sandy soil just back from the ocean, flowering in December. This reads like a good description of the locality where my wife and I found this species on our visit to Valparaiso in 1948. Gay (1849) notes that this "Planta algo comun en las provincias centrales y del norte, Valparaiso, Quintero, Coquimbo, etc." in Chile. Paxton (1840) asserts that it was introduced into cultivation in England in 1832.

Additional citations: CHILE: Coquimbo: Zöllner 6031 (Ac). Valparaiso: Collector undetermined s.n. (Pd); Morrison 16846 (Ba).

LOCALITY OF COLLECTION UNDETERMINED: Herb. Missouri Bot. Gard. 118049 (E).

VERBENA SUPINA L.

Additional synonymy: Verbenaca svpina sive foemina Fuchs, Hist. Plant. Basil. 593. 1542.

Additional & emended bibliography: Fuchs, Hist. Plant. Basil. 591 & 593. 1542; Rausch., Nom. Bot., ed. 3, 3. 1797; Desf., Tabl. Écol. Bot., ed. 1, 55 (1804) and ed. 2, 66. 1815; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; Plin. Sec., [transl. Bostock & Riley], Nat. Hist. 1--6. 1855; Le Grand, Fl. Anal. Berry 72. 1887; Marcellus Empiricus [ed. Helmreich], Marcell. Medicament. 1889; J. G. Baker in Thiselet.-Dyer, Fl. Trop. Afr. 5: 286. 1900;

J. M. Black, Fl. South Austr. 3: 478, fig. 199. 1926; M. Woodward, Leaves Gerard's Herb., pr. 1, 231. 1931; Wangerin in Just, Bot. Jahresber. 54 (1): 1170 [366] (1932) and 52 (1): 482 [114]. 1933; Fedde in Just, Bot. Jahresber. 52 (1): 825. 1934; Petzak & Rech., Fl. Iran. 43: 1--8. 1967; M. Woodward, Leaves Gerard's Herb., pr. 2, 231. 1969; Willaman & Li, Lloydia 33, Suppl. 3a: 220. 1970; Hartwell, Lloydia 34: 387. 1971; Polunin, Pflanz. Europ. 277 & 539. 1971; Amaral Franco in Tutin & al., Fl. Eur. 3: 123. 1972; Farnsworth, Pharmacog. Titles 7 (4): xxv & 222. 1972; Kunkel, Monog. Biol. Canar. 3: 62. 1972; Moldenke, Phytologia 24: 228--231. 1972; R. R. Stewart in Nasir & Ali, Fl. West Pakist. 608. 1972; Tutin in Tutin & al., Fl. Eur. 3: 369. 1972.

Additional illustrations: Fuchs, Hist. Plant. Basil. 593 (in color). 1542; M. Woodward, Leaves Gerard's Herb., pr. 1, 231 [as "V. officinalis"]. 1931; J. M. Black, Fl. South Austr. 3: fig. 199. 1926; M. Woodward, Leaves Gerard's Herb., pr. 2, 231 [as "V. officinalis"]. 1969.

Polunin (1971) notes that this species is similar to V. officinalis L. "aber Stengel niederliegend, reich verzweigt [which is true also of V. officinalis var. prostrata Gren. & Godr.]".

B[lätter] 2fach fiederteilig mit ovalen Abschnitten. Krone helllila, kürzer, 3 mm." and gives its distribution as "Südeuropa". Petzat & Rechinger (1967) also describe it as "decumbens" in their key, but in their formal diagnosis say "Annuua, 20--40 cm alta, hispidula, canescens, ramis ascendentibus vel decumbentibus". Rauschel (1797) also describes it as an annual plant, giving "Hispan." as the distribution of V. supina and "Arabia" for what he calls V. procumbens.

Additional common names for this plant recorded by Hartwell (1971) are "herba verbena", "hierabotane", "peristereon", "verbenaca", and "vervain". These names, however, are more usually regarded as applying to V. officinalis L., so it is a matter of doubt whether the medicinal uses which he also records may not actually apply instead to that species rather than to this one. At all events, Hartwell records the following medicinal uses for V. supina: with wine in the treatment of corns on the feet, as a decoction in vinegar for "Indurations and gatherings; callosities", as a plaster for parotid tumors, and the juice in a cerate also for parotid tumors. Paxton (1840) assures us that from a horticultural standpoint the species is "worthless".

The Sennen & Mauricio 7656, distributed as V. supina and previously so cited by me, seems better placed as f. erecta Moldenke, as are also Faure s.n. [5 Mai 1911] and G. Täckholm s.n. [28/1/1927] and s.n. [4/4/1927], while P. Hartmann s.n. [3-V-1911] is V. officinalis L.

Additional citations: PORTUGAL: Rainha 2419 [Herb. Stat. Agron. Nat. Port. 39523] (Ba). HUNGARY: Borbás 934 (Ba); Heuffel s.n. (Pd). EGYPT: Acerbi s.n. (Pd); Boulos s.n. [3/9/1952] (Gz); Boulos Tanadros s.n. [12 Sept. 1962] (Gz); Chrték & Kosinova s.n.

[19/6/1971] (Gz); Collector undetermined s.n. (Gz); Hadidi s.n. [5/1/1952] (Gz); Hadidi, Kosinova, & Chrtěk s.n. [22.4.1967] (Gz); Halwagi s.n. [Spring 1961] (Gz); E. Hartmann s.n. [29/5/1907] (Gz, Gz); Imam & Ayyad s.n. [26/4/1957] (Gz); Imam, Ibrahim, Mahdi, & Sisi s.n. [29/9/1971] (Gz); G. Maire 432 [Ascher-son & Schweinfurth 810] (Gz, Gz, Gz); Runkewitz s.n. [15/3/1933] (Gz), s.n. [26/3/1933] (Gz); E. S. s.n. [Jan. 29, 1880] (Gz); Salem s.n. [17/4/1867] (Gz); G. Täckholm s.n. [23/1/1927] (Gz, Gz), s.n. [25/2/1927] (Gz), s.n. [6/3/1927] (Gz), s.n. [26/3/1927] (Gz); V. Täckholm s.n. [12/5/1962] (Gz, Gz, Gz, Gz); Täckholm, Boulos, Girgis, Zahran, & Elsayed s.n. [23/5/1963] (Gz, Gz, Gz, Gz), s.n. [24/5/1964] (Gz); Täckholm & Kassas 277 (Gz).
 SUDAN: Khartoum: Kotschy 9326 (Pd). Kordofan: Pfund 141 (Gz, Gz), 141 [119] (Gz, Gz, Gz, Gz, Gz, Gz, Gz, Gz). ISRAEL: Meyers & Dinsmore B.203 (Gz, Gz).

VERBENA SUPINA f. ERECTA Moldenke

Additional bibliography: Moldenke, Phytologia 24: 230 & 231. 1972.

The Sennen & Mauricio collection cited below was previously cited by me as typical V. supina L., but seems better placed in f. erecta. Its printed label reads "Plantas d'Espagne", but the specimen was actually collected in Morocco. The Constable collection, also cited below, is described as having been "9-12 inches tall, of erect growth" and was actually first identified by the collector as V. officinalis L. It obviously represents f. erecta and shows again how different the aspect of this plant is from that of typical V. supina. Constable found it growing in sandy loam soil.

Additional citations: HUNGARY: Kovács 460 (Pd). MOROCCO: Sennen & Mauricio 7657 (Ba). ALGERIA: Faure s.n. [5 Mai 1911] (Gz). LIBYA: Boulos 2014 (Gz). EGYPT: Romé & Hadidi s.n. [17.1.1968] (Gz); G. Täckholm s.n. [28/1/1927] (Gz, Gz, Gz), s.n. [4/4/1927] (Gz); V. Täckholm s.n. [Spring 1949] (Gz), s.n. [2/4/1961] (Gz), s.n. [Merseh Matruh] (Gz); Täckholm & al. s.n. [1/4/1972] (Gz). AUSTRALIA: New South Wales: Constable 5199 (Ba).

VERBENA TAMPENSIS Nash

Additional bibliography: Fedde & Schust. in Just, Bot. Jahrbuch. 60 (2): 573. 1941; Solbrig in Heywood, Mod. Meth. Pl. Tax. 88 & 89. 1968; Moldenke, Phytologia 24: 231 (1972), 26: 377 (1973), and 28: 200. 1974.

The specimen depicted in the photograph of S. M. Tracy 6650 in the herbarium of the L. H. Bailey Hortorium, cited below, is deposited in the Britton Herbarium at the New York Botanical Garden. Solbrig (1968) speaks of an unnamed hybrid between this species and V. canadensis (L.) Britton. This is a hybrid which possibly occurs frequently in the wild since the ranges of the two species

overlap in Florida. The herbarium vouchers for the artificially produced hybrid should be carefully studied and compared with herbarium material now annotated as the one parent or the other in various herbaria. It is possible that some of these specimens represent the hybrid.

Additional citations: FLORIDA: Lee Co.: J. K. Small s.n. [Punta Rassa, May 1928] (Ba). Manatee Co.: S. M. Tracy 6650 (Ba—photo).

xVERBENA TEASII Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 232 (1932) and 28: 208 & 209. 1974.

Arnoldo-Broeders describes this plant as "creeping" and its flowers as "dark-purple". He collected it in anthesis in November and misidentified it as V. tenera Spreng.

Additional citations: CULTIVATED: Curacao: Arnoldo-Broeders 3599 (Ba), 3642 (Ba).

VERBENA TENERA Spreng.

Additional synonymy: Schuttleworthia tenera Meissn. ex Gibert, *Enum. Pl. Montevid.* 43. 1873. Verbena terna Spreng., in herb.

Additional & emended bibliography: C. Gay, *Hist. Fis. Chile Bot.* 5: 8. 1849; Gibert, *Enum. Pl. Montevid.* 43. 1873; R. O. Williams, *Useful & Ornament. Pl. Zanzib.* 482. 1949; R. C. Foster, *Contrib. Gray Herb.* 184: 171. 1958; R. Bailey, *Good Housekeep Ill. Encycl. Gard.* 15: 2303. 1972; Moldenke, *Phytologia* 24: 232--234, 236--239, & 253 (1972) and 28: 247. 1974.

Burkill (1966), speaking of the economic plants of the Malay Peninsula, says "V. tenera, Spreng., of the Argentine can be grown more freely, as it is possible to propagate it by cuttings". Hepper (1963) says "V. tenera Spreng., a native of S. America, has been introduced into Nigeria (Obubra Dist., FHI 43964); a creeping herb with very dissected leaves and white or violet flowers." I believe that both authors are speaking of V. tenuisecta Briq. rather than the true V. tenera. Similarly, Williams (1949) speaks of V. tenera as cultivated on Zanzibar and Pemba islands, describing the plant as having small flower-heads, finely divided leaves, and deep-mauve corollas with a white eye. Probably he is also talking about V. tenuisecta. Bailey (1972) describes V. tenera as "A shrubby plant with purple flowers in long spikes. Native to southern Brazil." Certainly the plant is not shrubby, so it is not clear to what species Bailey is referring.

Gay (1849) says of the genus Verbena: "En Chile son muy comunes, pero es sin duda por equivocacion que se le ha mencionado la Verb. tenera de Spr." I have not seen any material of it from Chile.

The Sellow specimen depicted in the Bailey Hortorium photograph cited below is deposited in the herbarium of the Royal Botanic Gardens at Kew.

The Moldenke, Moldenke, & Jayasuriya 28150, distributed as V. tenera, is actually V. monacensis Moldenke, while Arnoldo-Broeders 3599 & 3642 are xV. teasii Moldenke and Hassib s.n. [22/V/1941] is

V. tenuisecta Briq.

Additional citations: BRAZIL: State undetermined: Sellow s.n. [Brasilia] (Ba--photo). LOCALITY OF COLLECTION UNDETERMINED: Maldonado s.n. (Pd).

VERBENA TENERA var. ALBIFLORA Kuntze

Additional bibliography: Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Moldenke, Phytologia 24: 234. 1972.

The white-flowered "V. tenera" of Hepper (1963) is more probably V. tenuisecta var. alba Moldenke.

VERBENA TENERA var. MAONETTI Regel

Additional bibliography: R. Bailey, Good Housekeep. Ill. Encycl. Gard. 15: 2303. 1972; Moldenke, Phytologia 24: 234. 1972.

VERBENA TENUISECTA Briq.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahrbuch. 60 (2): 573. 1941; R. O. Williams, Useful & Ornament. Pl. Zanzib. 482. 1949; Kearney, List Citations Place Publ. Spp. Ariz. Fl. 112 [thesis]. 1951; R. C. Foster, Contrib. Gray Herb. 184: 171. 1958; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 3-5, text fig. 5. 1962; Burkill, Dict. Econ. Prod. Malay Penins. 2: 2266. 1966; Drar, Publ. Cairo Univ. Herb. 3: 111. 1970; Beadle, Evans, Carolin, & Tindale, Fl. Sydney Reg., ed. 2, 507. 1972; C. A. Br., Wildfls. La. 156 & 246. 1972; G. W. Park, Parks Flow. Book 1973: 86. 1972; Venter, Journ. S. Afr. Bot. 38: 231. 1972; Moldenke, Phytologia 24: 218, 219, 232-241, & 253 (1972), 25: 228 & 234 (1973), and 28: 112, 113, 116, 206, & 216. 1974.

Additional illustrations: Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 3, text fig. 5 [as "V. pinnatifida"]. 1962; C. A. Br., Wildfls. La. 156 (in color). 1972; G. W. Park, Parks Flow. Book 1973: 86 [as "V. Bipinnatifida"] (in color). 1972.

It seems most probable that the "V. tenera" of Williams (1949) cultivated on Pemba and Zanzibar islands, the "V. tenera" and "V. erinoides" of Burkill (1966), the "V. bipinnatifida" of Drar (1970), the "V. Bipinnatifida" of Park (1972), the "V. tenera" of Hepper (1963), and the "V. pinnatifida" of Nair & Rehman (1962) are all actually V. tenuisecta, a species far more widespread in cultivation and escaped from cultivation than the species named by these authors. Park (1972) describes his plant as "A showy 15 in. everblooming perennial in lavender-blue with lovely fern-like foliage". Beadle and his associates (1972) describe it as a "Prostrate and ascending annual less than 50 cm high. Introd. from S. Amer.", the "Upper and lower leaves ca. 2 cm long, all deeply divided and subdivided." Venter (1972) refers to it as an "Herb of disturbed places", with purple flowers, blooming from September to February in South Africa.

The specimen depicted in the Bailey Hortorium photograph cited below of Morong 219 is deposited in the herbarium of the United

States Department of Agriculture, while that of Jürgensen 2465 is in the United States National Herbarium at Washington.

Recent collectors describe this plant as 8 inches tall (Collins), in erect clumps 9 inches tall (Bayliss), or 12 inches tall (McClintock), and have found it growing on rocky campos, dry roadsides, sandy roadfills, in stream bottoms, and very sandy soil in full exposure to the sun, while Lindeman & Haas refer to it as "gregarious on campos".

The corollas are said to have been "purple" on Abedin 2643, Bayliss BS.5318, DeWolf 1384, Dress, Moore, & Lawrence 633, McClintock s.n. [June 26, 1961], H. E. Moore 823, Nafday 112, and Qaiser & Ghafoor 4891, "purple with a minute white eye" on Lundell & Lundell 11065, "magenta-purple" on Shimmers 14012, "purplish-blue" on Lindeman & Haas 1021, "lavender" on I. Collins s.n. [July 29, 1941], "violet" on Dress 1561, Hatschbach 30817, Hatschbach & Guimarães 18368, and Krapovickas, Cristóbal, & Quarín 22778, "dark-purple" on Abedin 7392, "pinkish-purple" on Abedin 7327, and "violet-blue" on Y. W. de Silva 722. The short, white, strigose hairs on the calyx are very sparse in Hatschbach & Guimarães 18368 and it is very possible that two races or forms are represented in the material cited.

Material of V. tenuisecta has been misidentified and distributed in some herbaria as "V. bonariense L." or "V. terna Spreng." Knauz s.n. [7/2/41] is a mixture with V. bipinnatifida Nutt.

Additional citations: NORTH CAROLINA: Columbus Co.: Bell 11313 (Bl--150282); Moldenke & Moldenke 27037 (Ba). SOUTH CAROLINA: Lee Co.: Moldenke & Moldenke 27017 (Ld). GEORGIA: Baker Co.: Moldenke & Moldenke 26890 (Ld). Bleckley Co.: Moldenke & Moldenke 26932 (Ac). Calhoun Co.: Moldenke & Moldenke 26905 (Ba, Ps--1324). Columbia Co.: Moldenke & Moldenke 26994 (Ac). Dougherty Co.: Moldenke & Moldenke 26907 (Ac), 26912 (Ld). Early Co.: Moldenke & Moldenke 26882 (Ac). Liberty Co.: Moldenke & Moldenke 26405 (Ld). Lowndes Co.: DeWolf 1384 (Ba). McIntosh Co.: Moldenke & Moldenke 26414 (Ac). Pulaski Co.: Moldenke & Moldenke 26927 (Ba). Taylor Co.: Dress, Moore, & Lawrence 633 (Ba, Bl--253600). Turner Co.: Moldenke & Moldenke 26915 (Ac). Ware Co.: P. O. Schallert 251 (Ba). Warren Co.: Moldenke & Moldenke 26984 (Ba). Wilcox Co.: Moldenke & Moldenke 26921a (Ld). Wilkinson Co.: Moldenke & Moldenke 26939 (Ld). Worth Co.: Moldenke & Moldenke 26914 (Ba). FLORIDA: Bay Co.: Moldenke & Moldenke 26675 (Ld), 26690 (Ba), 26704 (Ac). Duval Co.: Moldenke & Moldenke 26437 (Ba). Escambia Co.: Moldenke & Moldenke 26741 (Ld). Holmes Co.: Moldenke & Moldenke 26725 (Ac). Jackson Co.: Moldenke & Moldenke 26717 (Ld). Lafayette Co.: Moldenke & Moldenke 26580 (Ba). Lake Co.: Moldenke & Moldenke 26496 (Ws). Okaloosa Co.: Moldenke & Moldenke 26738 (Ba). Orange Co.: Moldenke & Moldenke 26497 (Ac). Polk Co.: Co-

nard s.n. [Mar. 23, 1961] (Ba). Santa Rosa Co.: Moldenke & Moldenke 26740 (Ac). Taylor Co.: Moldenke & Moldenke 26587 (Ld). Wakulla Co.: Moldenke & Moldenke 26607 (Ac). Walton Co.: Moldenke & Moldenke 26732 (Ld). Washington Co.: Moldenke & Moldenke 26724 (Ba), 26744 (Ba). ALABAMA: Baldwin Co.: Moldenke & Moldenke 26749 (Ac). Barbour Co.: Moldenke & Moldenke 26370 (Ba), 26871 (Ac). Butler Co.: Moldenke & Moldenke 26865 (Ba). Choctaw Co.: Moldenke & Moldenke 26850 (Ac, Ld). Crenshaw Co.: Moldenke & Moldenke 26866 (Ac). Henry Co.: Moldenke & Moldenke 26872 (Ld). Houston Co.: Moldenke & Moldenke 26877 (Ba). Pike Co.: Moldenke & Moldenke 26867 (Ld). MISSISSIPPI: Forrest Co.: Moldenke & Moldenke 26322 (Ld). Lamar Co.: Moldenke & Moldenke 26820 (Ac). Marion Co.: Moldenke & Moldenke 26817 (Ba). Pearl River Co.: Moldenke & Moldenke 26799 (Ba); F. H. Sargent 8570 (Bl--208272). Perry Co.: Moldenke & Moldenke 26827 (Ba). Stone Co.: Moldenke & Moldenke 26784 (Ld). Walthall Co.: Moldenke & Moldenke 26812 (Ld). Wayne Co.: Moldenke & Moldenke 26840 (Ac). LOUISIANA: Orleans Par.: Knaus s.n. [7/2/41] (E-1302083). Washington Par.: Moldenke & Moldenke 26805 (Ac). TEXAS: Angelina Co.: Lundell & Lundell 11065 (Mi). Hardin Co.: Cory 52723 (Bl--90688). Smith Co.: H. E. Moore 823 (Ba). Upshur Co.: Shinners 14012 (Ba). ARIZONA: Pima Co.: Moldenke & Moldenke 27954 (Ld). BRAZIL: Paraná: Hatschbach 30817 (Ld); Hatschbach & Guimarães 18368 (Ac); Lindeman & Haas 1021 (N). Rio Grande do Sul: Krapovickas, Cristóbal, & Quarín 22778 (Ld). PARAGUAY: Hassler 2650 (Ba--photo), 12411 (Ba--photo); Morong 219 (Ba--photo, Ba--photo). ARGENTINA: Chaco: Jürgensen 2465 (Ba--photo). Entre Ríos: Ruíz Huidobro 3588 (Bl--105042). Santa Fé: Ruíz Huidobro 3359 (Bl--105043). EGYPT: Hellendoorn s.n. [18/7/1965] (Gz, Gz). SOUTH AFRICA: Cape Province: Bayliss BS.5313 (N). PAKISTAN: Lahore: Abedin 2643 (Kh, Kh). Northwest Frontier: Abedin 7327 (Kh), 7392 (Kh). Sind: Qaiser & Ghafoor 4891 (Kh). CULTIVATED: California: McClintock s.n. [June 26, 1961] (Ba). Ceylon: Y. W. de Silva 722 (Pd). Egypt: Boulos s.n. [July 1952] (Gz); Hassib s.n. [7/3/1929] (Gz, Gz), s.n. [22/4/1941] (Gz, Gz); Herb. Univ. Kahir. s.n. (Gz, Gz); Sisi s.n. [30/5/1973] (Gz); G. Täckholm s.n. [October 1925] (Gz); V. Täckholm s.n. [2/11/1959] (Gz). India: Nafday 112 (Ba). New Jersey: I. Collins s.n. [July 29, 1941] (Ba). New York: Dress 1561 (Ba). Sudan: Drar & Mahdi 2525 (Gz). Venezuela: Ruíz-Teran & López-Palacios 6201 (N).

VERBENA TENUISECTA var. ALBA Moldenke

Additional bibliography: Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Moldenke, Phytologia 24: 240 (1972) and 28: 113. 1974.

Recent collectors have found this plant growing on rocky cam-
pos, in sandy clay roadsides, on road shoulders, and, according to
DeWolf, "occasional" in acid bogs along roadsides. Collins de-
scribes it as growing 8 inches tall. In addition to the months
previously reported by me, it has been collected in flower in Sep-
tember and in fruit in May. Pancho asserts that it is "commonly
cultivated in most Philippine Islands gardens". Hatschbach &
Guimarães refer to it as a "rare form". The white-flowered "V.
tenera" of Hepper (1967) is most probably V. tenuisecta var. alba.

Material has been misidentified and distributed in some herbaria
under the designation Glandularia pulchella (Sweet) Troncoso.

Additional citations: GEORGIA: Baker Co.: Moldenke & Moldenke
26892 (Ba). Bleckley Co.: Moldenke & Moldenke 26933 (Ld). Cal-
houn Co.: Moldenke & Moldenke 26906 (Ac, Ps--1325). Early Co.:
Moldenke & Moldenke 26884 (Ld). Lowndes Co.: DeWolf 1385 (Ba).
FLORIDA: Okaloosa Co.: Moldenke & Moldenke 26739 (Ba). Wakulla
Co.: Moldenke & Moldenke 26608 (Ac). Walton Co.: Moldenke & Mol-
denke 26733 (Ws), 26735 (Ld). ALABAMA: Henry Co.: Moldenke & Mol-
denke 26873 (Ac, Ld). LOUISIANA: Lincoln Par.: Shinners 19994
(Ba). BRAZIL: Paraná: Hatschbach & Guimarães 19864 (Gz). ARGEN-
TINA: Corrientes: Krapovickas & Cristóbal 15588 (Ws). CULTIVATED:
New Jersey: I. Collins s.n. [July 29, 1941] (Ba). Philippine Is-
lands: Pancho 1062 (Ba).

VERBENA TEUCRIIFOLIA Mart. & Gal.

Additional & emended bibliography: Schau., Linnaea 20: 477--
478. 1847; Schau. in A. DC., Prodr., pr. 1, 11: 553 & 555. 1847;
Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Schau.
in A. DC., Prodr., pr. 2, 11: 553 & 555. 1966; Sanchez Sanchez,
Fl. Val. Mex., ed. 1, 329, fig. 263-D. 1969; Moldenke, Phytologia
24: 241--242. 1972.

Additional illustrations: Sanchez Sanchez, Fl. Val. Mex., ed. 1,
fig. 263-D. 1969.

Recent collectors have found this plant growing in colonies in
woodlands of Pinus cooperi, Quercus virginiana var. fusiformis, and
Arctostaphylos pungens. Sanchez Sanchez (1969) encountered it on
the pedregal in the Valley of Mexico. The corollas are described
as having been "pale-blue" on Hinton & al. 17320 and "dark-purple"
on Rzedowski & McVaugh 619.

The Genelle & Fleming 824 and Long & Burch 3321, distributed as
V. teucrifolia, are actually V. ciliata Benth.

Additional citations: MEXICO: Durango: Detling 8425 (W--2669327).
México: Lundell & Lundell 12370 (Mi). Michoacán: Rzedowski & Mc
Vaugh 619 (Mi). Nuevo León: Hinton & al. 17320 (Mi).

VERBENA TEUCRIIFOLIA var. COROLLULATA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahres-
ber. 60 (2): 575. 1941; Moldenke, Phytologia 24: 242. 1972.

Moore describes this plant as "trailing, dense cover with fibrous roots" and found it flowering in September. The corollas on H. E. Moore 22 are said to have been "magenta" in color when fresh.

Additional citations: MEXICO: Puebla: H. E. Moore 22 (Ba).

VERBENA THYMOIDES Cham.

Additional & emended bibliography: Angely, Fl. Anal. & Fito-geogr. S. Paulo, ed. 1, 4: 840 & xix, map 1395. 1971; Moldenke, Phytologia 24: 242. 1972.

The Angely (1971) work cited above was previously erroneously cited by me as "1970", the title-page date, but the volume involved was not actually published until 1971.

Additional citations: BRAZIL: State undetermined: Sellow s.n. [Brasilia] (Ba--cotype).

VERBENA TOMOPHYLLA Briq.

Additional bibliography: Moldenke, Phytologia 24: 243. 1972.

Additional citations: ARGENTINA: Formosa: Jørgensen 2636 (E--866406).

VERBENA TRIFIDA H.B.K.

Additional bibliography: Paxt., Pock. Bot. Dict., ed. 1, 328. 1840; Schau., Linnaea 20: [476]. 1847; Paxt., Pock. Bot. Dict., ed. 2, 328. 1849; Moldenke, Phytologia 24: 243--244. 1972.

Paxton (1840) asserts that this species was introduced into cultivation in England in 1813. Pring found it growing on savannas, flowering in May.

Additional citations: COLOMBIA: Cundinamarca: Pring 94 (E--904950).

VERBENA TUMIDULA Perry

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 575. 1941; Moldenke, Phytologia 24: 244. 1972.

VERBENA URTICIFOLIA L.

Additional synonymy: Verbena virginica L., Philos. Bot. 99. 1751. Verbena urticifolia ♂ floribus albis Willd., Enum. Pl. Hort. Berol. 2: 634. 1809. Verbena urticaefolium Clute, Am. Botanist 33: 114, sphalm. 1927. Verbena riparia Small & Heller ex Dole, Fl. Vt., ed. 3, 224, in syn. 1937 [not V. riparia Raf., 1833].

Additional & emended bibliography: L., Philos. Bot. 99. 1751; Rausch., Nom. Bot., ed. 3, 3. 1797; Desf., Tabl. Écol. Bot., ed. 1, 54. 1804; Willd., Enum. Pl. Hort. Berol. 2: 634. 1809; Desf., Tabl. Écol. Bot., ed. 2, 66. 1815; E. Ell., Sketch, pr. 1 & 2, 98--99 & 743. 1821; Bigel., Florul. Boston., ed. 1, 239. 1824; J. Torr., Compend. Fl. 238. 1826; Bigel., Florul. Boston., ed. 3, 254. 1840; Paxt., Pock. Bot. Dict., ed. 1, 328 (1840) and ed. 2, 328. 1849; O. R. Willis, Fl. Westchester Co. 801. 1880; J. L. Bennett, Fl. Rhode Isl. 30. 1888; J. Jacks., Fl. Worcester Co., ed. 2, 40.

1894; Baerecke, Anal. Key Ferns & Flow. Pl. Atl. Sect. Middl. Fla. 114. 1906; W. Stone, Rep. N. J. State Mus. 1910 (2): 660. 1911; Twining, Fl. Northeast. Penn. 60. 1917; Blewitt, Fl. Waterbury 105. 1926; Clute, Am. Botanist 33: 114. 1927; Anon., Kew Bull. Misc. Inf. 1929, App. 3: 108. 1929; Fedde & Schust. in Just, Bot. Jahresber. 53 (1): 1076 [1058]. 1932; Rydb., Fl. Prairies & Plains, pr. 1, 677 & 967. 1932; Dole, Fl. Vt., ed. 3, 224. 1937; Martin, Zim, & Nels., Am. Wildlife & Pl., pr. 1, 414. 1951; L. J. Bradley, Ferns & Flow. Pl. Audub. Center 17, 67, & 100. 1955; Fell, Fl. Winnebago Co. 122--123. 1955; C. E. Phillips, Weeds Northeast 34 & 80. 1956; R. McVaugh, N. Y. State Mus. Bull. 360A: 195, 196, 358, 388, & 432. 1958; H. H. Iltis, Prelim. Checklist Ferns Seed Fl. Upham Woods, ed. 1, 12. 1960; Martin, Zim, & Nels., Am. Wildlife & Pl., pr. 2, 414. 1961; Grieve, Modern Herb., pr. 2, 2: 832. 1967; H. H. Iltis, Prelim. Checklist Ferns Seed Fl. Upham Woods, ed. 2, 12. 1968; Stuckey & Wentz, Ohio Journ. Sci. 69: 237. 1969; Delorit, Illust. Tax. Man. Weed Seeds 96 & 97. 1970; Eilers, Univ. Iowa Stud. Nat. Hist. 21: 61 & 123. 1971; S. Ell., Sketch, pr. 3, 2: 98--99 & 743. 1971; Ellis, Wofford, & Chester, Castanea 36: 242. 1971; Kusselman, Cochrane, Rice, & Rice, Mich. Bot. 10: 184. 1971; Rydb., Fl. Prairies & Plains, pr. 2, 2: 677 & 967. 1971; Sipple, Bartonica 41: 13, 21, & 27. 1971; H. V. Sm., Wildfl. Winter 201. 1971; Stafleu, Linnaeus & Linn. [65]. 1971; Wherry, Bartonica 41: 79. 1971; Stalter, Castanea 36: 174 (1971) and 37: 225. 1972; Chuey, Ohio Journ. Sci. 72: 43. 1972; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S. 1396 & 1399. 1972; Hutton, Castanea 37: 242. 1972; P. R. Pearson, Morris Arb. Bull. 23: 44. 1972; Wilkinson & Jaques, How to Know Weeds, ed. 2, 124, 207, & 231, fig. 297 & 298. 1972; Moldenke, Phytologia 24: 244--252 (1972) and 25: 225 & 226. 1973; Cody, Ind. Sem. 1973: 26. 1973; Davidson, Bull. Torrey Bot. Club 100: 50. 1973; Lommasson, Nebr. Wild Fls. 86 & 184. 1973; L. P. Mill., Phytochem. 1: 329, 362, 393, & 410. 1973; Ralph, Checklist Vasc. Pl. Coast. Pl. Comm. 29. 1973; Rickett, Wild Fls. U. S. 6 (3): 544, [545], & 783, pl. 196. 1973; W. Stone, Pl. South. N. J., pr. 2, 660. 1973; Barans, Castanea 39: 31. 1974; Mohlenbrock & Voigt, Fl. South. Ill. 286, 287, & 389. 1974.

Additional illustrations: H. V. Sm., Wildfl. Winter 201. 1971; Wilkinson & Jaques, How to Know Weeds, ed. 2, 124, fig. 297. 1972; Rickett, Wild Fls. U. S. 6 (3): [545], pl. 196 (in color). 1973.

Raueschel (1797) describes this species as both annual and perennial and credits it to Virginia, Davidson (1973) calls it an annual and biennial. Torrey (1843) describes its corollas a "white or sometimes slightly tinged with rose-color" and gives its habitat as "Road-sides, old fields, etc.; very common [in New York state]. Probably introduced from Europe. July--September. This plant was held sacred among the ancients, and used in making leagues by ambassadors, sacrificial rites, incantations, etc." The latter part of this statement is, of course, completely erroneous. Verbena urticifolia is native only to North America (not Europe!) and was not known to the ancients! The plant he is here erroneously referring

to is the Old World V. officinalis. The rose-colored form to which he alludes is now known as V. urticifolia var. incarnata (Raf.) Moldenke. He continues: "Between this species and the preceding [V. hastata] there are several intermediate hybrid forms, which, as well as other hybrid Verbenas, have been carefully and accurately described by Dr. Engelman in Silliman's Journal, vol. 46."

The corollas are usually described as "white" in this typical form of the species, as, for instance, on Allard 11989 & 21188 and E. H. Walker 3665. The Ward s.n. [July 14, 1884], cited below, exhibits deeply incised-dentate leaf-blades and may prove to be worthy of a form designation — or it may even represent the hybrid xV. baileyana Moldenke.

[to be continued]

NOTES ON NEW AND NOTEWORTHY PLANTS. LXXI

Harold N. Moldenke

ERIOCAULON NILAGIRENSE f. PARVIFOLIUM Moldenke, f. nov.

Haec forma a forma typica speciei statura humiliore et foliis brevioribus recedit.

This form differs from the typical form of the species in its generally lower stature and especially in its mature leaves at time of anthesis being much shorter, usually averaging only 8--18 cm. in length.

The type of the form was collected by Harold Norman Moldenke, Alma Lance Moldenke, Antony Harold Magdon Jayasuriya, and Don Bhathiya Sumithraarachchi (no. 28276) in a ditch in black patana grassland on the Horton Plains along the road from Farr Inn to World's End, at an altitude of 7000 feet, Nuwara-Eliya District, Central Province, Sri Lanka, on January 29, 1974, and is deposited in my personal herbarium at Plainfield, New Jersey.

ERIOCAULON WILLDENOVIANUM var. FERGUSONII Moldenke, var. nov.

Haec varietas a forma typica speciei foliis vaginisque densiuscule longeque villosis, pilis albidis mollibus, recedit.

This variety differs from the typical form of the species in having its leaves and sheaths rather densely long-villous with shaggy, soft, whitish hairs.

The type of the variety was collected by W. Ferguson in the Cinnamon Gardens at Colombo, Colombo District, Western Province, Sri Lanka, in March, 1883, and is deposited in the herbarium of the Sri Lanka Botanical Garden at Peradeniya.

LANTANA CAMARA var. **NANA** Moldenke, var. nov.

Haec varietas a forma typica speciei statura valde humiliore recedit.

This variety differs from the typical form of the species in its regularly lower stature at maturity, usually attaining a height of only 1 meter or less. It is widely cultivated as a border or rock-garden or window-box plant.

The type of the variety was collected by Ellys Theodora Moldenke and Harold Norman Moldenke (no. 11903) in outdoor cultivation at the New York Botanical Garden, in the so-called "perennial border", Bronx Park, Bronx County, New York, on October 14, 1941, and is deposited in the Britton Herbarium at the New York Botanical Garden.

LANTANA PRIMULINA Moldenke, sp. nov.

Herba lignosa 1 m. alta; ramis densissime hispidis; foliis decussato-oppositis sessilibus subrotundis late ellipticisve ovato-subrotundisve 2--3.5 cm. longis 1.5--2.8 cm. latis utrinque plusminusve hispidis ad apicem rotundatis vel rotundato-acutis marginibus regulariter serratis ad basin rotundatis; inflorescentiis axillaribus; pedunculis elongatis 8--13 cm. longis dense hispidis; capitulis hemisphaericis multifloris; bracteis foliaceis ovatis 8--10 mm. longis ca. 5 mm. latis extus dense albido-hispidis; corollis hypocrateriformibus luteis.

Woody herb, about 1 m. tall; branches rather slender, obtusely tetragonal or subterete, very densely hispid with wide-spreading sordid-whitish stiff hairs; leaves decussate-opposite, the lowest smaller, all sessile, varying from subrotund to broadly elliptic or ovate-subrotund, 2--3.5 cm. long, 1.5--2.8 cm. wide, more or less densely hispid on both surfaces with long whitish hairs which become appressed in pressing, rounded or rounded-acute at the apex, regularly serrate along the margins, rounded at the base; inflorescence only axillary, capitate, far surpassing the subtending leaves; peduncles slender, divergent, 8--13 cm. long, densely hispid with wide-spreading sordid-whitish hairs; heads hemispheric, many-flowered, small, about 1.5 cm. wide and 1 cm. high in anthesis; bracts foliaceous, very conspicuous, broadly ovate, 8--10 mm. long, about 5 mm. wide at the base, densely white-hispid on the outer (lower) surface, the hairs more or less appressed in pressing; corolla hypocrateriform, yellow, equaling and mostly hidden by the bracts.

The type of this species was collected by E. A. Robinson (no. 4452) in damp grassy upland in the Mafinga Hills, Northern Province, Malawi, at an altitude of 1850 meters, on March 11, 1961, and is deposited as sheet no. 1776676 in the herbarium of the Missouri Botanical Garden at Saint Louis, Missouri.

LANTANA TRIPLINERVA var. **HISPIDA** (Moldenke) Moldenke, comb. nov.

Lantana minasensis var. hispida Moldenke, Phytologia 23: 454. 1972.

LANTANA TRIPLINERVIA var. *LONGIBRACTEOLATA* (Moldenke) Moldenke, comb. nov.

Lantana minasensis var. *longibracteolata* Moldenke, *Phytologia* 13: 242. 1966.

LANTANA TRIPLINERVIA var. *MINASENSIS* (Moldenke) Moldenke, comb. & stat. nov.

Lantana minasensis Moldenke, *Phytologia* 2: 138. 1948.

LANTANA TRIPLINERVIA var. *PUBERULENTA* (Moldenke) Moldenke, comb. nov.

Lantana minasensis var. *puberulenta* Moldenke, *Phytologia* 25: 220. 1973.

LIPPIA INTERMEDIA var. *PARVIFOLIA* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis maturis brevioribus 1.3--2 cm. longis 6--9 mm. latis ad apicem acutissime argutis marginibus crasse serratis recedit.

This variety differs from the typical form of the species in its mature leaves at time of anthesis being shorter, only 1.3--2 cm. long and 6--9 mm. wide, much more sharply acute at the apex, and with the marginal teeth much coarser.

The type of the variety was collected by Gert Hatschbach (no. 32582) on a "campo limpo" at Anfiteatro, in the Municipality of Ponta Grossa, Paraná, Brazil, on September 27, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey. The corollas are said to have been yellow when fresh and the plant is very obviously xylopodiferous.

PREMNA OBTUSIFOLIA var. *SERRATIFOLIA* (L.) Moldenke, stat. nov.

Premna serratifolia L., *Mant.* 253. 1771.

SYNGONANTHUS FISCHERIANUS var. *HATSCHBACHII* Moldenke, var. nov.

Haec varietas a forma typica speciei bracteis involucrentibus regulariter at apicem attenuato-acutis recedit.

This variety differs from the typical form of the species in having its receptacular bractlets regularly and gradually attenuate to the sharply acute apex and more glistening white.

The type of the variety was collected by Gert Hatschbach (no. 32760) -- in whose honor it is named -- in the "brejo" at Rio Atuba, in the Municipality of Curitiba, Paraná, Brazil, on October 30, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey.

XVERBENA STUPROSA Moldenke, hybr. nov.

Herba hybrida, ramis gracilibus tetragonis glabrescentibus; foliis anguste ellipticis 2--6 cm. longis 3--10 mm. latis brevissime petiolatis vel subsessilibus ad apicem acutis ad basin gradatim attenuatis firmis marginibus parvissime adpresseque serrulatis utrinque sparse antrorseque strigulosis; inflorescentiis numerosis spi-

catis elongatis 12--20 cm. longis gracillimis tenuissimis dense multifloris debilibus ubique minutissime sparsissimeque strigillosis; bracteolis lanceolatis ca. 2 mm. longis breviter acuminatis; calyce 2--3 mm. longo.

Hybrid herb, probably a natural hybrid between *V. simplex* Lehm. and *V. urticifolia* L.; stems and branches slender, rather sharply tetragonal, grayish, minutely strigillose when young, soon glabrescent; leaves decussate-opposite, very shortly petiolate or sessile, the blades firm, very narrowly elliptic, 2--6 cm. long, 3--10 mm. wide, acute at the apex, serrulate along the margins with very small appressed teeth, gradually attenuate to the base, sparsely strigillose on both surfaces with scattered antrorse whitish hairs; inflorescence terminating stems and branches, apparently numerous and irregular, spicate, the spikes numerous, mostly elongate, 12--20 cm. long (in fruit), very slender and weak, densely many-flowered and many-fruited with imbricate flowers and fruits, very minutely and sparsely strigillose throughout; peduncles very much abbreviated, about 1 cm. long, slender and resembling the branches; rachis very slender and weak; bracts very small, lanceolate, about 2 mm. long, short-acuminate at the apex, equaling the flowering calyx, shorter than the fruiting calyx, 2--3 mm. long, minutely and very sparsely strigillose on the outer surface, its rim minutely 4-apiculate.

The type of this hybrid was collected by Heinrich Karl Daniel Eggert in waste places at Corning, Clay County, Arkansas, on August 21, 1896, and is deposited in the herbarium of the Missouri Botanical Garden at Saint Louis, Missouri, as sheet no. 118279.

VITEEX NEGUNDO var. PURPURASCENS Sivarajan & Moldenke, var. nov.

Haec varietas a forma typica speciei recedit ramis foliisque subtus paniculisque calycibusque corollisque dense purpureo-pubescentibus, corollis ubique atropurpureis, fauce pilis griseis et purpureis intermixta, filamentis styloque purpureis, et filamentis ad basin purpureo-pilosis.

This variety differs from the typical form of the species in having its branches, under surface of the leaflet-blades, panicles, calyxes, and corollas densely purple-pubescent (slightly fading in age), the corollas deep-purple throughout, their throat with gray and purple hairs mixed, the stamen filaments purplish and with purple hairs at the base, and the style purple. In the typical form of the species the branches and under surface of the leaflets are densely gray-pubescent, the panicles, calyxes, and corollas are gray-pubescent, the corolla-tube is light-pink, the limb is light-purple, and the throat has only gray hairs within, the filaments are white with gray hairs at the base, and the style is white.

The type of the variety was collected by V. V. Sivarajan (no. 1349) on the Calicut University campus in Calicut, India, on May 9, 1974, and is deposited in my personal herbarium at Plainfield, New Jersey. I am indebted to Dr. Sivarajan for the details of the description and comparisons.

FLOTSAM AND JETSAM OF CANTON ATOLL, SOUTH PACIFIC

Otto & Isa Degener

Canton, a Pacific Ocean atoll lying between latitude $2^{\circ} 46'$ and $2^{\circ} 52'$ S., and longitude $171^{\circ} 37'$ and $171^{\circ} 44'$ W., is the most northern of eight low coral islands comprising the Phoenix Group. Resembling a pork chop in shape, it is about eight miles long, and has its longer axis lying roughly from its narrower eastern end to its four miles wide western end (fig. 1). The atoll consists of a rim 150 to 1,800 feet wide enclosing a shallow lagoon of about 25 square miles. The greatest elevation of the island is twenty feet.

Evidently built around a volcanic core, the atoll consists mainly of the calcareous skeletons and shells of invertebrates, fragments of coralline algae, and a few vertebrate skeletons. All have been comminuted into sand and powder, and/or cemented into vast stretches of calcite. These last rim the island and are worn smooth by the waves washing back and forth over them with scouring material. The dry atoll rim of calcite fragments, sand and powder is more or less glued together by felt-like or gelatinous films of numerous genera of blue-green algae (Degener & Degener 1959). Bird excrement, hardly guano, accumulates under the rookeries of booby and frigate birds nesting preferably on scaevola bushes (Murphy et al., 1954; fig. 2). Rare areas of humus may be found in patches of forest, the result not only of fallen twigs and leaves, but from accumulated excrement of the terrestrial hermit crab Coenobita perlatus. Some of this earth, an estimated collection of 1,000 years, may be four inches deep.

The atoll was of little importance until Pan American World Airways began to use it as a refueling station in 1939 for aircraft on Honolulu-Auckland flights. As both Great Britain and the United States laid claim to this flat area, the controversy was amicably settled April 6, 1939 by agreement to administer the atoll jointly as a condominium for fifty years and "thereafter until such time as it may be modified or terminated by mutual consent." With outbreak of World War II, Canton became the hub of Pacific air movement by United States Military Forces. In 1942, with 1,143 Army personnel stationed there, it was used for antisubmarine search and photographic reconnaissance missions. A year later it was the main base for the conquest of the Gilbert Islands from the Japanese. By 1950 commercial activity was at its zenith, with four major airlines involved and a resident force of about 300 Americans and British.

With continuous improvement in airplanes, the importance of Canton as a refueling station waned. The last scheduled commercial stop was in 1959. That same year the National Aeronautics and Space Administration (NASA) selected Canton as Project Mercury Tracking

Station Number 11, and for a few years until 1966 to support the astronauts in Project Gemini. During 1968 the Government of American Samoa was permitted to salvage whatever it wanted from deactivated installations. In 1970 the atoll became a Space and Missile Test Center serviced by United States personnel, many being Samoans (Bickett 1971 for details and references).

As Botanical Consultant for Canton Atoll for the Civil Aeronautics Administration (CAA), Otto Degener explored and worked on the atoll for a week in July 1950 and for six weeks in April-May 1951. Isa Degener and he then continued study of the atoll for about three weeks in February-March 1958.

Canton has been under the scrutiny of many scientists practicing diverse disciplines. According to the entomologist van Zwaluwenburg (1942) on Canton "Between December 1940 and February 1941 there were some weeks of strong westerly winds which attained a velocity of 55 knots. The effect of these prolonged gales on the normal ocean currents, though temporary, must have been considerable. Drift-borne seeds were absent or at least inconspicuous on the Canton beaches the year before, but by August they were a striking feature of the shore line everywhere. It is assumed that their presence is a result of the gales of the previous winter." He forthwith mentions what he considers to be Myristica sp., Entada scandens, Inocarpus edulis, Mucuna spp. (4), Caesalpinia cristata, Canarium sp., Barringtonia speciosa, Terminalia catappa, Cerbera odollam, unidentified spp. (3), Aleurites moluccana, Pandanus sp., and viable Cocos. "Seeds of many of the species listed had sprouted after stranding. Between 35 and 50 coconut sprouts were estimated to be still present in September along the entire 27-mile perimeter of the island, but these were only a fraction of the total number of coconuts cast up. Some of the hazards attending the survival of seedling plants from drift seeds are obvious: Coenobita olivieri Owen [C. perlatus] shred the husk of coconuts and eat out the contents of the sprouted nuts; flood tides drench many seedlings with sea water; in at least one case high water buried a sprouted palm deep in sand. So the complete failure of any of the above named species to become established on Canton in the past - - - is not surprising when, to the hazards already mentioned, are added the inevitable recurrent shortages of rain."

When we visited the island in the winter of 1957-58, we similarly found on its beaches great accumulations of floated debris, mostly wood (fig. 3), fruits and seeds (fig. 4) reminiscent of the situation mentioned by van Zwaluwenburg. Such objects, often with superficial scrutiny, can be identified to the genus; and, particularly fruits and seeds, to the species. For the specific determination of thousands of puzzling Canavalia seeds, however, considerable space in a garden is needed to raise them so that the plants can be identified by study of flowers, legumes and seeds. We lacked such space. Nevertheless, one questionable Canton seed collected in 1958 and

planted in our garden at Mokuleia Beach, Oahu, Hawaii, is now a 50 foot tall Hernandia peltata Meissn. Though hundreds of seeds of Erythrina were collected on Canton, only a few were planted in the garden. One, allowed to flower and fruit, was E. variegata var. orientalis (L.) Merr. Becoming too large and beginning to buckle a house foundation, it was chopped down. Its larger limbs and its trunk segments, rolled to the beach for disposal, soon struck root and sprouted. This variety evidently can colonize isolated islands not only by seed but by trunk fragments. With facilities to plant a thousand Canton seeds of Erythrina and a thousand of the very variable seeds of Canavalia, many as yet undescribed taxa might have been discovered.

As many representative propagules were collected, chiefly along the north shore, as the expense of shipping them home permitted. Numbered voucher specimens have been deposited at the New York Botanical Garden (NY) with unicates, and similar collections at the University of Massachusetts (MASS), Berlin (B), Kew (K), Bishop Museum (BISH), Arnold Arboretum (A), Cornell (BH, CU), Geneva (G), Munich (M), Smithsonian (US), St. Louis (MO), United States Department of Agriculture (USFS), Vienna (W) and elsewhere. Many of these specimens have been so efficiently filed away taxonomically that it is impracticable to reassemble them to ascertain their herbarium numbers. We succeeded in identifying most of the disseminules ourselves. Dr. R. Melville independently identified many of the numbers we had identified and, in addition, many unknown to us; and so did likewise Dr. Charles R. Gunn, Mr. John V. Dennis and Miss M.H. Stone.

Intrigued by a 1968 article by Dr. Gunn about stranded seeds and fruits along Florida's shore, we dusted off our old notes, photographs and the few specimens remaining to us. We then prepared the present paper, with editorial suggestions from Gunn and Dennis. Two companion papers should follow: one, under authorship of Degener, Gunn and Dennis, should describe and illustrate the Canton Atoll material in some detail; while the other, under authorship of Gunn and Dennis, might concentrate on wind and ocean currents in the Pacific, and buoyancy.

The following lists what we believe we collected on Canton. As the identification of certain propagules - especially of Canavalia, Erythrina, Mucuna, Terminalia - is difficult or impossible unless these can be grown to produce identifiable flowers, the list is a tentative one. Some of the specimens bear Degener & Degener collection numbers.

Cycadaceae: Cycas circinalis L., D. & D. 24,668.

Podocarpaceae: ?Podocarpus elongata L'Herit.

Pandanaceae: Pandanus spp.

Palmae: ?Borassus, D. & D. 24,625; Cocos nucifera L.; Nypa frutescens Wurmbo., D. & D. 24,692.

Taccaceae: Tacca leontopetaloides (L.) Kuntze.

Casuarinaceae: Casuarina equisetifolia Forst.

Fagaceae: Quercus bennettii Miq., D. & D. 24,683.

Olacaceae: ?Ximenia americana L.

Cassythaceae: Cassytha filiformis L.

Hernandiaceae: Hernandia nymphaeifolia (Presl) Kubitski; H. peltata Meissn., andor some similar species, D. & D. 24,697, 24,702.

Chrysobalanaceae: Parinari glaberrima Hassk.

Leguminosae: Canavalia cathartica Thouars, D. & D. 24,675; C. micropiper (DC.) Piper; C. spp., many taxa, some probably new; Cynometra sp.; Dioclea reflexa Hook. f., D. & D. 24,684, 24, 975; D. violacea Mart., D. & D. 24,671; D. spp.; Entada phaseoloides (L.) Merr., andor related spp., D. & D. 24,628, 24, 629; Erythrina variegata var. orientalis (L.) Merr., andor other spp., D. & D. 24,669; Guilandina crista (L.) Small; Intsia (Afzelia) bijuga (Colebr.) Kuntze, D. & D. 24,687; Mucuna gigantea (Willd.) DC., D. & D. 24,670; M. cf. gigantea, D. & D. 24,682; M. ?kraikei Warb., D. & D. 24,681, 24,974; M. spp. D. & D. 24,667; Pongamia pinnata (L.) Merr.; Sophora tomentosa L., D. & D. 24,706; Strongylodon lucidus (Forst. f.) Seem. (or perhaps S. pseudolucidus), D. & D. 24,691.

Burseraceae: Canarium cf. decumanum Gaertn., D. & D. 24,620; C. spp. D. & D. 24,620; C. mehenbethene Gaertn., D. & D. 24,626; C. spp. D. & D. 24,676, 24,694.

Meliaceae: Xylocarpus (Carapa) moluccensis (Lam.) Roem., (Globular fruit always with calcareous tunnels of Teredo clava.), D. & D. 24,665.

Euphorbiaceae: Aleurites moluccana Willd., D. & D. 24,686; Aleurites sp. nov.? with walnut-marked seed, D. & D. 24,627; Hevea brasiliensis (HBK) Muell-Arg.; Hippomane mancinella L., D. & D. 24,699.

Anacardiaceae: Spondias cytherea Sonner., (or perhaps doubtfully distinct S. dulcis), D. & D. 24,672.

Rhamnaceae: Colubrina cf. asiatica Brongn. (Seeds rather small.)

Tiliaceae: Triumfetta procumbens Forst.

Malvaceae: Pariti tiliaceum (L.) Britt.; Thespesia populnea (L.) Soland.

Bombacaceae: ?Ochroma sp.

Sterculiaceae: Heritiera littoralis Dryand.; Melochia sp.

Guttiferae: Calophyllum inophyllum L., D. & D. 24,680.

Flacourtiaceae: Pangium edule Reinw., D. & D. 24,677.

Sonneratiaceae: Sonneratia sp.

Lecythidaceae: Barringtonia speciosa (L.) Kurz.

Combretaceae: ?Lumnitzera; Terminalia cf. catappa L., D. & D. 24, 673; T. spp., D. & D. 24,668, 24,674, ?24,975.

Sapotaceae: Palaquium sp.; Sapotaceae?, D. & D. 24,693.

Apocynaceae: Cerbera manghas L.

Convolvulaceae: Ipomoea pes-caprae var. emarginata Hall. f., D. & D. 24,679.

Boraginaceae: Cordia subcordata Lam., D. & D. 24,578; Messerschmidia argentea (L. f.) Johnston.

Verbenaceae: Clerodendrum inerme (L.) Gaertn.

Rubiaceae: Guettarda speciosa L., D. & D.24,678; Morinda citrifolia L.

Apocynaceae: Ochrosia cf. oppositifolia (Lam.) K. Schum., D. & D. 24,698.

Goodeniaceae: Scaevola sp.

Compositae: Wedelia biflora (L.) DC.

Because drift logs had housed shipworms of various genera (Banksia sp.; Martensia spp.; Teredo bensoni, T. clava, T. samoensis) and some goose barnacles (Lepas anatifera), nearly a hundred wood samples were collected. These were shipped to the late Dr. Charles H. Edmondson for his studies of wood-fouling organisms. Even logs of balsa, Ochroma pyramidale (Cav.) Urb., an American species, were found. These were conspicuous from other dicotyledonous wood by being practically free of shipworms and entirely free of goose barnacles. This freedom of organisms on floating balsa is due more to the remarkable lightness of the wood than to any other factor. Balsa wood practically floats on the ocean surface and, with the slightest breeze, the wet surface is lifted out of the water and exposed to the drying air. Hence this wood, as a whole, is simply too dry to sustain marine organisms.

In chopping drift logs for the pallets and shells, so necessary for the identification of shipworms, we came across several colonies of termites, such as Coptotermes formosana hitherto unrecorded from Canton. These insects appeared to have drifted to the atoll. It seems reasonable that wood boring insects can survive ocean transportation within a tree trunk as time is not always sufficient for wood to get waterlogged through and through. Though not in a position to offer proof, it is possible for a knothole in a tree to seal over so that the enclosed cavity will house propagules of animals and plants; eggs, cysts, the aestivating or hibernating organisms themselves, spores, seeds, fungus hyphae, etc. Such a drifted log, cast upon a sun-scorched beach and there decaying, would eventually liberate such propagules into such an unfavorable environment that most would succumb. But another factor promoting survival and colonization not only for "knothole migrants" but for drift fruits and seeds enters the picture.

Living at the beach on northern Oahu, Hawaiian Islands, and having had our home and garden devastated by the tsunami or "tidal waves" of April 1, 1946 and March 9, 1957, we were overwhelmed by one truth. Tsunami are frequent and of enormous effect, pushing drift of all kinds a few feet to hundreds of feet inland from the inhospitable beach to often humus soil and loam. Such action of the tsunami is on a wholesale scale, entire coastlines usually totaling thousands of miles being affected.

For some years after a tsunami we eradicated seedlings of the wild, endemic naupaka kai (Scaevola sericea var. fauriei (Lévl.) Deg. & Deg.) and of the exotic seagrape (Coccoloba uvifera (L.) L.) that

continued to sprout in flower beds 200 to 300 feet inland from the stands along the beach. Similarly, on the south shore of Cahu, some years after the tsunami of 1946, Mr. Walter Bayer showed us healthy plants of the locally rare endemic taxon of Colubrina asiatica (L.) Brongn., that had sprouted from the elevated windrow of debris cast up in his garden.

Anyone who has seen the hard-shelled eggs of geckos glued in holes and crevices of coconut and other logs along the beach will have an explanation - perhaps the true one - for the wide distribution of such reptiles.

Islands surrounded by great deeps with icy cold water even in the tropics, are beyond reach of most nonswimming, aquatic organisms unless they have a pelagic stage of some duration in their life. If these do not reach the completely isolated island via floating logs or larger propagules, a rare but effective means of transportation may be available. In studying the beaches of Canton we have come across quantities of gray to almost black blocks of pumice, and occasionally the shells of the pearly nautilus and the cuttlebone of the octopus. A random glance at dark pumice and more careful inspection of pale nautilus and cuttlebone occasionally discloses the white of coral and the calcareous housing of marine worms. Such types, and many others, may well have reached Canton waters mature enough to reproduce their kind before being washed upon the beach to die. We wish to emphasize that electric light bulbs, other waste artifacts and garbage of Caucasian and Oriental civilizations, so common to many beaches, are conspicuously absent on Canton. Outstanding artifacts were several outrigger canoes and a primitive paddle. Residents claim that one canoe, definitely hollowed out with a stone adz, is of African origin. Study of a wood fragment, never collected, would have decided such claim.

They are just bugs (Hemiptera, Family Vallidae); but to us, pathetic ones all the same. Just beyond where the strongest waves lap the beach, among foam, sand and coral blocks of various sizes, clumsily and weakly hop exhausted marine waterstriders (Halobates micans). They are black above, perhaps for desired warmth; pale bluish below to be camouflaged against attack by hungry fish fry looking upward from below. They are only a few millimeters long. Agile skaters on the surface film of ocean water, like their relatives on fresh water of American brooks and ponds, they are helpless when thoroughly wetted during a storm or when blown unsuspectingly by the trade winds and swept by the breakers onto shore. They are out of their element and here they die. Though living on the vast expanse of the ocean, they are no more water creatures than are the frigate birds flying overhead. This insect, to survive from generation to generation, must find a chance piece of driftwood, seed, pumice or even floating feather upon which to lay its eggs: while the bird and the sea turtle must find an island like Canton to lay theirs. These waterstriders, we believe, had been swept along the surface of the ocean like the fruits and seeds by gale force winds rather than washed by ocean currents to pile up on the beach.

Due to a spell of rainy weather germination of more or less salt freed seeds were so successful that the beach showed a narrow, faint line of green extending for many miles, a condition unknown to any resident of the time. In this line of drift not a single Canton species was noticed except Cassyttha filiformis, Triumfetta procumbens and Cordia subcordata. As these propagules were wave worn, we believe them not of local origin.

The sea hearts (Entada phaseoloides s.l.), with large expanded cotyledons, a few leaves and a slender stem elongating vainly for a support to climb, were already beginning to suffer in February from the strong drying salt breeze. Not one became established. Thousands upon thousands of seedlings of the beach morningglory (Ipomoea pes-caprae var. emarginata) with stiff, thick, green, deeply notched cotyledons horizontally akimbo, were being daily eaten by the hermitcrab (C. perlatus), known in the vernacular as "Bernard." Various Mucuna species, probably rich in the poison L-dopa, were germinating merely to fall prey to these hungry hermitcrabs. Of the myriad viable seeds that braved the ocean for unknown weeks and months without succumbing before landing on Canton shores, we failed to see a single successful introduction. This atoll simply does not offer conditions fit for survival of phanerogams excepting for the trees Cordia subcordata and Messerschmidia argentea (fig. 5), the vines moonflower (Calonyction tuba) and lovevine (Cassyttha filiformis), and thirteen other shrubs and herbs (fig. 6). These natives are described in Degener & Gillaspay (1955) and Degener & Degener (1958). Should certain kinds of seeds be washed farther inland by a tsunami where shelter and favorable soil conditions would permit such adventives to establish themselves, they would be soon destroyed by the hermitcrabs. These congregate under bushes and trees during the heat of the day, while at other times they roam over the atoll greedily scavenging in search of food (figs. 7, 8).

Of individuals who have been on Canton, we wish to acknowledge the help of Island Manager Edwin Gillaspay and Mrs. Gillaspay; Mr. & Mrs. Albert Lincoln, well-informed residents and malacologists; and Dr. L.H. MacDaniels, who analysed the soil and water of Canton many years ago. For additional information touching diverse aspects of the atoll, the reader is advised to consult Murphy, Niedrach & Bailey (1954), and their bibliography compiled by E.H. Bryan, Jr., of about seventy items published between 1862 and 1954; and the following bibliography of additional pertinent items:

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- Degener, O., & I. 1973. *Lepturus Pilgerianus* versus *L. Repens*. *Newsl. Haw. Bot. Soc.* 12(5):31.

The above references apply to Canton Atoll in the Pacific; the following applies to Florida, off the Atlantic:

- Gunn, C.R. (March-April) 1968. Stranded Seeds and Fruits from the Southeastern Shore of Florida. *N.Y. Bot. Gard. Journ.* 43-54.

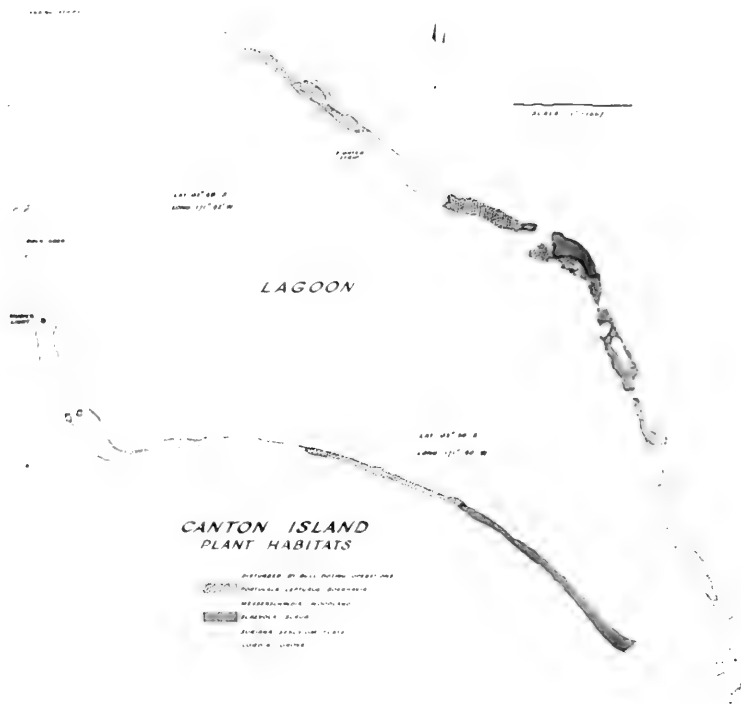


Fig. 1. Canton Atoll (After Hatheway 1955)

Fig. 2. Frigate bird rookery amid scaevola bushes

(overleaf, following page)





Fig. 3. Driftwood and barringtonia fruits, etc.



Fig. 4. Fruits, seeds and seedlings



Fig. 5. Messerschmidia argentea, a favorite shade tree for the terrestrial hermit crab (C. perlatus) to rest during heat of day (Degener & Rasche photo)

Fig. 6. Native phanerogam vegetation consists of seventeen species only: Digitaria, Eragrostis, two of Lepturus, Boerhavia, Sesuvium, Portulaca, Cassytha, Tribulus, Suriana, Triumfetta, Sida, Pemphis, Calonyction, Cordia, Messerschmidia and Scaevola

(opposite page)





Fig. 7. Hermitcrabs enjoying their siesta (Degener & Rasche photo)



Fig. 8. Hermitcrabs roaming over atoll in search of food

SPATHODEA IN HAWAII

Otto & Isa Degener

It may seem strange for residents of the Hawaiian Islands to burst into print regarding taxa of the African genus Spathodea of the Bignoniaceae. Nevertheless, as three are grown here, we wish to dispel some local confusion regarding them.

The glabrous taxon with scarlet flowers having a silky tomentulose calyx with elevated nerves is widely planted as a street tree. This we consider to be Spathodea campanulata Beauv. According to Welwitsch in Iter Angolense, in Journ. Bot. London 3:332. 1865, it occurs naturally in Golungo Alto and Cazongo.

The taxon with leaves densely tawny puberulent beneath and with scarlet flowers having a silky tomentulose calyx with impressed nerves was flourishing about the Botany Building on the University of Hawaii campus between 1922 and 1927. This is mentioned in Degener, O., Flora Haw. Fam. 321. 12/24/34. It still occurs, but rarely, in some gardens in the State. In spite of some leading botanists considering it synonymous with the above species, we consider this to be typical Spathodea nilotica Seem. According to page 333 of the Iter, this "Bushy scarlet-flowered tree" came from "Ungoro Glav., Aug. 1860. Speke and Grant's Expedition to the Sources of the Nile."

Recently a third taxon appeared in the Islands which botanically is of modest interest, but horticulturally is causing a furor. We here name it:

Spathodea nilotica forma bryanii Deg. & Deg., f. nov.
A specie corollae floris different. Degener's' 33, 441. Seed introduced from Africa by L. V. Bryan. Specimen from cultivated tree in Kona, Hawaii. Collected by Lester W. Bryan, Dec. 1973.
Type: at U.S. Nat. Arb.; cotype, N.Y.

As Kelsey & Dayton (Standardized Plant Names, Ed. 2. 1942.) chose "flambeautree" for members of Spathodea, we here name this new taxon "Bryans flambeautree" with the vain hope of discouraging its local name of "Bryans Kona gold" from becoming popular. "Kona" applies to a Hawaiian district hardly associated with the taxon, and "gold" might apply to any kind of yellow-flowered plant whatsoever. The corolla, style and filaments, instead of being red, are "pumpkin-yellow."

According to retired forester Bryan (letter dated March 8, 1974.), "My seed came from Peter Greensmith of Nairobi, Kenya, Africa thru David Barry, Jr. who operates the California Jungle Nursery in Los Angeles." The name "Bryans Kona Gold" was printed Oct. 12, 1973 in the "West Hawaii Today" newspaper; and Oct. 14 with text and colored plate in the magazine section of the "Hawaii Tribune-Herald" by County Agent Norman Bezona. We had never realized the complicated history of this

or of a similar form until we communicated with Dr. Frederick G. Meyer of the U.S. National Arboretum, who sent us a copy of the American Horticulturist, Vol. 52, Spring 1974. There Dr. Edwin A. Menninger writes about "The Yellow African Tulip Tree" in some detail. That our form is strictly a cultigen is questionable. According to Eggeling & Dale (Indigenous Trees of Uganda. Ed. 2. 42. 1952,) "A form with rich buttercup yellow flowers, well worth perpetuating, occurs in Bugishu and a somewhat similar tree has been found in Mengo."

BISHOP'S "INVENTORY"

Otto & Isa Degener

After eighteen months of research Dr. Luther Earl Bishop authored "Honolulu Botanic Gardens Inventory 1972," a 294 page book measuring eight by eight inches. It was published by the Friends of Foster Gardens Press in 1973. Its thick eggshell brown, Manila cover attractively binds about thirty pages to include a "Forward" and an introduction to seven botanic gardens located on the Island of Oahu. The oldest and most interesting historically is Foster Botanic Garden located in downtown Honolulu.

Foster Botanic Garden, also known as Foster Park, had been the home of the German William Hillebrand, physician to Hawaiian royalty and author of the prized "Flora of the Hawaiian Islands," published posthumously in 1888. During his twenty years' residence in Honolulu, Hillebrand (b. 1821 - d. 1886) cultivated choice Hawaiian and exotic plants in the garden about his home in Nuuanu Valley. In 1880 the Canadian Thomas R. Foster purchased the property. He married Mary Elizabeth Robinson (1844-1930), also known by her Hawaiian name Mikahala, the daughter of James Robinson and a Hawaiian chiefess. A convert to Buddhism, the aging widow had seen the ghost of Captain Foster riding his favorite horse, nights, among the towering trees in her garden. This dream may have helped the tactful and understanding botanist Harold L. Lyon (1879-1957) to prevail upon Mrs. Foster to deed this property to the City and County of Honolulu as a "public and tropical park to be known as Foster Park." Thus the Board of Public Parks and Recreation assumed responsibility for the five and a half acres in 1931. Botanist Lyon became Director of the Garden until his death, whereupon Landscape Architect Paul R. Weissich took over the position. By 1972 the Honolulu Botanic Garden System, under the latter's able guidance, had grown to seven botanic gardens comprising 266 acres!

The "Inventory" proper lists the plants by binomials, fortunately with authorities; the accession number, giving the

student ready opportunity to consult additional information recorded on the proper filing card in the J. F. Rock Memorial Library; the geographical source; and in which of the seven gardens each species is growing. Page 35 to 46 are devoted to about 75 species and named cultigens of ferns and their allies; page 47 to 55 to about 100 Gymnosperms and their allies; page 59 to 197 (not 167) to about 2,200 Dicots; and page 199 to 287 to about 1,400 Monocots. Thousands of additional species, identified to the genus only, are likewise listed. Families in these groups are arranged alphabetically. A map and eleven full page plates illustrate the work.

As expected with such a wealth of binomials the reader, like the reviewers, may question some listings. Personally, we believe many legumes deserve segregation into different genera largely according to pod characters; and that some of the orthography be altered such as Alyxia olivaeformis to A. oliviformis, Senecio kleiniaeformis to S. kleiniformis, Boerhaavia to Boerhavia, Casasia clusifolia to C. clusiifolia, Phaius to Phajus.

Besides being delightful and instructive to residents and tourists alike, these plantings indicate what species will and will not thrive at an elevation from sea level to 1,300 feet, at an exposure of 24 to 52 inches of rainfall per year, and to extremes of 56° to 95° Fahrenheit. The reviewers hope that State Legislators will realize that these seven kipuka, or oases amid condominiums and asphalt, can be bound together by streets and highways adorned and shaded by fascinating plants already tested for survival. With proper appropriations to the Department of Parks and Recreation, Honolulu can become a true botanical garden city.

It is fortunate that the Friends of Foster Garden, Inc., with the backing of various eleemosynary Trusts, was enabled to finance and publish Luther E. Bishop's "Inventory." The work is to be distributed to more than three hundred leading botanical gardens in the World. The book is enlightening.

BOOK REVIEWS

Alma L. Moldenke

"THE RAND McNALLY ATLAS OF WORLD WILDLIFE" edited by Sir Julian Huxley (consultant), Martyn Bramwell et al., 208 pp., illus. Mitchell Beazley Ltd., London, & Rand McNally & Co., San Francisco, California 94104, New York, N. Y. 10019, Chicago, Box 760, Illinois 60680. 1973. \$25.00 oversize.

If the long-time conservationist, Sir Julian Huxley, can write in the Foreword "I myself have learned much from the Atlas, gaining especially a better comprehension of world ecology", there must surely be much to learn in store here for all of us — children, general readers, teachers, all kinds and levels of scientists. The vast amount of content-material is organized through attractive panoramas, dynamic charts, outstanding wildlife photographs, and valuable maps for the nature of the world before man's arrival and his impact since then and for the major biogeographical regions of our earth. These colorful composite layouts, drawings and photographs reveal so effectively much of ecological and ethological relationships among variously feeding and breeding animals with each other and with their surrounding plant life and with man.

Any adverse criticisms are of minor import: misspellings such as for invertebrates on p. 12, proboscis on p. 83, *myxomatosis* and *virginica* on p. 177, etc.; misstatements such as "Most life forms must either climb or swim unless they are birds or fish" on p. 40 and "thick heavy bills of some [finches] are the result of a need to crack open tough seeds and nuts" on p. 173; loss of clarity in a few small color photographs as the Kenyan pastoral scene on p. 179, etc.; the orphaning of the angiosperms in the diagram on p. 12; and the occasional elimination of Sri Lanka (Ceylon) from the southern tip of India on maps like those on pp. 120 & 121. Because the text is clear and the glossary very short, the latter is really non-functional.

Considering the price of books today, this one is really a bargain; considering the contents, it is a treasurehouse!

"INSECT/PLANT RELATIONSHIPS" edited by H. F. van Emden, viii & 215 pp., illus., Halsted Press of John Wiley & Sons, New York, N. Y. 10016. 1973. \$19.75.

These 13 valuable papers and their subsequent interesting discussions were presented at the 6th Symposium of the Royal Entomological Society held in the Imperial College, London, in September 1971. Each paper carries its own bibliography. It is disappointing that there is no general index to all this important material of concern to so many different kinds of biologists, students and

technicians.

Since the papers are all well written, choosing favorites must be determined by the reader's personal interests from such topics as Yeo's "Floral allurements for pollinating insects", Rothschild's "Secondary plant substances and warning colouration in insects", Schoonhoven's "Plant recognition by lepidopterous larvae", and Southwood's introductory paper on the evolutionary perspective of this insect/plant relationship.

"RATTLESNAKES: Their Habits, Life Histories, and Influence on Mankind" by Laurence K. Klauber, Second Revised Edition, Volumes I & II, xxx & xvii & 1533 pp., illus., published for the Zoological Society of San Diego by the University of California Press, London, Los Angeles, California, Berkeley, California 94720, & New York, N. Y. 10017. 1972 [1973]. \$50.00 boxed.

Since the original publication in 1956 of this highly regarded definitive study, the author had continued expansion and revision until shortly before his terminal illness in 1968. The first three chapters were completely rewritten with revised taxonomy, with keys, expanded zoogeography with distribution maps, paleontology and phylogeny. Other additional material has been interspersed in the rest of the text and a considerably supplemental bibliography has been appended.

The very detailed table of contents and the full index make for facile selective hunting of information. But because the content is of intrinsic interest and because its presentation is simple, direct and supplied with extrinsic interest, one just reads on and on.

Botanists in the field wishing more information than is provided in most field guides and those within academic walls will find this work of great learning value to themselves and to their students.

"EVOLUTIONARY STUDIES IN WORLD CROPS: Diversity and Change in the Indian Subcontinent" edited by Sir Joseph Hutchinson, viii & 175 pp., illus., Cambridge University Press, London NW1 2DB and New York, N. Y. 10022. 1974. \$11.95.

This condensed careful study summarizes for the interested reading public the Symposium held in New Delhi in 1970 on Crop Plant Evolution set against the time scale of agricultural development.

"The evolutionary changes in Indian crop plants.....here recorded [west Asian wheat and barley, south Asian and African rice, Coix, rape, mustard, castor bean, pigeon pea, cotton, okra, Solanum nigrum, and New World maize, grain amaranths and potatoes] have gone on in response to the needs of an agricultural system that changed only slowly over the past 4500 years. The rate of change

has increased enormously in the last twenty years, and the needs of the new agriculture for suitable varieties will only be met in so far as genetic change matches changes in the crop environment..

"The so-called Green Revolution is fundamentally a fertility revolution." That dwarf Mexican wheat produces its high yields in India only under heavy fertilization and irrigation.

The book is composed of fourteen papers by Indian scientists on paleobotany and specific crops and two evaluating ones by the famous English editor. It has a valuable bibliography and index. It is also available in even less expensive paper binding in ELBS countries.

"ALLAN CUNNINGHAM: Botanist and Explorer" by W. G. McMinn, viii & 147 pp., illus., Melbourne University Press, Carlton, Victoria 3053, Australia; also ISBS Inc. of London & of Zion, Illinois 60099. 1970. \$4.20 Australian.

This is a succinctly and carefully written account of Cunningham as a scientist and therefore of his training, his exploratory travels first to Brazil and then "Down Under" and his associations with his mentor, Sir Joseph Banks, and others and as a human being who was precise, kind, sensitive (really supersensitive) and tremendously industrious despite lingering physical limitations. "The most striking feature of Cunningham's character was a concern for detail and propriety." His faithfully kept journal, his plant introductions, and his herbarium at Kew vouchsafe the value of his scientific contributions.

People interested in the plants and places bearing his name or his study will find this book interesting and carefully documented with notes and bibliography and well indexed.

"HOW TO KNOW WILD FRUITS: A Guide to Plants When Not in Flower by Means of Fruit and Leaf" by Maude Gridley Peterson, lxvi & 340 pp., illus., Facsimile Edition for Dover Publications, Inc., New York, N. Y. 10014. 1973. \$3.00 paperbound.

Originally published in 1905 and covering the Gray's "Manual" area, this unabridged republication will be a real asset to the growing number of amateur naturalists and ecologically oriented students who wonder what that attractively berried herb or shrub or tree is. The simple keys, descriptions, and 80 illustrations are still helpful. The nomenclature has been brought up to date in an additional outline by E. S. Harrar who follows basically the 3th edition of Gray's "Manual", while the book originally followed the 6th edition.

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1

A FIFTH SUMMARY OF THE VERBENACEAE, AVICENNIACEAE, STILBACEAE,
DICRASTYLIDACEAE, SYMPHOREMACEAE, NYCTANTHACEAE, AND
ERIOCAULACEAE OF THE WORLD AS TO VALID TAXA, GEOGRAPHIC
DISTRIBUTION, AND SYNONYMY. SUPPLEMENT 4

Harold N. Moldenke

Since the publication of Supplement 3 in *Phytologia* 26: 356--377 last year a vast amount of new material has come to light which will be of value to the many users of my "Fifth Summary" (1971). Some of this new material comes from the excellent botanical researches being conducted on these groups by Santiago López-Palacios in Venezuela and Nelida Troncoso in Argentina and from the excellent breeding and genetic work by Otto Solbrig on the Glandularia group of Verbena.

Since Supplement 3 went to press I have been able to examine 7,101 additional herbarium specimens of these groups chiefly from the United States National Herbarium, the herbaria of the Universities of Arizona, Colorado, Texas, Wisconsin, Aarhus, Brasflia, Cairo, Calicut, Karachi, Peradeniya, and Zürich, the Missouri and New York Botanical Gardens, the Oakes Ames Economic Museum, and certain private herbaria. These specimens have brought to light hundreds of new geographic records and even several new undescribed taxa, particularly since some represent the collections recently made along the newly opened portions of the Pan-American Highway and the new Trans-Amazonian Highways of Brazil.

Continued investigation has revealed the necessity for changing the taxonomic rank of several well-known species to variety or form and several taxa have had to be resurrected from the synonymy into which they had previously been sunk, especially in the genera Lippia, Phyla, and Stachytarpheta.

Several hundred changes and/or additions have had to be made in the listing of rejected names because of the above-mentioned changes in status and because of the wealth of new botanical and horticultural literature which has been reviewed, largely by my wife, Alma L. Moldenke, in which so many additional errors in spelling and/or accreditation have been found, some of which could be most confusing to workers not expert in the group and which therefore might be copied and perpetuated in the mistaken belief of their validity.

It is manifestly impractical for me to attempt to correct the printed and typewritten annotations made by me over the past 46 years on such of the 223,432 herbarium specimens thus far examined by me as may be involved in these and other recent name-changes, since these specimens are scattered in no less than 306 herbaria all over the world. I shall have to depend on the curators of these herbaria, if they wish to do so or feel it worthwhile to do so, to make the proper changes based on the information presen-

ted in these Supplements and in my various generic monographs and their supplements which appear regularly on the pages of this journal.

Herbarium voucher citations for the new distribution records and bibliographic citations for the new rejected names will, as usual, be found in my generic monographs and/or their supplements.

Addenda & errata to Part I:

Wherever the name "Stachytarpheta australis Moldenke" occurs, it should be changed to S. dichotoma (Ruiz & Pav.) Vahl; wherever "Stachytarpheta australis f. albiflora Moldenke" occurs, it should be changed to S. dichotoma f. albiflora (Moldenke) Moldenke; wherever "Stachytarpheta australis var. neocaledonica Moldenke" occurs, it should be changed to S. dichotoma var. neocaledonica (Moldenke) Moldenke; wherever "Premna gaudichaudii Schau." occurs it should be changed to P. obtusifolia var. gaudichaudii (Schau.) Moldenke; wherever "Aegiphila integrifolia (Jacq.) Jacks." occurs it should be changed to A. integrifolia (Jacq.) Jacq.; and wherever "Vitex altissima f. alata (Willd.) Moldenke" occurs it should be changed to "V. altissima f. juv. alata (Willd.) Moldenke. Wherever "Koyama" occurs as an authority it should be changed to "T. Koyama". Where "Mysore" occurs as the name of an Indian state it should be changed to "Karnataka", where "Ceylon" occurs it should be changed to "Sri Lanka", and where "Democratic Republic of the Congo" appears it should be changed to "Zaire".

CANADA:

Nova Scotia:

Eriocaulon pellucidum Michx. [Madame Island]

Québec:

Verbena hastata L. [Wolfe County]

Ontario:

Eriocaulon pellucidum Michx. [Perry Sound District; Big Island]

Verbena hastata L. [Big Chicken Island]

Verbena hastata f. caerulea Moldenke -- delete the asterisk

Verbena stricta Vent. [Frontenac County]

UNITED STATES OF AMERICA:

New Hampshire:

Eriocaulon pellucidum Michx. [Sullivan County]

Vermont:

Verbena bracteata Lag. & Rodr. [Caledonia & Rutland Counties]

xVerbena engelmannii Moldenke [Rutland & Windson Counties]

Connecticut:

Verbena bracteata Lag. & Rodr. [New Haven County]

xVerbena rydbergii Moldenke [New Haven County]

New York:

- Eriocaulon parkeri B. L. Robinson [Iona & Rogers Islands]
Verbena officinalis var. prostrata Gren. & Godr. [Albany & Queens Counties]

New Jersey:

- Eriocaulon decangulare f. parviceps Moldenke [Burlington & Ocean Counties]
Eriocaulon pellucidum Michx. [Hudson & Passaic Counties]

Pennsylvania:

- Verbena simplex Lehm. [Monroe County]
Verbena stricta Vent. [Luzerne & Montgomery Counties]
Verbena urticifolia var. leiocarpa Perry & Fernald [Montgomery County]

Maryland:

- Eriocaulon decangulare L. [Wiconico County]
Eriocaulon decangulare f. parviceps Moldenke [Harford & Prince Georges Counties]
Phyla lanceolata (Michx.) Greene [Plummer's Island]
Verbena bracteata Lag. & Rodr. [Baltimore City]
Verbena hastata L. [Plummer's Island]
Verbena hastata f. caerulea Moldenke [Prince Georges County]
Verbena officinalis L. [Charles County]
Verbena simplex Lehm. [Plummer's Island]
Verbena urticifolia L. [Plummer's Island]
Verbena urticifolia var. leiocarpa Perry & Fernald [Frederick County]

District of Columbia:

- Eriocaulon decangulare var. minor Moldenke
Eriocaulon decangulare f. parviceps Moldenke
~~x~~Verbena engelmannii Moldenke

Virginia:

- Callicarpa americana L. [Lancaster County]
Eriocaulon decangulare L. [Prince George County]
Eriocaulon parkeri B. L. Robinson [Alexandria City]
Eriocaulon pellucidum Michx. [Fairfax County]
Verbena officinalis L. [Alexandria City]
Verbena simplex Lehm. [Culpeper County]
Verbena urticifolia L. [Arlington & Prince William Counties]

North Carolina:

- Eriocaulon decangulare L. [Chowan County]
Eriocaulon decangulare var. minor Moldenke [Lincoln County]
Eriocaulon decangulare f. parviceps Moldenke [Brunswick, Buncombe, Catawba, Columbus, Dare, Jackson, New Hanover, Onslow, Pender, Rowan, & Sampson Counties]
Vitex agnus-castus L. [Rockingham County]

South Carolina:

- Callicarpa americana L. [Jasper County]

Eriocaulon decangulare f. parviceps Moldenke [Anderson, Clarendon, & Lancaster Counties]

Lantana camara L. [Beaufort & Orangeburg Counties]

Phyla lanceolata (Michx.) Greene [Horry County]

Verbena bonariensis L. [Colleton County]

Georgia:

Eriocaulon decangulare L. [Camden & Chatham Counties]

Eriocaulon decangulare f. parviceps Moldenke [Columbia, Douglas, Lee, Sumter, & Wilcox Counties]

Lantana tiliaefolia Cham.

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Clinch County]

Florida:

Callicarpa americana L. [Hendry County]

Duranta repens L. [Holmes & Lee Counties]

Eriocaulon compressum Lam. [Brevard, Calhoun, & Putnam Counties]

Eriocaulon compressum var. harperi Moldenke [Highlands & Osceola Counties]

Eriocaulon decangulare L. [Washington County; Saint Vincent Island]

Eriocaulon decangulare var. latifolium Chapm. [Marion County]

Eriocaulon decangulare f. parviceps Moldenke [Manatee County]

Eriocaulon lineare Small [delete "Santa Rosa"]

Eriocaulon lineare var. gigas Moldenke [Santa Rosa County]*

Eriocaulon ravenelii Chapm. [Martin County]

Alabama:

Eriocaulon decangulare L. [Butler County]

Eriocaulon decangulare var. latifolium Chapm. [Baldwin County]

Eriocaulon decangulare f. parviceps Moldenke [Cherokee County]

Eriocaulon lineare Small [Covington & Houston Counties]

Lachnocaulon digynum Körn. [Conecuh, Escambia, & Washington Counties]

Lachnocaulon minus (Chapm.) Small [Covington & Houston Counties]

Lantana montevidensis (Spreng.) Briq. [Mobile County]

Lantana tiliaefolia Cham. [Mobile County]

Mississippi:

Clerodendrum indicum (L.) Kuntze [George County]

Phyla incisa Small -- to be deleted

Phyla nodiflora var. reptans (Spreng.) Moldenke [Jackson County]

Phyla nodiflora var. texensis Moldenke [Bolivar County]

Verbena xutha Lehm. [Wilkinson County]

Illinois:

Verbena canadensis (L.) Britton [Monroe County]

xVerbena engelmannii Moldenke [Hardin County]

xVerbena moechina Moldenke [Hardin County]

xVerbena rydbergii Moldenke [Jackson County]

Indiana:

Eriocaulon pellucidum Michx. [Marshall County]

Michigan:

Eriocaulon pellucidum Michx. [Vilas County]

Verbena urticifolia var. simplex Farwell [Oakland, Tuscola, & Wayne Counties]*

Wisconsin:

Eriocaulon pellucidum Michx. [Shawano County]

xVerbena rydbergii Moldenke [Juneau, Lafayette, & Richland Counties]

Minnesota:

Eriocaulon pellucidum Michx. [Lake County]

Verbena hastata L. [Mahnommen County]

South Dakota:

Verbena bracteata Lag. & Rodr. [Jackson County]

Verbena hastata var. scabra Moldenke [Washabaugh County]

Kansas:

Phyla incisa Small — to be deleted

Phyla nodiflora var. texensis Moldenke [Stafford County]

Missouri:

Phyla incisa Small — to be deleted

Phyla nodiflora var. texensis Moldenke [Dunklin County]

xVerbena deamii Moldenke [Butler County]

Arkansas:

Phyla incisa Small — to be deleted

Phyla nodiflora var. texensis Moldenke [Arkansas, Faulkner, Hempstead, Little River, Miller, & Pulaski Counties]

Verbena brasiliensis Vell. [Ashley County]

xVerbena stuprosa Moldenke [Clay County]*

Louisiana:

Callicarpa americana L. [Ouachita Parish]

Eriocaulon decangulare var. minor Moldenke [Jackson Parish]

Eriocaulon decangulare f. parviceps Moldenke [Allen, Beauregard, Natchitoches, Rapides, Saint Tammary, & Vernon Parishes]

Phyla incisa Small — to be deleted

Phyla nodiflora var. incisa (Small) Moldenke [Bossier Parish]

Phyla nodiflora var. texensis Moldenke [LaSalle, Natchitoches, Plaquemines, Rapides, Saint Bernard, Sevier, & Vermillion Parishes; Chandeleur Island]

Verbena bipinnatifida Nutt. [Orleans Parish]

Colorado:

Verbena bracteata Lag. & Rodr. [Alamosa, Baca, Moffat, & Park Counties]

Verbena hastata var. scabra Moldenke [Boulder, Denver, Las Animas, & Weld Counties]

Verbena stricta Vent. [Sedgwick County]

Nebraska:

Phyla lanceolata (Michx.) Greene [Oteo County]

Verbena hastata L. [Cherry County]

Oklahoma:

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Bryan, Caddo, Cleveland, Comanche, Creek, Grear, Kay, Kingfisher, Logan, Marshall, McClain, McCurtain, Murray, Muskogee, Noble, Oklahoma, Osage, Payne, Pontotoc, Seminole, Sequoyah, & Tulsa Counties; Number 3 Island]

Verbena ambrosifolia f. eglandulosa Perry [Cimarron County]

Vitex negundo L. [Marshall County]

Texas:

Aloysia gratissima var. schulzae (Standl.) Moldenke [Dimmitt County]

Eriocaulon decangulare f. parviceps Moldenke [Austin, Henderson, Smith, & Waller Counties]

Lantana montevidensis (Spreng.) Briq. [Dallas County]

Phyla cuneifolia (Torr.) Greene [Childress & Hudspeth Counties]

Phyla incisa Small -- to be deleted

Phyla nodiflora var. incisa (Small) Moldenke [Bell, Brazoria, Brooks, Cameron, Colorado, Comal, El Paso, Fayette, Harris, Kenedy, Kleberg, Lavaca, Nueces, Reeves, San Patricio, Val Verde, & Willacy Counties]

Phyla nodiflora var. reptans (Spreng.) Moldenke [Briscoe & Somervell Counties]

Phyla nodiflora var. texensis Moldenke [Angelina, Austin, Bastrop, Bell, Bexar, Bosque, Bowie, Brazoria, Brazos, Brewster, Brooks, Brown, Burnet, Calhoun, Callahan, Cameron, Cass, Colorado, Comal, Coryell, Cottle, Crockett, Dallas, Denton, Eastland, Edwards, Ellis, El Paso, Erath, Falls, Fayette, Fort Bend, Frio, Galveston, Garza, Gillespie, Goliad, Gonzales, Grayson, Gregg, Harris, Hays, Hidalgo, Hill, Howard, Hudspeth, Jackson, Jefferson, Jim Hogg, Johnson, Karnes, Kendall, Kenedy, Kerr, Kimble, Kimney, Kleberg, Lampasas, La Salle, Lavaca, Matagorda, Maverick, McLennan, Medina, Midland, Mitchell, Montague, Montgomery, Navarro, Nueces, Palo Alto, Parker, Pecos, Presidio, Reagan, Reeves, Refugio, Robertson, Runnels, San Patricio, Schleicher, Somervell, Starr, Tarrant, Taylor, Terrell, Throckmorton, Tom Green, Travis, Uvalde, Val Verde, Victoria, Walker, Washington, Webb, Wharton, Wichita, Willacy, Williamson, Wilson, & Zapaca Counties; El Toro, High, Horse, & Steppingstone Islands]

Verbena ambrosifolia Rydb. [Zavala County]

Verbena bracteata Lag. & Rodr. [Childress County]

New Mexico:

Aloysia wrightii (A. Gray) Heller [Eddy County]

Phyla cuneifolia (Torr.) Greene [Guadalupe & Roosevelt Counties]

Phyla incisa Small -- to be deleted

Phyla nodiflora var. incisa (Small) Moldenke [Dona Ana County]

Phyla nodiflora var. texensis Moldenke [Dona Ana, Eddy, Luna, Otero, & Socorro Counties]

Verbena ambrosifolia Rydb. [Catron & Harding Counties]

Verbena bracteata Lag. & Rodr. [Roosevelt County]

Verbena gooddingii Briq. [Sandoval County]

Verbena macdougalii f. albiflora Moldenke [Santa Fe County]

Verbena plicata Greene [Chaves County]

Verbena wrightii A. Gray [Hidalgo County]

Arizona:

Aloysia gratissima var. schulzae (Standl.) Moldenke [Pima County]

Aloysia wrightii (A. Gray) Heller [Santa Cruz County]

Phyla cuneifolia (Torr.) Greene [Apache County]

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Apache, Pima, & Yuma Counties]

Verbena ciliata Benth. [Pinal County]

California:

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Fresno, Imperial, Kern, Kings, Merced, Sacramento, San Diego, San Joaquin, Santa Barbara, Stanislaus, & Tulare Counties]

Verbena lasiostachys Link [Alpine County]

MEXICO:

Lantana camara L. [Querétaro & Yucatán]

Lantana camara var. aculeata (L.) Moldenke [Puebla]

Lantana camara var. mista (L.) L. H. Bailey [Morelos]

Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Chiapas, Hidalgo, & Veracruz]

Lantana glandulosissima Hayek [Hidalgo]

Lantana maxima Hayek [Chiapas]

Lantana moritziana Otto & Dietr. -- to be deleted

Lippia callicarpaefolia H.B.K. [Chiapas]

Lippia hypoleia Briq. -- to be deleted

Lippia hypoleia var. ovatifolia Moldenke -- to be deleted

Lippia myriocephala Schlecht. & Cham. [Jalisco]

Lippia myriocephala var. hypoleia (Briq.) Moldenke [Chiapas, Hidalgo, Jalisco, Nayarit, Oaxaca, Puebla, San Luis Potosí, Tamaulipas, & Veracruz]

Lippia myriocephala var. ovatifolia (Moldenke) Moldenke [Chiapas]

Lithophytum violaceum T. S. Brandeg. [Puebla]*

Phyla incisa Small -- to be deleted

Phyla nodiflora var. canescens (H.B.K.) Moldenke [San Luis Potosí]

Phyla nodiflora var. incisa (Small) Moldenke [Chihuahua, Jalisco, & Sonora]

Phyla nodiflora var. texensis Moldenke [Baja California, Chihuahua, Coahuila, Durango, Federal District, Guerrero, Hidalgo, Jalisco, Nayarit, Oaxaca, Sinaloa, Sonora, Tamaulipas, & Veracruz]

Stachytarpheta frantzii var. mollissima Moldenke [Chiapas]

Verbena bipinnatifida Nutt. [Zacatecas]

Verbena carolina f. albiflora Moldenke [Oaxaca]

Verbena halei Small [Zacatecas]

Verbena litoralis var. albiflora Moldenke [Chiapas]

Verbena teucrifolia var. corollulata Perry [Puebla]

BAY OF CAMPECHE ISLANDS:

Citharexylum ellipticum Sessé & Moc. [Sacrificios Island]

GUATEMALA:

Cornutia lilacina Moldenke [Escuintla]

Lantana camara var. moritziana (Otto & Dietr.) López-Palacios
[Sacatepéquez & Sololá]

Lantana moritziana Otto & Dietr. — to be deleted

Lippia chiapasensis Loes. [Guatemala]

Lippia graveolens H.B.K. [Baja Verapaz]

Lippia hypoleia Briq. — to be deleted

Lippia hypoleia var. ovatifolia Moldenke — to be deleted

Lippia myriocephala var. hypoleia (Briq.) Moldenke [Alta Verapaz, Baja Verapaz, El Petén, & San Marcos]

Lippia myriocephala var. ovatifolia (Moldenke) Moldenke [El Progreso]

Priva lappulacea (L.) Pers. [Baja Verapaz]

Stachytarpheta frantzii var. mollissima Moldenke [Jutiapa & Santa Rosa]

BRITISH HONDURAS:

Lippia hypoleia Briq. — to be deleted

Lippia myriocephala var. hypoleia (Briq.) Moldenke

Paepalanthus belizensis Moldenke*

BRITISH HONDURAN ISLANDS:

Avicennia germinans (L.) L. [Northwest Cay]

Stachytarpheta jamaicensis (L.) Vahl [Middle & Southwest Cays]

HONDURAS:

Cornutia lilacina Moldenke [Cortés]

Lantana camara var. moritziana (Otto & Dietr.) López-Palacios
[Santa Bárbara]

Lippia cardiostegia Benth. [Lempira]

Lippia hypoleia Briq. — to be deleted

Lippia myriocephala var. hypoleia (Briq.) Moldenke [Comayagua, El Paraíso, & Morazán]

Petrea volubilis L. [Yoro]

Stachytarpheta frantzii var. mollissima Moldenke [Copán, Ocotepeque, & Santa Bárbara]

BAY ISLANDS:

Phyla nodiflora (L.) Greene

EL SALVADOR:

Lippia hypoleia Briq. -- to be deleted

Lippia myriocephala var. hypoleia (Briq.) Moldenke [San Salvador & Santa Ana]

NICARAGUA:

Lippia cardiostegia Benth. [León & Masaya]

Lippia hypoleia Briq. -- to be deleted

Lippia myriocephala var. hypoleia (Briq.) Moldenke [Chontales & Matagalpa]

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Granada & Zelaya]

Stachytarpheta frantzii var. mollissima Moldenke [Managua]

COSTA RICA:

Citharexylum caudatum L. [San José]

Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Puntarenas]

Lantana lopez-palacii Moldenke [Cartago]

Lantana moritziana Otto & Dietr. -- to be deleted

Lippia controversa Moldenke [Guanacaste]

Lippia hypoleia Briq. -- to be deleted

Lippia myriocephala var. hypoleia (Briq.) Moldenke [Cartago, Guanacaste, & San José]

Phyla nodiflora var. texensis Moldenke [Puntarenas]

Stachytarpheta frantzii var. mollissima Moldenke [Guanacaste]

PANAMA:

Aegiphila anomala Pittier [Bocas del Toro & Panamá]

Aloysia virgata var. platyphylla (Briq.) Moldenke [Herrera]

Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Bocas del Toro, Canal Zone, Chiriquí, Coclé, Herrera, Panamá, & Veraguas; Shepherd Island]

Lantana moritziana Otto & Dietr. -- to be deleted

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Canal Zone & Colón]

Vitex masoniana Pittier [Chocó]

BERMUDA ISLANDS:

Phyla incisa Small -- to be deleted

Phyla nodiflora var. texensis Moldenke [Saint Georges]

BAHAMA ISLANDS:

Callicarpa americana L. [Abaco & North Andros]

Lantana involucrata f. rubella Moldenke [East Plana]

Priva lappulacea (L.) Pers. [Cat]

Stachytarpheta jamaicensis (L.) Vahl [Cat]

CUBA:

Duranta fletcheriana Moldenke -- delete the asterisk

CAYMAN ISLANDS:

Stachytarpheta jamaicensis (L.) Vahl [Little Cayman]

PALOMINTOS ISLAND:

Citharexylum fruticosum L.Duranta fletcheriana MoldenkeLantana involucrata L.

CAJA DE MUERTO ISLAND:

Citharexylum fruticosum L.Duranta repens L.

DESECHO ISLAND:

Duranta repens L.

VIRGIN ISLANDS:

Avicennia germinans (L.) L. [Virgin Gorda]Citharexylum fruticosum var. subvillosum Moldenke [Jost Van Dyke]Clerodendrum aculeatum (L.) Schlecht. [Jost Van Dyke]Lantana involucrata f. rubella Moldenke [Saint Croix]

LEEWARD ISLANDS:

Bouchea prismatica var. brevirostra Grenz. [Guadalupe]

WINDWARD ISLANDS:

Duranta repens L. [Saint Vincent]Stachytarpheta urticaefolia f. albiflora Moldenke [Martinique]

TRINIDAD AND TOBAGO:

Citharexylum spinosum L. [Little Tobago]Lantana camara var. moritziana (Otto & Diestr.) López-Palacios [Trinidad]Lantana moritziana Otto & Diestr. -- to be deletedPriva lappulacea (L.) Pers. [Little Tobago]

SOUTHERN NETHERLANDS ANTILLES:

Lantana camara var. moritziana (Otto & Diestr.) López-Palacios [Curaçao]Lantana moritziana Otto & Diestr. -- to be deleted

NORTHERN SOUTH AMERICAN ISLANDS:

Lantana camara var. moritziana (Otto & Diestr.) López-Palacios [Margarita]Lantana moritziana Otto & Diestr. -- to be deleted

COLOMBIA:

Aegiphila caucensis Moldenke [Valle del Cauca]Aegiphila elata Sw. [Tolima]Aegiphila grandis Moldenke [delete "Caquetá"]Aegiphila guianensis Moldenke -- to be deletedAegiphila integrifolia var. guianensis (Moldenke) López-

Palacios [Caquetá, Chocó, Cundinamarca, Méta, & Valle del Cauca]

Aegiphila moldenkeana López-Palacios [Caquetá]Aegiphila mollis var. puberulenta (Moldenke) López-Palacios [Atlántico, Bolívar, Chocó, Magdalena, & Méta]Aegiphila puberulenta Moldenke -- to be deletedBouchea boyacana Moldenke [Guajira]Citharexylum bullatum Moldenke [Cundinamarca]*

- Citharexylum poeppigii Walp. [Putumayo]
Cormutia microcalycina Pavon & Moldenke [Bolívar]
Cormutia microcalycina var. pulverulenta Moldenke [Méta]
Eriocaulon microcephalum H.B.K. [Cundinamarca]
Lantana boyacana Moldenke — to be deleted
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios
 [Antioquia, Atlántico, Bolívar, Boyacá, Caldas, Caquetá,
 Cauca, Cundinamarca, Guajira, Huila, Magdalena, Méta, Norte
 de Santander, Putumayo, Santander, Tolima, & Valle del Cauca]
Lantana cujabensis var. punctata Moldenke — to be deleted
Lantana fucata Lindl. [Santander]
Lantana fucata f. albiflora Moldenke [Santander]
Lantana lopez-palacii Moldenke [Antioquia, Boyacá, Cauca, Cundinamarca, Huila, Santander, & Valle del Cauca]
Lantana moritziana Otto & Dietr. — to be deleted
Lantana rugulosa H.B.K. [Norte de Santander & Tolima]
Lantana rugulosa f. albiflora Moldenke [Tolima]
Lippia hirsuta L. f. [Caldas]
Lippia moritzii Turcz. — to be deleted
Paepalanthus columbiensis Ruhl. [Antioquia]
Paepalanthus fasciculatus f. sphaerocephalus Herzog [Vaupés]
Phyla nodiflora var. canescens (H.B.K.) Moldenke [Guajira]
Phyla strigulosa var. sericea (Kuntze) Moldenke [Atlántico]
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios
 [Guajira, Magdalena, & Vichada]
Stachytarpheta elatior Schrad. — to be deleted
Syngonanthus caulescens var. angustifolius Moldenke -- delete
 the asterisk
Verbena litoralis H.B.K. [Putumayo]
Vitex orinocensis var. multiflora (Miq.) Huber [Cundinamarca]

VENEZUELA:

- Aegiphila bogotensis var. aequinoctialis Moldenke [Mérida]
Aegiphila elata var. macrophylla (H.B.K.) López-Palacios [Mérida]
Aegiphila glandulifera Moldenke [Mérida]
Aegiphila grandis Moldenke [Trujillo]
Aegiphila guianensis Moldenke — to be deleted
Aegiphila integrifolia var. guianensis (Moldenke) López-Palacios
 [Amazonas, Apure, Barinas, Carabobo, Guárico, Mérida, & Trujillo]
Aegiphila lewisiana Moldenke [Mérida]
Aegiphila mollis var. intermedia Moldenke [Mérida]
Aegiphila mollis var. puberulenta (Moldenke) López-Palacios
 [Aragua]
Aegiphila puberulenta Moldenke — to be deleted
Aegiphila quinduensis (H.B.K.) Moldenke [Mérida]
Aegiphila sessiliflora Moldenke — to be deleted
Aegiphila ternifolia f. oppositifolia López-Palacios [Trujillo]

- Aegiphila venezuelensis var. serrata Moldenke [Aragua]
Bouchea prismatica var. longirostra Grenz. [Sucre]
Citharexylum dawei Moldenke [delete "Delta Amacuro"]
Citharexylum decorum Moldenke [Delta Amacuro]
Citharexylum dryanderæ Moldenke -- to be deleted
Citharexylum hybridum Moldenke [Falcón]
Citharexylum mirifolium Moldenke [delete "Falcón"]
Citharexylum poeppigii Walp. [Mérida]
Citharexylum subflavescens Blake [Trujillo]
Citharexylum venezuelense Moldenke [Mérida & Táchira]
Clerodendrum philippinum Schau. [Delta Amacuro]
Duranta repens L. [Delta Amacuro]
Lantana armata Schau. [Falcón, Monagas, & Sucre]
Lantana armata var. velutina Moldenke [Falcón & Sucre] -- delete the asterisk
Lantana boyacana Moldenke -- to be deleted
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Amazonas, Aragua, Barinas, Bolívar, Carabobo, Delta Amacuro, Falcón, Federal District, Guárico, Lara, Mérida, Miranda, Sucre, & Táchira]
Lantana camara var. mutabilis (Hook.) L. H. Bailey [Sucre]
Lantana caracasana Turcz. [Carabobo]
Lantana glandulosissima Hayek -- to be deleted
Lantana hispida H.B.K. -- to be deleted
Lantana maxima Hayek [Carabobo & Zulia]
Lantana moritziana Otto & Dietr. -- to be deleted
Lantana pittieri Moldenke -- to be deleted
Lantana trifolia f. hirsuta Moldenke [Monagas & Táchira]
Lantana velutina Mart. & Gal. -- to be deleted
Lippia hirsuta L. f. [Aragua, Federal District, Lara, Mérida, Miranda, & Trujillo]
Lippia linearis H.B.K. -- to be deleted
Lippia micromera Schau. [Delta Amacuro & Trujillo]
Lippia moritzii Turcz. -- to be deleted
Lippia schomburgkiana Schau. -- to be deleted
Paepalanthus formosus Moldenke -- delete the asterisk
Paepalanthus sessiliflorus var. venezuelensis Moldenke [Bolívar]*
Petrea glandulosa Pittier [Trujillo]
Phyla linearis (H.B.K.) López-Palacios [Sucre]*
Phyla strigulosa (Mart. & Gal.) Moldenke [Federal District]
Phyla strigulosa var. sericea (Kuntze) Moldenke [Falcón]
Priva lappulacea f. albiflora Moldenke [Delta Amacuro]
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios [Bolívar, Guárico, & Monagas]
Stachytarpheta angustifolia f. jenmani (Moldenke) Moldenke [Aragua, Aragua, Carabobo, Cojedes, Guárico, & Mérida]

- Stachytarpheta dichotoma (Ruiz & Pav.) Vahl [Mérida]
Stachytarpheta dichotoma f. albiflora (Moldenke) Moldenke [Delta Amacuro & Monagas]
Stachytarpheta elatior Schrad. — to be deleted
Stachytarpheta elatior var. jermani Moldenke — to be deleted
Stachytarpheta jamaicensis (L.) Vahl [Monagas]
Stachytarpheta mutabilis (Jacq.) Vahl [Anzoátegui]
Stachytarpheta trinitensis Moldenke [Sucre]
Vitex stahelii Moldenke [delete "Amazonas" and "Barinas"]

GUYANA:

- Aegiphila cowani Moldenke*
Aegiphila guianensis Moldenke — to be deleted
Aegiphila integrifolia var. guianensis (Moldenke) López-Palacios
Amasonia lasiocaulos Mart. & Schau.
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios
Lantana moritziana Otto & Dietr. — to be deleted
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios
Stachytarpheta angustifolia f. jermani (Moldenke) Moldenke
Stachytarpheta elatior Schrad. — to be deleted
Stachytarpheta elatior var. jermani Moldenke — to be deleted
Stachytarpheta lythrophylla Schau.
Stachytarpheta roraimensis Moldenke — to be deleted
Syngonanthus glandulosus var. epapillosus Moldenke

SURINAM:

- Aegiphila mollis var. intermedia Moldenke
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios
Stachytarpheta elatior Schrad. — to be deleted
Syngonanthus fertilis (Körn.) Ruhl.
Vitex panshiniana Moldenke

ECUADOR:

- Aegiphila bogotensis var. aequinoctialis Moldenke — delete the asterisk
Aegiphila multiflora Ruiz & Pav. [Guayas]
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Chimborazo, El Oro, Esmeraldas, Guayas, Loja, Los Ríos, Napo-Pastaza, Pichincha, & Tunguragua]
Lantana moritziana Otto & Dietr. — to be deleted

PERU:

- Aegiphila filipes Mart. & Schau. [San Martín]
Aegiphila lanceolata Moldenke [Loreto]
Aegiphila umbraculiformis Moldenke [San Martín]
Duranta coriacea Hayek [Huánuco]
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Amazonas, Apurímac, Cajamarca, Huánuco, Junín, Lima, Loreto, Madre de Dios, & San Martín]
Lantana moritziana Otto & Dietr. — to be deleted

- Lantana trifolia var. rigidiuscula Briq. [San Martín]
Verbena litoralis var. albiflora Moldenke [Loreto]
Verbena litoralis var. caracasana (H.B.K.) Moldenke [Junín]

BRAZIL:

- Aegiphila guianensis Moldenke — to be deleted
Aegiphila integrifolia var. guianensis (Moldenke) López-Palacios [Amazônas & Pará]
Aegiphila lanceolata Moldenke [Goiás & Mato Grosso]
Aegiphila lhotzkiana Cham. [Mato Grosso]
Aegiphila mediterranea Vell. [Guanabara]
Aegiphila sellowiana Cham. [Mato Grosso]
Aloysia ternifolia f. oppositifolia Moldenke [Paraná]*
Amsonia lasiocaulos Mart. & Schau. [Maranhão]
Clerodendrum thomsonae Balf. f. [Bahia & Ceará]
Eriocaulon carajense Moldenke [Pará]*
Eriocaulon ligulatum (Vell.) L. B. Sm. [Santa Catarina Island]
Eriocaulon magnificum Ruhl. [Santa Catarina Island]
Eriocaulon modestum Kunth [Santa Catarina Island]
Eriocaulon sellowianum var. minor Moldenke [Goiás]*
Eriocaulon sellowianum var. paranense (Moldenke) Moldenke & Smith [Mato Grosso]
Eriocaulon steyermarkii Moldenke [Goiás]
Eriocaulon ulaei var. radiosum Ruhl. [Santa Catarina]
Lantana aristata var. cabreræ Moldenke — to be deleted
Lantana armata var. velutina Moldenke [Goiás]
Lantana camara var. alba Moldenke [Distrito Federal]
Lantana camara var. angustifolia Moldenke — to be deleted
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [Goiás, Guanabara, Minas Gerais, Pará, Paraná, Rio de Janeiro, Roraima, Santa Catarina, & São Paulo]
Lantana canescens H.B.K. [Paraná]
Lantana fucata Lindl. [Maranhão]
Lantana minasensis Moldenke — to be deleted
Lantana minasensis var. longibracteolata Moldenke — to be deleted
Lantana minasensis var. puberulenta Moldenke — to be deleted
Lantana moritziana Otto & Dietr. — to be deleted
Lantana tiliaefolia Cham. [Goiás]
Lantana trifolia f. oppositifolia Moldenke [Mato Grosso]
Lantana trifolia var. rigidiuscula Briq. [Paraná]
Lantana triplinervia Turcz. [Mato Grosso, Minas Gerais, Paraná, & São Paulo]
Lantana triplinervia var. longibracteolata (Moldenke) Moldenke [Minas Gerais]*
Lantana triplinervia var. minasensis (Moldenke) Moldenke [Bahia, Guanabara, Minas Gerais, Rio de Janeiro, & São Paulo]*
Lantana triplinervia var. puberulenta (Moldenke) Moldenke [Ba-

- hia & Minas Gerais]*
Leiostrix argyroderma var. brevipes Moldenke [Rio de Janeiro]
Leiostrix fluminensis var. puberula Moldenke [Rio de Janeiro]
Lippia affinis Schau. [Distrito Federal]
Lippia gehrtii Moldenke [Mato Grosso]
Lippia hatschbachii Moldenke [Mato Grosso]*
Lippia intermedia var. parvifolia Moldenke [Paraná]*
Lippia lacunosa var. ovatifolia Moldenke [Minas Gerais]*
Lippia lupulina var. paraguariensis Chod. [Mato Grosso]
Lippia petiolata Moldenke [Minas Gerais]*
Lippia sidoides Cham. [Goiás]
Lippia vernonoides var. attenuata (Mart.) Moldenke [Goiás,
 Maranhão, Mato Grosso, Minas Gerais, Pará, & São Paulo]
Lippia vinosa Moldenke [Mato Grosso]*
Paepalanthus amoemus (Bong.) Körn. [delete "Distrito Federal"]
Paepalanthus bryoides (Riedel) Kunth [Paraná]
Paepalanthus formosus Moldenke [Pará]
Paepalanthus leiseringii Ruhl. [delete "Santa Catarina"]
Paepalanthus planifolius var. globulifer (Alv. Silv.) Moldenke
 & Smith [Paraná]
Paepalanthus plumipes Alv. Silv. [delete "Bahia" and "Espírito
 Santo"]
Paepalanthus polyanthus (Bong.) Kunth [Bahia & Espírito Santo;
 Santa Catarina Island]
Paepalanthus rhizocephalus Alv. Silv. [Goiás]
Paepalanthus speciosus var. attenuatus Moldenke [Distrito
 Federal & Goiás]*
Paepalanthus speciosus f. calvescens Moldenke [Goiás & Mato
 Grosso]*
Paepalanthus subtilis Miq. [Rio Grande do Norte]
Paepalanthus urbanianus Ruhl. [Distrito Federal & Minas Gerais]
Stachytarpheta andersonii Moldenke [Goiás]*
Stachytarpheta angustifolia (Mill.) Vahl [Amapá]
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios
 [Amapá, Amazonas, Bahia, Ceará, Guanabara, Mato Grosso, Minas
 Gerais, Pará, Paraíba, Pernambuco, Rio de Janeiro, Rio Grande
 do Norte, & Roraima]
Stachytarpheta angustifolia f. jermani (Moldenke) Moldenke
 [Pará]
Stachytarpheta chamissonis var. andersonii Moldenke [Goiás]*
Stachytarpheta chamissonis var. longipedicellata Moldenke
 [Goiás]*
Stachytarpheta elatior Schrad. — to be deleted
Stachytarpheta elatior var. jermani Moldenke — to be deleted
Stachytarpheta gesnerioides var. simplex (Hayek) Moldenke [Goi-
 ás, Mato Grosso, Minas Gerais, & São Paulo]
Stachytarpheta lacunosa var. angustifolia Moldenke — to be de-
 leted

- Stachytarpheta lacunosa var. attenuata Moldenke [Minas Gerais]*
Stachytarpheta lythrophylla Schau. -- delete the asterisk
Stachytarpheta macedoi Moldenke [Goiás]
Stachytarpheta simplex Hayek -- to be deleted
Stachytarpheta trispicata Nees & Mart. [Minas Gerais]
Syngonanthus caulescens var. angustifolius Moldenke [Mato Grosso & Santa Catarina]
Syngonanthus fischerianus var. hatschbachii Moldenke [Paraná & São Paulo]*
Syngonanthus glandulosus var. epapillosus Moldenke [Paraná]
Syngonanthus gracilis var. glabriusculus Ruhl. [Amazônas]
Syngonanthus nitens var. hirtulus Ruhl. [Mato Grosso]
Syngonanthus nitens var. koernickei Ruhl. [Mato Grosso]
Verbena cabreræ var. angustilobata Moldenke [Mato Grosso]*
Verbena calliantha Briq. [Paraná]
xVerbena intercedens Briq. [Santa Catarina]
Verbena rectiloba Moldenke [Rio Grande do Sul]*
Verbena tenuisecta var. alba Moldenke [Paraná]

MARAJÓ ISLAND:

- Stachytarpheta angustifolia (Mill.) Vahl

BOLIVIA:

- Lantana aristata var. cabreræ Moldenke -- to be deleted
Lantana tiliaefolia Cham. [Santa Cruz]
Lippia vernonioides var. attenuata (Mart.) Moldenke [El Beni]
Paepalanthus speciosus (Bong.) Körn. -- to be deleted
Paepalanthus speciosus var. bolivianus Moldenke [Santa Cruz]*
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios [El Beni & Santa Cruz]
Stachytarpheta elatior Schrad. -- to be deleted
Verbena brasiliensis Vell. [Santa Cruz]

PARAGUAY:

- Lantana aristata var. cabreræ Moldenke -- to be deleted
Lantana canescens H.B.K.
Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios
Stachytarpheta gesnerioides var. cuneata Schau.
Stachytarpheta gesnerioides var. simplex (Hayek) Moldenke
Stachytarpheta simplex Hayek -- to be deleted

CHILE:

- Acantholippia trifida (C. Gay) Moldenke [Coquimbo]
Junellia tridens (Lag.) Moldenke [Magellanes]
Verbena bonariensis L. [Malleco]

ARGENTINA:

- Aegiphila saltensis Legname [Salta]*
Aloysia chacoënsis var. angustifolia Troncoso*
Aloysia polystachya (Griseb.) Moldenke [Mendoza]

- Bouchea boliviana (Kuntze) Moldenke [Jujuy]
Junellia erinacea (Gill. & Hook.) Moldenke [Neuquén]
Junellia tridens (Lag.) Moldenke -- delete the asterisk
Lantana aristata var. cabreræ Moldenke -- to be deleted
Lantana canescens H.B.K. [Entre Ríos, Jujuy, Salta, & Tucumán]
Lantana fucata f. albiflora Moldenke [Salta]
Lantana micrantha f. violacea Moldenke [Jujuy]
Lantana minasensis var. puberulenta Moldenke -- to be deleted
Lantana triplinervia var. hispida (Moldenke) Moldenke [Corrientes]*
Lippia integrifolia (Griseb.) Hieron. [Mendoza]
Parodianthus capillaris Troncoso [Córdoba]*
Phyla strigulosa var. sericea (Kuntze) Moldenke [Salta]
Verbena atacamensis Moldenke [Mendoza; delete "Formosa"]
Verbena hasslerana Briq. [Corrientes]
Verbena macrosperma Speg. [Neuquén]
Verbena perakii (Covas & Schnack) Moldenke [Salta]
Verbena tenuisecta var. alba Moldenke [Corrientes]

AUSTRIA:

Vitex agnus-castus L.

LIBYA:

- Lantana camara var. aculeata (L.) Moldenke
Verbena supina f. erecta Moldenke

EGYPT:

- Clerodendrum splendens G. Don
Lantana camara L.
Lantana camara var. aculeata (L.) Moldenke
Lantana rugosa var. tomentosa Moldenke
Vitex agnus-castus L.
Vitex agnus-castus var. pseudo-negundo Hausskn.

MALI:

Svensonia laeta (Fenzl) Moldenke [Senegambia]

NIGER REPUBLIC:

Mesanthemum radicans (Benth.) Körn.

SUDAN:

- Clerodendrum cordifolium (Hochst.) A. Rich. [Bahr El Ghazal]
Clerodendrum discolor (Klotzsch) Vatke [Equatoria]
Clerodendrum myricoides var. grosseserratum Gürke [Red Sea]
Lantana viburnoides var. velutina Moldenke [Bahr El Ghazal & Dafur]
Lippia multiflora Moldenke [Bahr El Ghazal]
Phyla nodiflora (L.) Greene [Kassala & Nubia]
Phyla nodiflora var. reptans (Spreng.) Moldenke [Kassala]
Premna resinosa (Hochst.) Schau. [Red Sea]
Premna resinosa f. grossedentata Moldenke*
Stachytarpheta urticaefolia (Salisb.) Sims [Bahr El Ghazal]

Tectona grandis L. f. [Khartoum]

Vitex doniana var. parvifolia (Engl.) Moldenke [Bahr El Ghazal & Blue Nile]

Vitex madiensis Oliv. [Bahr El Ghazal]

Vitex madiensis var. schweinfurthii (Gürke) Pieper [Kordofan]

BAKIYAI ISLANDS:

Avicennia marina (Forsk.) Vierh. [Aqiq, Nile, & Toti]

AFARS AND ISSIS:

Avicennia marina (Forsk.) Vierh.

Chascanum hildebrandtii (Vatke) Gillett

Chascanum marrubiifolium Fenzl

Lantana petitiana A. Rich.

Phyla nodiflora (L.) Greene

Premna resinosa (Hochst.) Schau.

Priva cordifolia (L. f.) Druce

SIERRA LEONE:

Eriocaulon dalzellii Körn.

LIBERIA:

Clerodendrum botryodes J. G. Baker

LIBERIAN ISLANDS:

Avicennia africana P. Beauv. [Bushrod]

CHAD:

Svensonia laeta (Fenzl) Moldenke

ZAIRE:

Clerodendrum guerkei J. G. Baker

BURUNDI:

Phyla nodiflora var. reptans (Spreng.) Moldenke

PANZA ISLAND:

Vitex negundo L.

PEMBA ISLAND:

Avicennia marina (Forsk.) Vierh.

Clerodendrum glabrum E. Mey.

Stachytarpheta jamaicensis (L.) Vahl

Stachytarpheta urticaefolia (Salisb.) Sims

Vitex doniana Sweet

Vitex negundo L.

TUMBATU ISLAND:

Clerodendrum sansibarense Gürke

ZANZIBAR:

Lantana camara L.

ANGOLA:

Lippia hispida Good [Hufla]

ZAMBIA:

Clerodendrum myricoides var. camporum Gürke

Eriocaulon schlechteri Ruhl.

MALAWI:

Lantana primulina Moldenke*

MOZAMBIQUE:

Eriocaulon schlechteri Ruhl. -- delete the asterisk

SOUTH AFRICA:

Eriocaulon sonderianum Körn. [Cape Province]

Verbena officinalis var. gaudichaudii Briq. [Transvaal]

Vitex agnus-castus L. [Cape Province]

SEYCHELLES ISLANDS:

Avicennia marina (Forsk.) Vierh. [Cousin]

Premna obtusifolia R. Br. [Silhouette]

Stachytarpheta jamaicensis (L.) Vahl [Cousin]

Stachytarpheta urticaefolia (Salisb.) Sims [Frigate]

ARABIA:

Phyla nodiflora (L.) Greene [Riyad]

PERSIAN GULF ISLANDS:

Avicennia marina (Forsk.) Vierh. [Tarut]

PAKISTAN:

Avicennia alba Blume [delete "Sind"]

Clerodendrum inerme (L.) Gaertn. [Sind]

Gmelina arborea var. glaucescens C. B. Clarke [Northwest Frontier]

Lantana camara L. [Sind, West Kashmir, & West Punjab]

Lantana camara var. flava (Medic.) Moldenke [Sind & West Punjab]

Lantana indica Roxb. [Northwest Frontier]

Phyla nodiflora (L.) Greene [Baluchistan]

Phyla nodiflora var. canescens (H.B.K.) Moldenke [Sind & West Punjab]

Phyla nodiflora var. reptans (Spreng.) Moldenke [Baluchistan, Sind, & West Punjab]

Stachytarpheta cayennensis (L. C. Rich.) Vahl [Sind]

Tectona grandis L. f.

Verbena bonariensis L. [Northwest Frontier]

Verbena officinalis L. [Baluchistan & Sind]

Verbena tenuisecta Briq. [Northwest Frontier & Sind]

Vitex agnus-castus var. pseudo-negundo Hausskn. [Northwest Frontier & West Punjab]

Vitex negundo L. [Sind]

SIKKIM:

Eriocaulon cinereum R. Br.

Verbena officinalis L.

Vitex negundo L.

Vitex quinata (Lour.) F. N. Will.

INDIA:

Callicarpa arborea var. oblongifolia Kanjilal [Assam]*

Callicarpa nudiflora Hook. & Arn. [Khasi States]

Callicarpa psilocalyx C. B. Clarke [Khasi States]

Callicarpa vestita Wall. [Assam & Khasi States]

Caryopteris odorata (Hamilt.) B. L. Robinson [Assam]

- Garyopteris paniculata C. B. Clarke [Assam]
Citharexylum spinosum L. [Indore & Kerala]
Clerodendrum indicum (L.) Kuntze [Karnara & Karnataka]
Clerodendrum lasiocephalum C. B. Clarke [Khasi States]
Clerodendrum philippinum Schau. [Karnataka, Kerala, Madhya Pradesh, & Manipur]
Clerodendrum serratum var. wallichii C. B. Clarke [Khasi States]*
Clerodendrum villosum Blume [Assam]
Duranta repens L. [Indore]
Eriocaulon breviscapum Körn. [Madhya Pradesh]
Eriocaulon dalzellii var. glabratum Moldenke [Gujarat]*
Eriocaulon diana Fyson [Kerala]
Eriocaulon lanceolatum var. pilosum Moldenke [Kerala]
Eriocaulon leucomelas Steud. [Kerala]
Eriocaulon nilagirensis f. parvifolium Moldenke [Madras]
Eriocaulon odoratum Dalz. [Indore]
Eriocaulon ritchieanum Ruhl. [Madhya Pradesh]
Eriocaulon vanheurckii Muell.-Arg. [Kerala]
Holmskioldia sanguinea f. citrina Moldenke [Assam]*
Lantana camara L. [Delhi]
Lantana camara var. aculeata (L.) Moldenke [Khasi States]
Lantana indica Roxb. [Assam]
Lantana tiliaefolia Cham. [Indore]
Nyctanthes arbor-tristis L. [Karnataka]
Phyla nodiflora (L.) Greene [Indore]
Phyla nodiflora var. canescens (H.B.K.) Moldenke [Indore]
Premna barbata Wall. [Madhya Pradesh]
Premna interrupta Wall. [Khasi States]
Premna khasiana C. B. Clarke [Khasi States]
Premna latifolia Roxb. [Assam]
Premna milleflora C. B. Clarke [Assam & Khasi States]
Premna obtusifolia R. Br. [Khasi States]
Premna odorata Blanco -- to be deleted
Premna pinguis C. B. Clarke [Khasi States]
Premna punduana Wall. [Khasi States]
Premna scandens Roxb. [Kerala]
Premna tomentosa Willd. [Andhra Pradesh, Karnataka, Kerala, & Madras]
Priva cordifolia (L. f.) Druce [Khasi States]
Pygmaepremna herbacea (Roxb.) Moldenke [Khasi States & Madhya Pradesh]
Stachytarpheta jamaicensis (L.) Vahl [Indore & Khasi States]
Stachytarpheta mutabilis var. violacea Moldenke [Kerala & Uttar Pradesh]
Verbena hybrida Voss [Bihar]
Verbena officinalis L. [Khasi States & Madhya Pradesh]

- Vitex altissima L. f. [Assam]
Vitex glabrata R. Br. [Khasi States]
Vitex limonifolia Wall. [Khasi States]
Vitex negundo var. purpurascens Sivaraman & Moldenke [Kerala]*
Vitex peduncularis Wall. [Khasi States]
Vitex pinnata L. [Karnataka]
Vitex quinata (Lour.) F. N. Will. [Khasi States]
Vitex trifolia L. [Assam]
Vitex vestita Wall. [Khasi States]

BANGLADESH:

All the references under "East Bengal" in PAKISTAN should now be transferred here

Premna interrupta Wall.

LACCADIVES ISLANDS:

Premna obtusifolia R. Br. [Minikoy]

Stachytarpheta jamaicensis (L.) Vahl [Minikoy]

MALDIVE ISLANDS:

Lantana camara var. aculeata (L.) Moldenke [Heddufure]

Phyla nodiflora (L.) Greene [Addu, Hunigandi, Hunigonitila, & Vermandu]

Vitex negundo L. [Dunnika, Malé, Turadu, & Vermandu]

SRI LANKA:

Clerodendrum incisum Klotzsch

Clerodendrum umbellatum var. speciosum (Dombroin) Moldenke

Duranta repens L.

Eriocaulon collinum var. nanum Moldenke*

Eriocaulon ligulaefolium Alston*

Eriocaulon nilagirensis f. parvifolium Moldenke

Eriocaulon quinquangulare var. elatus Moldenke*

Eriocaulon quinquangulare var. martianum Wall.

Eriocaulon robusto-brownianum Ruhl.

Eriocaulon setaceum var. capillus-naiadis (Hook. f.) Moldenke*

Eriocaulon sexangulare f. viviparum Moldenke

Eriocaulon willdenovianum var. fergusonii Moldenke*

Lantana camara var. alba Moldenke

Lantana camara var. mista (L.) L. H. Bailey

Lantana camara var. varia (Kuntze) Moldenke

Lantana montevidensis (Spreng.) Briq.

Lantana trifolia f. albiflora Moldenke

Premna latifolia var. cuneata C. B. Clarke

Premna latifolia var. mollissima C. B. Clarke

Premna odorata Blume -- to be deleted

Premna odorata var. detergibilis (C. B. Clarke) Moldenke -- to be deleted

Premna thwaitesii f. glabrescens Moldenke*

Premna tomentosa Willd.

Premna tomentosa var. detergibilis C. B. Clarke*

- Stachytarpheta dichotoma (Ruiz & Pav.) Vahl
 xStachytarpheta intercedens Dans.
Stachytarpheta jamaicensis f. parviflora Moldenke
Stachytarpheta mitabilis (Jacq.) Vahl
Stachytarpheta urticaefolia f. albiflora Moldenke
Verbena hispida Ruiz & Pav.

SRILANKAN ISLANDS:

- Avicennia marina (Forsk.) Vierh. [Erumativu]
Premna latifolia var. viburnoides (Wall.) C. B. Clarke [Sober]
Premna procumbens Moon [Sober]

BURMA:

- Callicarpa macrophylla Vahl [Southern Shan States]
Eriocaulon quinquangulare var. martianum Wall. -- delete the asterisk
Tectona grandis var. glabrifolia Moldenke
Vitex trifolia L. [Upper Burma]
Vitex trifolia var. subtrisecta (Kuntze) Moldenke [Upper Burma]

ANDAMAN ISLANDS:

- Callicarpa longifolia Lam. [South Andaman]

MERGUI ARCHIPELAGO:

- Clerodendrum villosum Blume [Mergui]
Vitex pinnata L. [Mergui]

THAILAND:

- Eriocaulon xeranthemum Mart.

INDOCHINA:

- Callicarpa candicans var. sumatrana (Miq.) Moldenke [Vietnam]
Clerodendrum paniculatum L. [Vietnam]
Lantana camara var. aculeata (L.) Moldenke [Vietnam]
Premna odorata var. pierriana (Dop) Moldenke [Cambodia]
Stachytarpheta urticaefolia (Salisb.) Sims [Vietnam]

MALAYA:

- Callicarpa longifolia f. floccosa Schau. [Penang]
Clerodendrum philippinum Schau. [Singapore]
Eriocaulon sexangulare f. viviparum Moldenke -- delete the asterisk
Eriocaulon truncatum Hamilt. [Perak]
Gmelina asiatica L. [Singapore]
Sphenodesme pentandra Jack [Penang]

JAPAN:

- Caryopteris incana (Thunb.) Miq. [Tsushima]
Vitex negundo var. intermedia (P'ei) Moldenke [Honshu]

PHILIPPINE ISLANDS:

- Premna depauperata Merr. [Luzon]

MARIANAS ISLANDS:

- Clerodendrum inerme (L.) Gaertn. [Sarigan]
Phyla nodiflora (L.) Greene [Cabras]
 xStachytarpheta intercedens Dans. [Guam]

Stachytarpheta jamaicensis (L.) Vahl [Pagan]

PALAU ISLANDS:

Clerodendrum inerme (L.) Gaertn. [Peleliu]

Clerodendrum thomsonae Balf. f. [Koror]

Clerodendrum umbellatum var. speciosum (Dombrain) Moldenke
[Koror]

Phyla nodiflora var. reptans (Spreng.) Moldenke [Angaur]

Stachytarpheta jamaicensis (L.) Vahl [Angaur, Aulupseel, &
Peleliu]

Stachytarpheta urticaefolia (Salisb.) Sims [Angaur, Malakal, &
Urukthapel]

Tectona grandis L. f. [Koror]

GREATER SUNDA ISLANDS:

Eriocaulon brownianum Mart. [Java & Sumatra]

Eriocaulon sollyanum Royle [Sumatra]

Lantana camara var. angustifolia Moldenke — to be deleted

Lantana triplinervia Turcz. [Java]

Premna obtusifolia var. gaudichaudii (Schau.) Moldenke [Java]

CAROLINE ISLANDS:

Callicarpa erioclona f. glabrescens Moldenke [Falalis]

Clerodendrum inerme (L.) Gaertn. [Lamotrek, Nukuoro, Satawal,
Sonsorol, & Wattagai]

Phyla nodiflora (L.) Greene [Faraulap]

Phyla nodiflora var. reptans (Spreng.) Moldenke [Peleliu]

Premna obtusifolia R. Br. [Moch]

Premna obtusifolia var. gaudichaudii (Schau.) Moldenke [Fala-
lis & Nukuoro]

Stachytarpheta urticaefolia (Salisb.) Sims [Namoluk]

Vitex trifolia var. bicolor (Willd.) Moldenke

MARSHALL ISLANDS:

Premna obtusifolia R. Br. [Bekrak]

Stachytarpheta jamaicensis (L.) Vahl [Dalep]

GILBERT ISLANDS:

Clerodendrum inerme (L.) Gaertn. [Bikenibeu & Butaritari]

Stachytarpheta jamaicensis (L.) Vahl [Butaritari]

Stachytarpheta urticaefolia (Salisb.) Sims [Butaritari & Ta-
rawa]

PHOENIX ISLANDS:

Clerodendrum inerme (L.) Gaertn. [Canton]

Lantana camara L. [Hull]

Stachytarpheta jamaicensis (L.) Vahl [Canton]

Stachytarpheta jamaicensis f. parviflora Moldenke [Canton]

NEW GUINEA:

Eriocaulon sollyanum Royle

NEW GUINEAN ISLANDS:

Premna nitida K. Schum. [Fergusson]

SOLOMON ISLANDS:

- Avicennia marina (Forsk.) Vierh. [Bougainville]
Avicennia officinalis L. [Bougainville]
Callicarpa pedunculata R. Br. [Bougainville]
Faradaya amicornum (Seem.) Seem. [Bougainville]
Gmelina moluccana (Blume) Backer [Bougainville]
Premna obtusifolia R. Br. [Bougainville]
Stachytarpheta dichotoma f. albiflora (Moldenke) Moldenke
 [Upolu]
Stachytarpheta jamaicensis (L.) Vahl [Bougainville]
Teijsmanniodendron ahernianum (Merr.) Bakh. [Bougainville]

NEW HEBRIDES:

- Vitex trifolia var. subtrisecta (Kuntze) Moldenke [Eromange]

AUSTRALIA:

- Eriocaulon cinereum R. Br. [New South Wales]
Glossocarya hemiderma (F. Muell.) Benth. [Northern Territory]
Pityrodia jamesii Specht [Northern Territory]*

HAWAIIAN ISLANDS:

- Lantana camara L. [Hawaii]
Stachytarpheta incana var. angustibracteata Moldenke [Kauai]

CULTIVATED:

- Aloysia gratissima (Gill. & Hook.) Troncoso [Arizona]
Aloysia nahuire Gentry & Moldenke [Maryland]
Aloysia triphylla (L'Hér.) Britton [Egypt & Sri Lanka]
Callicarpa kochiana Mak. [Germany]
Callicarpa longifolia Lam. [Egypt & Pakistan]
Callicarpa longifolia f. floccosa Schau. [Egypt]
Callicarpa macrophylla Vahl [Sri Lanka]
Callicarpa nudiflora Hook. & Arn. [Sri Lanka]
Callicarpa pedunculata R. Br. [Sri Lanka]
Caryopteris odorata (Hamilt.) B. L. Robinson [Egypt, Pakistan,
 & Sri Lanka]
Citharexylum fruticosum L. [Germany & Sri Lanka]
Citharexylum hidalgense Moldenke [Egypt]
Citharexylum montevidense (Spreng.) Moldenke [Egypt]
Citharexylum poeppigii Walp. [Venezuela]
Citharexylum spinosum L. [Pakistan]
Clerodendrum aculeatum (L.) Schlecht. [Egypt]
Clerodendrum bungei Steud. [Arizona & Egypt]
Clerodendrum emirnense Bojer [Pakistan]
Clerodendrum floribundum R. Br. [Sri Lanka]
Clerodendrum fortunatum L. [Germany]
Clerodendrum glabrum E. Mey. [Sri Lanka]
Clerodendrum heterophyllum (Poir.) R. Br. [Sri Lanka]
Clerodendrum incisum var. macrosiphon (Hook. f.) J. G. Baker
 [Sri Lanka]
Clerodendrum indicum (L.) Kuntze [Pakistan, Sri Lanka, & Ven-

- ezuela]
- Clerodendrum inerme (L.) Gaertn. [Egypt, Germany, Pakistan, Sri Lanka, & Venezuela]
- Clerodendrum kaempferi (Jacq.) Sieb. [Sri Lanka]
- Clerodendrum ligustrinum (Jacq.) R. Br. [Germany]
- Clerodendrum lindleyi f. albiflorum Moldenke [Sri Lanka]
- Clerodendrum minahassae Teijsm. & Binn. [Sri Lanka]
- Clerodendrum philippinum Schau. [Egypt, Pakistan, & Sri Lanka]
- Clerodendrum phlomidis L. f. [Egypt & Germany]
- Clerodendrum rotundifolium Oliv. [Egypt]
- Clerodendrum schweinfurthii var. bakeri (Gürke) Thomas [Sri Lanka]
- Clerodendrum serratum (L.) Moon [Sri Lanka]
- Clerodendrum speciosissimum Van Geert [Egypt, Sri Lanka, & Zanzibar]
- Clerodendrum speciosissimum f. album Moldenke [Sri Lanka]
- Clerodendrum splendens G. Don [Egypt, Pakistan, & Sri Lanka]
- Clerodendrum thomsonae Balf. f. [Egypt, Pemba, Sri Lanka, Timian, & Zanzibar]
- Clerodendrum trichotomum var. ferrugineum Nakai [Egypt]
- Clerodendrum umbellatum var. speciosum (Dombrain) Moldenke [Pakistan & Sri Lanka]
- Clerodendrum viscosum Vent. [Sri Lanka]
- Clerodendrum wallichii Merr. [Egypt]
- Congea griffithiana Munir [Sri Lanka]
- Congea tomentosa Roxb. [Bangladesh & Sri Lanka]
- Congea velutina Wight [India & Sri Lanka]
- Cornutia microcalycina Pavon & Moldenke [Venezuela]
- Duranta repens L. [Germany, Missouri, Pemba, & Zanzibar]
- Duranta repens var. alba (Masters) L. H. Bailey [China, Pakistan, & Sri Lanka]
- Duranta repens var. integrifolia (Tod.) Moldenke [Florida]
- Duranta repens var. microphylla (Desf.) Moldenke [Germany]
- Duranta serratifolia (Griseb.) Kuntze [Egypt & Sudan]
- Duranta serratifolia var. variegata Moldenke [Egypt]*
- Faradaya papuana Scheff. [Sri Lanka]
- Faradaya splendida F. Muell. [Sri Lanka]
- Gmelina arborea Roxb. [Egypt & Sri Lanka]
- Gmelina arborea var. canescens Haines [British Honduras]
- Gmelina arborea var. glaucescens C. B. Clarke [India & Sri Lanka]
- Gmelina asiatica L. [Sri Lanka]
- Gmelina elliptica J. E. Sm. [Java & Zanzibar]
- Gmelina philippensis Cham. [Pakistan, Sri Lanka, & Zanzibar]
- Holmskioldia sanguinea Retz. [Pakistan, Sri Lanka, Sudan, & Zanzibar]

Holmskioldia sanguinea f. citrina Moldenke -- delete the asterisk

Lantana boyacana Moldenke -- to be deleted

Lantana callowiana Monrovia [Pakistan]

Lantana camara L. [Arizona, Egypt, India, Pakistan, & Sri Lanka]

Lantana camara var. aculeata (L.) Moldenke [Egypt & Sudan]

Lantana camara var. alba Moldenke [Egypt, Pakistan, & Sri Lanka]

Lantana camara var. angustifolia Moldenke -- to be deleted

Lantana camara var. flava (Medic.) Moldenke [Egypt & Pakistan]

Lantana camara var. mista (L.) L. H. Bailey [Arizona]

Lantana camara var. moritziana (Otto & Dietr.) López-Palacios [California, Colombia, Germany, & Java]

Lantana camara var. multiflora (Otto & Dietr.) Moldenke [Arizona]

Lantana camara var. nana Moldenke [Missouri & New York]*

Lantana camara var. rubella Moldenke [Pakistan]

Lantana camara var. sanguinea (Medic.) L. H. Bailey [Pakistan]

Lantana canescens H.B.K. [Venezuela]

Lantana depressa Small [Thailand]

Lantana horrida H.B.K. [Arizona, North Carolina, & South Carolina]

Lantana involucrata L. [Germany]

Lantana maxima Hayek [Peru]

Lantana montevidensis (Spreng.) Briq. [Egypt & Sri Lanka]

Lantana moritziana Otto & Dietr. -- to be deleted

Lantana tiliaefolia Cham. [Egypt]

Lantana trifolia L. [Venezuela]

Lantana triplinervia Turcz. [Banka, Brazil, Germany, India, & Java]

Lantana velutina Mart. & Gal. [Egypt]

Lippia alba (Mill.) N. E. Br. [Peru]

Lippia javanica (Burm. f.) Spreng. [Germany]

Lippia turbinata Griseb. [Egypt]

Nyctanthes arbor-tristis L. [Egypt & Sri Lanka]

Oxera pulchella Labill. [Sri Lanka]

Petrea arborea H.B.K. [Sri Lanka & Zanzibar]

Petrea volubilis L. [Egypt, Pakistan, Pemba, Sri Lanka, & Zanzibar]

Petrea volubilis var. pubescens Moldenke [Egypt & Sri Lanka]

Phyla incisa Small -- to be deleted

Phyla nodiflora (L.) Greene [Guam & Sri Lanka]

Phyla nodiflora var. texensis Moldenke [Arizona, Germany, & Iran]

Premna divaricata Wall. [Sri Lanka]

Premna foetida Reinw. [Sri Lanka]

Premna gaudichaudii Schau. -- to be deleted

- Premna latifolia var. viburnoides (Wall.) C. B. Clarke [Sri Lanka]
- Premna obtusifolia R. Br. [Sri Lanka & Trinidad]
- Premna obtusifolia var. gaudichaudii (Schau.) Moldenke [Florida]
- Premna obtusifolia var. serratifolia (L.) Moldenke [Sri Lanka]*
- Premna tomentosa Willd. [Egypt]
- Pygmaeopremna herbacea (Roxb.) Moldenke [Sri Lanka]
- Sphenodesme pentandra var. wallichiana (Schau.) Munir [Sri Lanka]
- Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios [Belgium & Sweden]
- Stachytarpheta elatior Schrad. — to be deleted
- Stachytarpheta jamaicensis (L.) Vahl [Kwajalein]
- Stachytarpheta mutabilis (Jacq.) Vahl [Tahiti]
- Stachytarpheta urticaefolia (Salisb.) Sims [Sri Lanka]
- Tectona grandis L. f. [Burundi, Guinea, Indochina, Pakistan, Pemba, & Zanzibar]
- Tectona grandis f. abludens Koord. & Valet. [Egypt]
- Tectona grandis var. glabrifolia Moldenke [Egypt & Sri Lanka]
- Verbena bonariensis L. [Venezuela; delete "New York"]
- Verbena canadensis (L.) Britton x V. ambrosifolia Rydb. [Massachusetts]*
- Verbena canadensis (L.) Britton x V. elegans H.B.K. [Massachusetts]*
- Verbena canadensis (L.) Britton x V. maritima Small [Massachusetts]*
- Verbena canadensis (L.) Britton x V. peruviana (L.) Britton [Massachusetts]*
- Verbena canadensis (L.) Britton x V. tampensis Nash [Massachusetts]*
- Verbena carolina L. [Germany]
- Verbena hastata f. rosea Cheney [Germany & Netherlands]
- Verbena hispida Ruzf & Pav. [Sri Lanka]
- xVerbena hybrida Voss [Missouri, Pakistan, Pemba, Singapore, Sri Lanka, Thailand, & Zanzibar]
- Verbena laciniata (L.) Briq. [Germany]
- Verbena laciniata var. contracta (Lindl.) Moldenke [France & Germany]
- Verbena laciniata var. sabini (Sweet) Moldenke — to be deleted
- Verbena megapotamica Spreng. x V. pulchella Sweet [Massachusetts]*
- Verbena monacensis Moldenke [India & Sri Lanka]
- Verbena peruviana (L.) Britton [Missouri]
- Verbena rigida Spreng. [Egypt, Sri Lanka, & Venezuela]
- Verbena tenera Spreng. [Sri Lanka]
- Verbena tenuisecta Briq. [Egypt, Pemba, Sri Lanka, & Zanzibar]
- xVerbena vaga Moldenke [Massachusetts]

- Vitex agnus-castus L. [Arizona, Pakistan, & Poland]
Vitex agnus-castus var. diversifolia (Carr.) Schelle [Egypt]
Vitex agnus-castus var. pseudo-negundo Hausskn. [Pakistan]
Vitex capitata Vahl [Sri Lanka]
Vitex cofassus Reinw. [Sri Lanka]
Vitex cymosa Bert. [Egypt]
Vitex doniana Sweet [Egypt]
Vitex doniana var. parvifolia (Engl.) Moldenke [Sudan]
Vitex megapotamica (Spreng.) Moldenke [Egypt]
Vitex negundo L. [Pakistan & Sri Lanka]
Vitex negundo var. heterophylla (Franch.) Rehd. [Egypt]
Vitex negundo var. intermedia (P'ei) Moldenke [Oklahoma & Pakistan]
Vitex orinocensis H.B.K. [Venezuela]
Vitex peduncularis Wall. [Sri Lanka]
Vitex trifolia L. [Germany, Pakistan, & Sri Lanka]
Vitex trifolia var. bicolor (Willd.) Moldenke [Egypt]
Vitex trifolia var. subtrisecta (Kuntze) Moldenke [India & Sri Lanka]

Addenda & errata to Part II:

- Abena jamaicensis Hitchc. = Stachytarpheta jamaicensis (L.) Vahl
Acantholippia trifida Clos = A. trifida (C. Gay) Moldenke
Aegiphila grandis [Moldenke] = Aegiphila grandis Moldenke
Aegiphila alata Heckel = A. elata Sw.
Aegiphila arborea Spruce = A. integrifolia var. guianensis (Moldenke) López-Palacios -- this is the corrected entry
Aegiphila barbadensis Moldenke = A. martinicensis f. barbadensis (Moldenke) Moldenke
Aegiphila costarricensis Moldenke = A. costaricensis Moldenke
Aegiphila depeana [Steud.] = A. depeana Steud.
Aegiphila elata var. macrophylla (H.B.K.) López-Palacios = A. elata var. macrophylla (H.B.K.) López-Palacios
Aegiphila glandulifera var. glandulifera López-Palacios = A. glandulifera Moldenke
Aegiphila guianensis Aristeguieta = A. integrifolia var. guianensis (Moldenke) López-Palacios
Aegiphila guianensis Moldenke = A. integrifolia var. guianensis (Moldenke) López-Palacios
Aegiphila integrifolia [Jacq.] = A. integrifolia (Jacq.) Jacq.
Aegiphila macrophylla H.B.K. = A. elata var. macrophylla (H.B.K.) López-Palacios
Aegiphila martinicensis Jack. = A. martinicensis Jacq.
Aegiphila mollis var. surfaceana Moldenke = A. mollis var. surfaceana (Moldenke) Moldenke
Aegiphila nobilis Heckel = A. mollis H.B.K.

- Aegiphila novoratanensis López-Palacios = A. novogranatensis Moldenke
- Aegiphila obdurata Darwin = A. obducta Vell.
- Aegiphila paraguayensis Briq. = A. paraguariensis Briq.
- Aegiphila puberulenta Moldenke = A. mollis var. puberulenta (Moldenke) López-Palacios
- Aegiphila sprucena Moldenke = A. spruceana Moldenke
- Aegiphila steyermarkii var. macrophylla [Moldenke] = A. steyermarkii var. macrophylla Moldenke
- Aegiphila ternifolia H.B.K. = A. ternifolia (H.B.K.) Moldenke
- Aegiphila verrucosa Schau. = A. ternifolia f. oppositifolia López-Palacios — this is the corrected entry
- Aegiphila macrophylla Willd. = Aegiphila elata var. macrophylla (H.B.K.) López-Palacios
- Aegiphila obducta Vell. = Aegiphila obducta Vell.
- Aegiphila Vell. = Aegiphila Jacq.
- Aegiphila obducta Vell. = Aegiphila obducta Vell.
- Aloysia selloi Cham. = A. sellowii (Briq.) Moldenke
- Aloysia virgata var. laxa Mold. = A. virgata var. laxa (Briq.) Moldenke
- Amasonia lasiocaulis Mart. & Schau. = A. lasiocaulis Mart. & Schau.
- Amasonia sprucena [Moldenke] = A. spruceana Moldenke
- Amasonia arborea H.B.K. = Amasonia arborea H.B.K.
- Amsonia Stearn = Amasonia L. f.
- Avicennia tomentosa Duarte = Avicennia schaueriana Stapf & Leechman
- Avicennia L. = Avicennia L.
- Avicennia officinalis L. = Avicennia officinalis L.
- Avicennia germinans (L.) L. = A. germinans (L.) L.
- Avicennia marina L. = A. marina (Forsk.) Vierh.
- Avicennia officialis Por = A. officinalis L.
- Avicennia officinalis Auct. ex Jafri = A. marina var. acutissima Stapf & Moldenke
- Avicennia Whipple = Avicennia L.
- Baillonia spartoides Ball = Diostea scoparia (Gill. & Hook.) Miers
- Bouchea Truncosa = Bouchea Cham.
- Bouchea boliviana Mold. = B. boliviana (Kuntze) Moldenke
- Bouchea dessecta S. Wats. = B. dissecta S. Wats.
- Bouchea pseudogervae f. pilosa Herzog = B. boliviana (Kuntze) Moldenke
- Brückea eglandulosa Klotzsch & Karst. = Aegiphila ternifolia f. oppositifolia López-Palacios — this is the corrected entry
- Brückea grandifolia (Willd.) Klotzsch & Karst. = Aegiphila ternifolia f. oppositifolia López-Palacios — this is the corrected entry
- Brückea verrucosa (Schau.) Klotzsch & Karst. = Aegiphila ternifolia

- f. oppositifolia López-Palacios — this is the corrected entry
- Brueckea glandulosa Klotzsch & Karst. = Aegiphila ternifolia f. oppositifolia López-Palacios -- this is the corrected entry
- Brueckea grandifolia Klotzsch & Karst. = Aegiphila ternifolia f. oppositifolia López-Palacios -- this is the corrected entry
- Brueckea verrucosa (Schau.) Klotzsch & Karst. = Aegiphila ternifolia f. oppositifolia López-Palacios -- this is the corrected entry
- Buddleia bracteolata Kränzl. = Lippia myriocephala var. hypoleia (Briq.) Moldenke -- this is the corrected entry
- Callicarpa wallichiana Walp. = Callicarpa tomentosa (L.) Murr.
- Callicarpa lanceolarium F.B.I. = C. longifolia f. floccosa Schau.
- Callicarpa longifolia var. lanceolarium F.B.I. = C. longifolia f. floccosa Schau.
- Callicarpa pentandra var. typica (Schum.) Bakh. f. = Geunsia pentandra (Roxb.) Merr.
- Callicarpa pentandra var. typica f. geniuna Bakh. f. = Geunsia pentandra (Roxb.) Merr.
- Callicarpa sagaitifolia Wall. = C. rubella Lindl.
- Callicarpa scabra Hort. = C. pedunculata R. Br.
- Callicarpa squamosa Blume = C. arborea Roxb.
- Carptopetala Moldenke = Carptotepala Moldenke
- Carptopetala jenmani (Gleason) Moldenke = Carptotepala jenmani (Gleason) Moldenke
- Cartelia cuneato-ovata Cav. = Castelia cuneato-ovata Cav.
- Chascanum sessilifolia (Vatke) Moldenke = C. sessilifolium (Vatke) Moldenke
- Chlorodendron inerme Gaertn. = Clerodendrum inerme (L.) Gaertn.
- Citharexylem Altschul = Citharexylum B. Juss.
- Citharexylum donnel-smithii Greenm. = C. donnell-smithii Greenm.
- Citharexylum hidalguense Moldenke = C. hidalguense Moldenke
- Citharexylum poeppigii Walp. & Moldenke = C. poeppigii Walp.
- Clerodendrum indicum (L.) Kuntze = Clerodendrum indicum (L.) Kuntze
- Clerodendron calamitosum ♂ glabriusculum Horsf. = Clerodendron calamitosum L.
- Clerodendron disparifolium ♂ denticulatum Hort. = Clerodendron laevifolium Blume
- Clerodendron divaricatum Jack = Clerodendrum serratum var. wallichii C. B. Clarke -- this is the corrected entry
- Clerodendron fallax var. fl. albo Hort. = Clerodendrum speciosissimum f. album Moldenke
- Clerodendron farinosum Wall. = Clerodendrum serratum var. wallichii C. B. Clarke -- this is the corrected entry
- Clerodendron fragrans fl. pleno Hort. = Clerodendrum philippinum

Schau.

Clerodendron indicum Kuntze = Clerodendrum indicum (L.) Kuntze

Clerodendron japonicum Sweet = Clerodendrum japonicum (Thunb.)

Sweet

Clerodendron jasminoides Din = Clerodendrum calamitosum L.

Clerodendron javanicum Walp. = Clerodendrum serratum var. wallichii

C. B. Clarke — this is the corrected entry

Clerodendron mite Vahl = ?

Clerodendron mite Vatke = Clerodendrum indicum (L.) Kuntze

Clerodendron rotundifolium Oliv. = Clerodendrum rotundifolium

Oliv.

Clerodendron rotundifolium var. keniensis Rh. Frijr. = Clerodendrum rotundifolium var. keniense Fries

Clerodendron serratum var. wallichianum Royle = Clerodendrum serratum var. wallichii C. B. Clarke — this is the corrected entry

Clerodendron serratum var. wallichii C. B. Clarke = Clerodendrum serratum var. wallichii C. B. Clarke — this is the corrected entry

Clerodendron squamatum var. bethuniana (Lowe) Bakh. = Clerodendrum bethunianum Lowe

Clerodendrum aculeatum (L.) Garcke = C. aculeatum (L.) Schlecht.

Clerodendrum cochinchinensis Altschul. = C. cochinchinense Dop

Clerodendrum fallax f. albiflorum Hort. = C. speciosissimum f. album Moldenke

Clerodendrum foetidum Bunge = C. bungei Steud.

Clerodendrum fragrans var. multiplex Sweet = C. philippinum Schau.

Clerodendrum fragrans var. pleniflorum Schau. = C. philippinum Schau.

Clerodendrum inerme Gaertn. = C. inerme (L.) Gaertn.

Clerodendrum inermis Nevill = C. inerme (L.) Gaertn.

Clerodendrum japonicum Sw. = C. japonicum (Thunb.) Sweet

Clerodendrum nerifolium Subram. & Nair = C. inerme (L.) Gaertn.

Clerodendrum nerilolium Subram. & Nair = C. inerme (L.) Gaertn.

Clerodendrum plomides Farnsworth = C. phlomidis L. f.

Clerodendrum ternifolia [H.B.K.] = C. ternifolium H.B.K.

Clerodendrum thomsonae Balf. = C. thomsonae Balf. f.

Clerodendrum thompsonii Ball = C. thomsonae Balf. f.

Clerodendrum tricotomum Thunb. = C. trichotomum Thunb.

Clerodendrum umbellatum var. speciosum Moldenke = C. umbellatum var. speciosum (Dombrain) Moldenke

Cordia macrocephala Willd. = Lantana trifolia f. hirsuta Moldenke
this is the corrected entry

Cordia microcephala Willd. = Lantana trifolia f. hirsuta Moldenke
this is the corrected entry

Dicrasyllis panifolia Ostenfeld = D. parvifolia F. Muell.

- Dupatya affinis (Bong.) Kuntze = Paepalanthus ramosus var. affinis (Bong.) Ruhl.
- Dupatya affinis Kuntze = Paepalanthus ramosus var. affinis (Bong.) Ruhl.
- Dupatya karstenii (Ruhl.) Rusby = Paepalanthus karstenii Ruhl.
- Dupatya ramosa Kuntze = Paepalanthus ramosus (Wikstr.) Kunth
- Dupatya ramosa (Wikstr.) Kuntze = P. ramosus (Wikstr.) Kunth
- Dupatya roraimae (Oliver) Rusby = Rondonanthus roraimae (Oliv.) Herzog
- Duranta benthamii Briq. = D. benthami Briq.
- Duranta klotzschii Moritz = D. mutisii L. f.
- Duranta serratifolia var. punctata Troncoso = D. serratifolia var. punctata Caro
- Durantha mutisii L. f. = Duranta mutisii L. f.
- Eriocaulon articulatum Hudson = E. aquaticum (J. Hill) Druce
- Eriocaulon beauverdi (Beauverd) Moldenke = E. beauverdi Moldenke
- Eriocaulon capillus-naiadis Hook. f. = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry
- Eriocaulon capillus-naidis Hook. f. = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry
- Eriocaulon capillus-naidus Hook. f. = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry
- Eriocaulon capillus najadis Hook. f. = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry
- Eriocaulon capillus-najadis Hook. f. = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry
- Eriocaulon caulescens Hook. = E. atratum var. major Thwaites
- Eriocaulon ceylanicum var. subacaulescens Wangerin = E. ceylanicum Körn.
- Eriocaulon cristatum var. Thwaites = E. longicuspe Hook. f. -- this is the corrected entry
- Eriocaulon cristatum var. bracteis floralibus denticulatis et longiuscule cuspidato-acuminatis Thwaites & Hook. f. = E. longicuspe Hook. f. -- this is the corrected entry
- Eriocaulon decangulare L. = E. decangulare L.
- Eriocaulon melanocephalum var. usterianum Beauverd = E. melanocephalum ssp. usterianum Beauverd
- Eriocaulon minimum Ruhl. = E. abyssinicum Hochst.
- Eriocaulon quinquangulare f. viviparum Moldenke = E. quinquangulare var. martianum Wall.
- Eriocaulon quinquangulare L. = E. quinquangulare L.
- Eriocaulon setaceum f. capillis-naiadis Haines = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry
- Eriocaulon setaceum f. capillus-naiadis Haines = E. setaceum var. capillus-naiadis (Hook. f.) Moldenke -- this is the corrected entry

ted entry

- Eriocaulon sexangulare A. Rich. = E. abyssinicum Hochst.
Eriocaulon sexangulare Ruhl. = E. stuhlmanni N. E. Br. -- this is
the corrected entry
Eriocaulon sonderianum Rendle = E. decipiens N. E. Br.
Eriocaulon stratum Gunaw. = E. atratum Körn.
Eriocaulon suichaense Hayata = E. suishaense Hayata
Eriocaulon triangulare With. = E. pellucidum Michx.
Eriocaulon trimerium Mart. = the trimerous species of Eriocaulon
Gron.
Eriocaulon wallichianum var. fol. hirsutis Ferguson = E. willde-
novianum var. fergusonii Moldenke
Eriope horridula Epling = Lippia grandiflora Mart. & Schau.
Geinsia Wangerin = Geunsia Blume
Gesneria pilosa Hort. = G. aureonites Hook., Gesneriaceae
Ghinia cardenasii Moldenke = G. cardenasi Moldenke
Glandularia aristigera (Briq.) Tronc. = Verbena aristigera S.
Moore
"Glandularia canadensis x G. bipinnatifida" Solbrig = xVerbena
oklahomensis Moldenke
Glandularia ciliata Solbrig = Verbena ciliata Benth.
Glandularia elegans (L.) Small = Verbena elegans H.B.K.
"Glandularia elegans x G. peruviana" Solbrig -- see under Verbena
elegans H.B.K. x V. peruviana (L.) Britton
"Glandularia elegans x G. pulchella" Solbrig -- see under Verbena
elegans H.B.K. x V. pulchella Sweet
"Glandularia elegans (L.) Small x G. stellaroides (Cham.) Sch-
nack & Covas" -- see under Verbena elegans H.B.K. x V. stel-
larioides Cham.
Glandularia glutinosa (O. Ktze.) Schn. & Covas = Verbena glutin-
osa Kuntze
Glandularia hasslerana (Briq.) Tronc. = Verbena hasslerana Briq.
Glandularia hassleriana Schnack & Rubens = Verbena hasslerana
Briq.
Glandularia kuntzeana (Mold.) Tronc. = Verbena kuntzeana Moldenke
Glandularia macrosperma (Speg.) Tronc. = Verbena macrosperma Speg.
Glandularia marrubioides Cham. = Verbena marrubioides Cham.
Glandularia moricolor (Mold.) Tronc. = Verbena moricolor Moldenke
Glandularia nana (Mold.) Tronc. = Verbena nana Moldenke
Glandularia nana Schnack & Rubens = Verbena nana Moldenke
"Glandularia peruviana x G. megapotamica" Solbrig = xVerbena
schneckii Moldenke
Glandularia porrigens (Phil.) Troncoso = Verbena porrigens R. A.
Phil.
Glandularia pulchella (Spr.) Tronc. = Verbena pulchella Sweet
Glandularia santiaguensis x peruviana Solbrig -- see under Verbena

- santiaguensis (Covas & Schnack) Moldenke x V. peruviana (L.) Britton
- Glandularia scrobiculata (Gris.) Tronc. = Verbena scrobiculata Griseb.
- Glossocarya linnaei Clarke = G. scandens (L. f.) Moon
- Glossocarya scandens Trimen = G. scandens (L. f.) Moon
- Gmelina hystrix Schult. ex Kurz = G. philippensis Cham.
- Junellia (Mold.) Tronc. = Junellia Moldenke
- Kalaharia uncinata var. parviflora Moldenke = K. uncinata var. parviflora (Schinz) Moldenke
- Kalaharia uncinata var. paaviflora Moldenke = K. uncinata var. parviflora (Schinz) Moldenke
- Kalaharia uncinata var. paaviflora Moldenke = K. uncinata (Schinz) Moldenke
- Lampaya aratae Molf. = L. medicinalis R. A. Phil.
- Lampaya hieronymi Mold. = L. hieronymi Schum. & Moldenke
- Lampaya officinalis F. Phil. = L. medicinalis R. A. Phil.
- Lampaya schickendantzii Mold. = L. hieronymi Schum. & Moldenke
- Lantana primulia Moldenke = Lantana primulina Moldenke
- Lantana acononica Purpus = L. velutina Mart. & Gal.
- Lantana alba Brandis = L. indica Roxb.
- Lantana aristata var. cabreræ Moldenke = L. canescens H.B.K.
- Lantana aristeguieta [Moldenke] = L. aristeguietae Moldenke
- Lantana boyacana Desf. = L. rugulosa H.B.K. -- this is the corrected entry
- Lantana boyacana Moldenke = L. rugulosa H.B.K.
- Lantana camara var. angustifolia Moldenke = L. triplinervia Turcz.
- Lantana canescens Fedde = Phyla nodiflora var. canescens (H.B.K.) Moldenke
- Lantana chamissonis (D. Dietr.) Briq. = L. chamissonis (D. Dietr.) Benth.
- Lantana cujabensis var. punctata Moldenke = L. lopez-palacii Moldenke
- Lantana cujabensis var. punctuata Moldenke = L. lopez-palacii Moldenke
- Lantana grisebachii Stuck. ex Seckt. = L. grisebachii Stuck.
- Lantana hyptoides Rusby = Hyptis rugosa Pohl, Lamiaceae
- Lantana inconspicua Tausch = L. fucata Lindl.
- Lantana macropoda Torr. = L. macropoda Torr.
- Lantana minasensis Moldenke = L. triplinervia var. minasensis (Moldenke) Moldenke
- Lantana minasensis var. hispida Moldenke = L. triplinervia var. hispida (Moldenke) Moldenke
- Lantana minasensis var. longibracteolata Moldenke = L. triplinervia var. longibracteolata (Moldenke) Moldenke
- Lantana minasensis var. puberulenta Moldenke = L. triplinervia var. puberulenta (Moldenke) Moldenke
- Lantana moritziana Otto & Dietr. = L. camara var. moritziana

(Otto & Dietr.) López-Palacios

Lantana nodiflora Fedde = Phyla nodiflora (L.) GreeneLantana nodiflora f. pseudo-sarmentosa Fedde = Phyla nodiflora
var. rosea (D. Don) MoldenkeLantana pittieri Moldenke = L. trifolia f. hirsuta MoldenkeLantana polyanthus Altschul = L. camara var. aculeata (L.) MoldenkeLantana salviaefolia Spreng. = L. rugosa Thunb.Lantana triplinervia Turcz. -- to be deletedLantana Glover = Lantana L.Lantamum Widgren = Lantana L.Leiothrix fluminensis var. pilosa Moldenke = L. fluminensis var.
puberula MoldenkeLippia myriocephala Ch. & Schl. = Lippia myriocephala Schlecht. &
Cham.Lippia Houst. ex L. = Lippia Houst.Lippia alba Schau. = Lantana rugosa Thunb.Lippia asperifolia Amico = L. alba (Mill.) N. E. Br.Lippia attenuata Mart. = L. vernonioides var. attenuata (Mart.)
Moldenke -- this is the corrected entryLippia briquetii Moldenke = L. hirsuta L. f. -- this is the cor-
rected entryLippia briquetii Moldenke = L. hirsuta L. f. -- this is the cor-
rected entryLippia canescens var. uncinuligera (Nees) Gay = Phyla nodiflora
var. rosea (D. Don) MoldenkeLippia cuneifolia var. incisa (Small) Blankinship = Phyla nodi-
flora var. incisa (Small) Moldenke -- this is the corrected
entryLippia cuneifolia var. incisa (Small) Lindheimer = Phyla nodi-
flora var. incisa (Small) Moldenke -- this is the corrected
entryLippia floribunda Briq. = L. hirsuta L. f. -- this is the correc-
ted entryLippia hypoleia Briq. = L. myriocephala var. hypoleia (Briq.)
MoldenkeLippia hypoleia var. ovatifolia Moldenke = L. myriocephala var.
ovatifolia (Moldenke) MoldenkeLippia hypoleuca Briq. = L. myriocephala var. hypoleia (Briq.)
Moldenke -- this is the corrected entryLippia chilensis Schau. in DC. = Aloysia salviaefolia (Hook. &
Arn.) MoldenkeLippia incisa Small = Phyla nodiflora var. incisa (Small) Molden-
ke -- this is the corrected entryLippia incisa (Small) Tidestr. = Phyla nodiflora var. incisa
(Small) Moldenke -- this is the corrected entryLippia linearis Humb. = Phyla linearis (H.B.K.) López-Palacios --
this is the corrected entry

- Lippia linearis Humb. & Bonpl. = Phyla linearis (H.B.K.) López-Palacios -- this is the corrected entry
- Lippia linearis Humb. & Kunth = Phyla linearis (H.B.K.) López-Palacios -- this is the corrected entry
- Lippia linearis H.B.K. = Phyla linearis (H.B.K.) López-Palacios
- Lippia linearis Kunth = Phyla linearis (H.B.K.) López-Palacios -- this is the corrected entry
- Lippia moritzii Turcz. = L. hirsuta L. f. -- this is the corrected entry
- Lippia moritzii Turcz. = L. hirsuta L. f. -- this is the corrected entry
- Lippia myriocephaloides Briq. = L. myriocephala var. hypoleia (Briq.) Moldenke -- this is the corrected entry
- Lippia nodiflora f. maritima Simpson = Phyla nodiflora (L.) Greene
- Lippia pycnocephala Schlecht. = L. myriocephala var. hypoleia (Briq.) Moldenke -- this is the corrected entry
- Lippia schaueriana Mart. & Schau. = L. schaueriana Mart.
- Lippia venezuelensis Moldenke = L. hirsuta L. f.
- Lychnidea verbenae tenuifoliae, vulgo Sandia Laguen Feuill. = Verbena laciniata (L.) Briq.
- Lycium grandifolium Willd. = Aegiphila ternifolia f. oppositifolia López-Palacios -- this is the corrected entry
- Maillelou Rheede = Vitex altissima L. f. -- this is the corrected entry
- Mail-elof Rheede = Vitex altissima L. f. -- this is the corrected entry
- Mesanthum Metcalfe = Mesanthemum Körn.
- Nasmythia septangularis Mart. = Eriocaulon aquaticum (J. Hill) Druce
- Nasmythia septangularis (With.) Mart. = Eriocaulon aquaticum (J. Hill) Druce
- Negundo prior, sive mas; Acostae Breyn. = Vitex negundo L.
- Newcastilia Jeffries & Ratajczak = Newcastilia F. Muell.
- Newcastilia viscida Jeffries & Ratajczak = Newcastilia viscida E. Pritz.
- Ovieda fragrans Hitchc. = Clerodendrum philippinum Schau.
- Ovieda mitis Burm. f. = Clerodendrum indicum (L.) Kuntze
- Paepalanibus Alv. Silv. = Paepalanthus Mart.
- Paepalanibus praedensatus Alv. Silv. = Paepalanthus praedensatus Alv. Silv.
- Paepalanthus exigus (Bong.) Korn. = P. exiguus (Bong.) Körn.
- Paepalanthus maximiliani (Schrad.?) Bong. = P. ramosus (Wikstr.) Kunth
- Paepalanthus maximiliani Schrad. = P. ramosus (Wikstr.) Kunth
- Paepalanthus polyanthos (Bong.) Knuth = P. polyanthus (Bong.) Kunth

- Paepalanthus polyanthus Ktz. = P. polyanthus (Bong.) Kunth
Paepalanthus polytrichoides var. (Körn. = P. polytrichoides
 Kunth
Paepalanthus polytrichoides var. (Körn. = P. polytrichoides
 Kunth
Paepalanthus ramosus var. (Körn. = P. ramosus (Wikstr.) Kunth
Paepalanthus ramosus var. (Körn. = P. ramosus (Wikstr.) Kunth
Paepalanthus regalis recurvus Alv. Silv. = P. regalis var. recur-
vus Alv. Silv.
Paepalanthus speciosus var. (Körn. = P. polyanthus var. tomento-
sus Alv. Silv. — this is the corrected entry
Paepalanthus succisus Körn. = P. succisus Mart. — this is the
 corrected entry
Paepalanthus umbellatus f. brachyphylla Huber = Syngonanthus um-
bellatus f. brachyphyllus (Huber) Moldenke
Petraea volubilis Schau. = Petraea aspera Turcz.
Phyla incisa Small = P. nodiflora var. incisa (Small) Moldenke
Phyla insisa Small = P. nodiflora var. incisa (Small) Moldenke —
 this is the corrected entry
Phylla incisa Williams = Phyla nodiflora var. incisa (Small)
 Moldenke — this is the corrected entry
Pityrodia barlingii El-Gazzar & Wats. = P. bartlingii (Lehm.)
 Benth.
Pityrodia eriobotrya (F. Muell.) E. Pritz. = Lachnostachys erio-
botrya (F. Muell.) Druce
Pityrodia myricantha F. Muell. = Dicrastylis fulva J. Drumm.
Pityrodia myricantha var. eriantha F. Muell. = Dicrastylis fulva
 J. Drumm.
Poeppigia Bert. ex Fer. = Rhaphithamnus Miers
Premna mooliensis (Pears.) Pieper = Premna mooliensis (H. H. W.
 Pearson) Pieper
Premna cambodjana P. Dop = P. cambodiana Dop
Premna cambodjana var. membranacea P. Dop = P. cambodiana var.
membranacea Dop
Premna corymbosa (Burm. f.) Roth & Willd. = P. obtusifolia R. Br.
Premna cuneate Kanjilal = P. scandens Roxb.
Premna japonica MIG. = P. microphylla Turcz.
Premna lucida Miq. = P. obtusifolia R. Br.
Premna mollis Bedd. = P. villosa C. B. Clarke
Premna mucronata Clarke = P. latifolia var. mucronata (Roxb.) C.
 B. Clarke
Premna oblonga Kanjilal = P. scandens Roxb.
Premna sulphurea Baker = P. sulphurea (J. G. Baker) Gürke
Premna tahitensis (Schau.) DC. = P. tahitensis Schau.
Priva adherens (Forsk.) Chiov. = P. adhaerens (Forsk.) Chiov.
Priva adherens a forskalii (Vahl) Chiov. = P. adhaerens (Forsk.)
 Chiov.

- Priva lappulacea f. lappulacea [Moldenke] = P. lappulacea (L.) Pers.
- Priva lappulaceae (L.) Pers. = P. lappulacea (L.) Pers.
- Pygnacopremna Moldenke = Pygmaeopremna Merr.
- Pygnacopremna herbacea (Roxb.) Moldenke = Pygmaeopremna herbacea (Roxb.) Moldenke
- Raphithamnus venustus (Phil.) Skotts. = Rhaphithamnus venustus (R. A. Phil.) B. L. Robinson
- Rhaphitamnus spinosus (A. Juss.) Moldenke = Rhaphithamnus spinosus (A. L. Juss.) Moldenke
- Rhaphythamnus Speg. = Rhaphithamnus Miers
- Rhaphythamnus cyanocarpus Speg. = Rhaphithamnus spinosus (A. L. Juss.) Moldenke
- Schuttleworthia tenera Meissn. = Verbena tenera Spreng.
- Schuttleworthia tenera Walp. = Verbena tenera Spreng.
- Siphonanthus indica Willd. = Clerodendrum indicum (L.) Kuntze
- Stachytarpha elatior Schrad. = Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios -- this is the corrected entry
- Stachytarphaeta cajanensis (L. C. Rich.) Vahl = Stachytarpheta cayennensis (L. C. Rich.) Vahl
- Stachytarphaeta canescens H.B.K. = Stachytarpheta canescens H.B.K.
- Stachytarphaeta elatior Schrad. = Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios
- Stachytarpheta australis Mild. = S. dichotoma (Ruíz & Pav.) Vahl -- this is the corrected entry
- Stachytarpheta australis Moldenke = S. dichotoma (Ruíz & Pav.) Vahl
- Stachytarpheta australis f. albiflora Moldenke = S. dichotoma f. albiflora (Moldenke) Moldenke
- Stachytarpheta australis var. neocaledonica Moldenke = S. dichotoma var. neocaledonica (Moldenke) Moldenke
- Stachytarpheta azurea Moldenke = S. gesnerioides var. simplex (Hayek) Moldenke -- this is the corrected entry
- Stachytarpheta cayennensis Cham. = S. cayennensis (L. C. Rich.) Vahl
- Stachytarpheta diamantinensis Moldenke = S. diamantinensis Moldenke
- Stachytarpheta dichotoma Vahl = S. dichotoma (Ruíz & Pav.) Vahl -- this is the corrected entry
- Stachytarpheta dichotoma Vahl = S. dichotoma (Ruíz & Pav.) Vahl -- this is the corrected entry
- Stachytarpheta dichotoma MacDaniels = S. dichotoma (Ruíz & Pav.) Vahl -- this is the corrected entry
- Stachytarpheta dicotoma Hastings = S. dichotoma (Ruíz & Pav.) Vahl -- this is the corrected entry

- Stachytarpheta dicotoma Vahl = S. dichotoma (Rufz & Pav.) Vahl --
this is the corrected entry
- Stachytarpheta elatio Moldenke = S. angustifolia f. elatio
(Schrad.) López-Palacios -- this is the corrected entry
- Stachytarpheta elatio var. jermani Moldenke = S. angustifolia f.
jermani (Moldenke) Moldenke
- Stachytarpheta elatior Schrad. = S. angustifolia f. elatior
(Schrad.) López-Palacios
- Stachytarpheta elatior var. jermani Moldenke = S. angustifolia f.
jermani (Moldenke) Moldenke
- Stachytarpheta indica Trimen = S. jamaicensis (L.) Vahl
- Stachytarpheta indica x S. mutabilis Trimen = xS. trimeni Rech.
- Stachytarpheta jamaicensis Vahl = S. jamaicensis (L.) Vahl
- Stachytarpheta jamaicensis sensu Alston = S. urticaefolia (Salisb.)
Sims
- Stachytarpheta jamaicensis Vell. = S. cayennensis (L. C. Rich.)
Vahl
- Stachytarpheta lacunosa var. angustifolia Moldenke = S. viscidula
var. brevipilosa Moldenke
- Stachytarpheta mutabilis x S. jamaicensis Lam & Brink = xS. adul-
terina Urb. & Ekm.
- Stachytarpheta nitens Hocking = Syngonanthus nitens (Bong.) Ruhl.
- Stachytarpheta nitens var. viviparus Hocking = Syngonanthus nitens
var. viviparus Moldenke
- Stachytarpheta palustris Jacq. f. = S. angustifolia f. elatior
(Schrad.) López-Palacios -- this is the corrected entry
- Stachytarpheta palustris Schott = S. angustifolia f. elatior
(Schrad.) López-Palacios -- this is the corrected entry
- Stachytarpheta roraimensis Moldenke = S. sprucei Moldenke
- Stachytarpheta simplex Hayek = S. gesnerioides var. simplex (Hayek)
Moldenke
- Stachytarpheta spectabilis Fosberg & Sachet = S. mutabilis (Jacq.)
Vahl
- Stachytarpheta villosa Schau. = S. schauerii Moldenke
- Stachytarpheta zeylanica Hort. = S. urticaefolia (Salisb.) Sims
- Stachytarpheta zeylanica x mutabilis Hort. = xS. trimeni Rech.
- Stadujtarpheta elatior Schrad. = Stachytarpheta angustifolia f.
elatior (Schrad.) López-Palacios -- this is the corrected
entry
- Stilb(in)aceae Erdtman = Stilbaceae Lindl.
- Symphorema Wangerin = Symphorema Roxb.
- Syngonanthus helminthorrhizus "(Martius) ex Koernicke Ruhlant in
Engler" = S. helminthorrhizus (Mart.) Ruhl.
- Tachigalea campestris Aubl. = Amasonia campestris (Aubl.) Moldenke
- Tamonea cardenasi (Mold.) Tronc. = Ghinia cardenasi Moldenke
- Tamonea cardenasi (Mold.) Tronc. = Ghinia cardenasi Moldenke

- Verbena americana annua, folio ocymi Breyn. = Bouchea prismatica (L.) Kuntze
- Verbena americana urticae folio minore, floribus dilute purpureis minoribus Breyn. = V. hastata L.
- Verbena angustifolia glabra Engelm. = V. simplex Lehm.
- Verbena aubletia drummondii Paxt. = V. canadensis (L.) Britton
- Verbena basslerana Hocking = V. hasslerana Briq.
- Verbena basslerana var. glandulosa Hocking = V. hasslerana var. glandulosa Moldenke
- Verbena bonariensis { longibracteata Kuntze = V. intermedia Gill. & Hook.
- Verbena canescens H.B.K. = V. canescens H.B.K.
- Verbena chamaedryoides Hort. = V. peruviana (L.) Britton
- Verbena ciliate Benth. = V. ciliata Benth.
- Verbena dolichothyrsa Sandw. = Junellia dolichothyrsa (Sandw.) Moldenke
- Verbena filicaudis Sch. = V. filicaulis Schau.
- Verbena grandiflora var. Hybr. Hort. = xV. hybrida Voss
- Verbena hastata x urticifolia Pepon = xV. engelmannii Moldenke
- Verbena hastata (C) floribus violaceis Willd. = V. hastata L.
- Verbena hastata (C) floribus rubris Willd. = V. hastata f. rosea Cheney
- Verbena kufferi Hort. = V. sulphurea D. Don
- Verbena maritima Small x V. canadensis (L.) Britton -- see reverse cross
- Verbena megapotamica (C) phlogiflora (Cham.) Kuntze = V. phlogiflora Cham.
- Verbena megapotamica (C) 1 tweediana (Niven) Kuntze = V. phlogiflora Cham.
- Verbena multiflora gigantea Burpee = xV. hybrida Voss
- Verbena o'donelli Mold. = Junellia o'donelli Moldenke
- Verbena o'donelli (Mold.) Tronc. = Junellia o'donelli Moldenke
- Verbena officinalis L. x V. rigida Spreng. -- see V. officinali-venosa Paxt.
- Verbena peruviana (L.) Britton x V. canadensis (L.) Britton -- see reverse cross
- Verbena pimela Rydb. = V. pumila Rydb.
- Verbena pulchella Sweet x V. megapotamica Spreng. -- see reverse cross
- xVerbena rhydbergii Fell = xV. rydbergii Moldenke
- Verbena rigida Spreng. x V. officinalis L. -- see V. officinali-venosa Paxt.
- Verbena riparia Small & Heller = V. urticifolia L.
- Verbena rosulata (Mold.) Tronc. = Junellia rosulata Moldenke
- Verbena sessilis (C) decurrens Cham. = V. stellarioides Cham.
- Verbena sessilis (C) sessilis Cham. = V. sessilis (Cham.) Kuntze

- Verbena simplex x stricta Ahles = xV. moechina Moldenke
Verbena simplex Lehm. x V. urticifolia L. = xV. stuprosa Moldenke
Verbena spegazzinii (Mold.) Tronc. = Junellia spegazzinii Moldenke
Verbena stereoclada Briq. = V. storeoclada Briq.
xVerbena stiposa Moldenke = xV. stuprosa Moldenke
Verbena straguloidea (Mold.) Tronc. = Junellia straguloidea Moldenke
Verbena sulfuru-lilacina Hort. = V. sulphurea D. Don
Verbena tampensis Nash x V. canadensis (L.) Britton -- see reverse cross
Verbena terna Spreng. = V. tenera Spreng.
Verbena teucrioidea Hook. = V. platensis Spreng.
Verbena tweediana latifolia Hort. = V. phlogiflora Cham.
Verbena tweediana superba Hort. = V. phlogiflora Cham.
Verbena urticaefolium Clute = V. urticifolia L.
Verbena urticifolia L. x V. simplex Lehm. = xV. stuprosa Moldenke
Verbena urticifolia var. simplex Farwell -- to be deleted
Verbena urticifolia () floribus albis Willd. = V. urticifolia L.
Verbena urticifolia () floribus rubicundis Willd. = V. urticifolia var. incarnata (Raf.) Moldenke
Verbena virginica L. = V. urticifolia L.
Verbenae americanae, urticae folio, flore carneo Hort. = V. hastata f. rosea Cheney
Vites agnus castus L. = Vitex agnus-castus L.
Vitex altissima var. alata Trimen = V. altissima f. juv. alata (Willd.) Moldenke
Vitex bogoiensis H. J. Lam = Teijsmanniodendron ahernianum (Merr.) Bakh.
Vitex carone Bircher = V. agnus-castus L.
Vitex cofassus Reinw. ex Blume = V. cofassus Reinw.
Vitex heterophylla forma glabra crassifolia macrantha Griff. = V. quinata (Lour.) F. N. Will.
Vitex ilensis Runkewitz = V. agnus-castus L.
Vitex lagundi Farnsworth = V. trifolia L.
Vitex payo Good = V. payos (Lour.) Merr.
Vitex phaeotricha Mildbr. ex Pieper = V. phaeotricha Mildbr.
Vitex roxburghiana Kanjilal = V. peduncularis var. roxburghiana C. B. Clarke
Vitex tridentata Menzies = Viola tridentata Menzies, Violaceae
Vitex trifolia major indica, fructu caroso, floribus minoribus & rarioribus Breyn. = V. altissima L. f.
Vitex trifolia minor, indica Breyn. = V. trifolia L.
Volkameria foetida Buch.-Ham. = Clerodendrum bungei Steud.

Addenda to Part IV:

Additional acronyms employed are Cz = Cairo University, Giza Campus, Giza, Egypt; HL = Steven T. Hill Herbarium, New York, N. Y.; Kh =

University of Karachi, Karachi, Pakistan; Pd = Sri Lanka Botanic Garden, Peradeniya, Sri Lanka; Rm = Andrew R. Moldenke Herbarium, Santa Cruz, California; Ub = Universidade de Brasília, Brasília, Brazil; Uc = University of Calicut, Calicut, Kerala, India; Zu = Botanischer Garten und Institut für Systematische Botanik der Universität, Zürich, Switzerland.

NOTES ON NEW AND NOTEWORTHY PLANTS. LXX

Harold N. Moldenke

ERIOCAULON QUINQUANGULARE var. *ELATIUS* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis omnino rubris usque ad 15 cm. longis et pedunculis usque ad 40 cm. longis recedit.

This variety differs from the typical form of the species in having its leaves and sheaths entirely bright red both when fresh and when dried, the leaves to 15 cm. long, and the flowering peduncles to 40 cm. long.

The type of the variety was collected by Harold Norman Moldenke, Alma Lance Moldenke, Don Bhathiya Sumithraarachchi, and Sheldon Waas (no. 28319), growing abundantly with *Xyris* sp. in a rice paddy field at milepost 4/4 on the road from Mirigama to Divulapitiya, Davatagahawatta, Negombo, Colombo District, Western Province, Sri Lanka, on February 3, 1974, and is deposited in my personal herbarium at Plainfield, New Jersey. The plant is reminiscent of *E. quinquangulare* var. *martianum* Wall. and *E. roseum* Fyson, but does not have the proliferating flower-heads nor elongated bractlets.

PAEPALANTHUS SPECIOSUS var. *ATTENUATUS* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis caulinis usque ad apicem longiter gradatimque attenuatis saepe plusminus arcuatis recedit.

This variety differs from the typical form of the species in having its stem-leaves gradually long-attenuate to the apex and often more or less arcuate-recurved.

The type of this variety was collected by Howard Samuel Irwin, Raymond M. Harley, and Gary Lane Smith (no. 32935) in the cerrado in an area of campo and cerrado on outcrops about 22 km. north of Alto do Paraíso, at an altitude of about 1250 m., in the Chapada dos Veadeiros, on the Planalto do Brasil, Goiás, Brazil, on March 22, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as having stems to 2 meters tall and white flower-heads.

PAEPALANTHUS SPECIOSUS var. BOLIVIANUS Moldenke, var. nov.

Haec varietas a forma typica speciei bracteis involucrantibus stramineo-brunneis nec nigris recedit.

This variety differs from the typical form of the species in having its involucral bracts stramineous-brownish rather than black.

The type of the variety was collected by Carl Ernst Otto Kuntze at 200 meters altitude near Velasco, Santa Cruz, Bolivia, in July, 1892, and is deposited in the Britton Herbarium at the New York Botanical Garden.

PAEPALANTHUS SPECIOSUS f. CALVESCENS Moldenke, f. nov.

Haec forma a forma typica speciei solum foliis caulinis glabris vel glabrescentibus recedit.

This form differs from the typical form of the species only in having its stem-leaves completely glabrous or glabrescent at time of anthesis, but being elongate-ascending as in the typical form.

The type of the form was collected by Hugh Algernon Weddell (no. 2133) somewhere in Goiás, Brazil, in November or December, 1844, and is deposited in the Britton Herbarium at the New York Botanical Garden.

STACHYTARPHETA ANGUSTIFOLIA f. JENMANI (Moldenke) Moldenke, comb. & stat. nov.

Stachytarpheta elatior var. jermani Moldenke, Phytologia 1: 472. 1940.

STACHYTARPHETA CHAMISSONIS var. ANDERSONII Moldenke, var. nov.

Haec varietas a forma typica speciei recedit floribus pedicellatis, racemis brevioribus, foliis obovato-spathulatis, et pubescentibus brevissimis.

This variety differs from the typical form of the species in its distinctly pedicellate flowers, often shorter racemes, the leaves obovate-spatulate in shape, and the very short puberulent pubescence on the stems and branches.

The type of the variety was collected by William Russell Anderson (no. 7893) — in whose honor it is named — in open rocky cerrado traversed by a stream, at about 1000 m. altitude, 4 km. by road east of São João de Aliança, in the Serra Geral do Paraná, Goiás, Brazil, on March 24, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as a shrub, 1--2 m. tall, with red-orange corollas.

STACHYTARPHETA CHAMISSONIS var. LONGIPEDICELLATA Moldenke, var. nov.

Haec varietas a forma typica speciei floribus longipedicellatis valde recedit.

This variety differs from the typical form of the species in having its flowers conspicuously long-pedicellate.

The type of the variety was collected by William R. Anderson (no. 6460) on a rocky hillside in a region of rocky sandstone

hilltop cerrado, seeping hillsides, rocky open cerrado in raised places on hillsides, and open mesophytic woods by a stream, at an altitude of 1600 m., 20 km. by road north of Alto Paraíso, in the Chapada dos Veadeiros, Goiás, Brazil, on March 6, 1973, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector notes that the plant is a shrub, 2 m. tall, with orange-red flowers.

VITEX ALTISSIMA f. juv. ALATA (Willd.) Moldenke, stat. nov.

Vitex alata Willd., Gesell. Naturforsch. Freund. Berlin Neue Schr. 4: 203. 1803.

Observation in the field by my wife and myself in Sri Lanka this past winter indicates that Willdenow's plant seems to be only the juvenile state of the Sri Lankan glabrous variety of V. altissima. It has been claimed by Trimen (Handb. Fl. Ceyl. 358. 1895) that this form sometimes matures and produced inflorescences with the flowers "more laxly arranged", citing a collection by J. P. Lewis from Mulliativu. He says that "Mr. J. P. Lewis informs me that it has a different habit of growth to the ordinary tree, being taller and straighter. He found a few trees only at Vavaddai and Neduchaddikkulam." He cites V. alata Heyne and V. appendiculata Roth and adopts V. altissima var. alata Trimen as the name. It seems clear, however, that Willdenow's name has priority. My good friend, Magdon Jayasuriya, has kindly examined the Lewis collection in the Peradeniya herbarium and reports that Trimen's statement "leaves with broadly alate petioles" "is not quite true; however the petioles are only slightly winged toward [the] base". This condition is often seen in normal mature trees and so I think the broadly alate form is only a juvenile condition. My good friend, Dr. Edwin A. Menninger, has been growing this species in his Florida nursery and informs me that seedling trees always exhibit the broadly winged petioles. However, when his trees reached flowering age this character was gradually lost. In a letter to me dated November 18, 1957, he says "You will note that the flowering branch has lost most of the winged petiole effect, but this is still retained by the non-flowering branch next to it."

On the many mature trees which my wife and I examined in Sri Lanka we did not find any of the broadly alate petioles, although non-flowering branches usually had the petiole base more conspicuously winged.

The broadly alate specimens so often found in herbaria seem, therefore, to represent a juvenile condition reminiscent of the juvenile forms of Eucalyptus and the juvenile forms of Chamaecyparis, such as C. obtusa ericoides Boshmer, C. pisifera plumosa (Carr.) Otto, C. pisifera squarrosa (Endl.) Beiss. & Hochst., C. pisifera minima Hornibr., etc., as described by Rehder (Man. Cult. Trees, ed. 2, 59--60. 1940). Whether the juvenile form of this Vitex will ever be propagated as a horticultural subject remains for the future to disclose.

A NEW MICRONESIAN TERMINALIA (COMBRETACEAE)

F. R. Fosberg and M. V. C. Falanruw

During botanical exploration of the northern Marianas in 1972, a most unexpected discovery was a new species of Terminalia from Asuncion Island. It is described here.

TERMINALIA ROSTRATA Fosberg and Falanruw, n. sp.

Arbor partibus juvenalibus ochraceis tomentosus vel sericeis, foliis obovatis brevipetiolatis spicis elongatis, fructibus teretibus umbonatis non alatis non compressis.

Tree to 8 m tall, 50 cm diameter of trunk, young growth, petioles, spikes yellowish tomentose, branchlets with proximal several cm slender, 5 mm thick, without leaf scars, distal portion with densely crowded large leaf and superposed inflorescence scars, about 9-10 mm thick, branching apparently "terminalioid;" leaves broadly obovate-cuneate, to 20 x 12 cm, apex rounded-subtruncate to very slightly acuminate or retuse, mucronulate, base cuneate, then abruptly contracted to a thick petiole about 5-7 mm long, 5 mm thick, principal veins 8-12 on a side, not exactly opposite, lower pairs and uppermost ones weak, main ones arching upward to near margin, network of several orders, mostly not prominent, upper surface of blade glabrous except tomentose basal part of midrib, lower surface sparsely yellowish pubescent, densely so on midrib, more so toward base; spike when mature 16 cm long, tapering, portion distal to main fruit scars slender, yellowish tomentose; flowers about 2-3 mm long, broadly campanulate, throat 3 mm wide, with recurved ovate acutish lobes about 1.5 mm long, stipitate base tomentose to glabrate, throat externally sparsely pilosulose, glabrate, within densely and stiffly bearded; stamens 10, filaments subulate, strongly exerted, glabrous, anthers oval, about 0.5 mm long; style slightly more exerted than stamens, slightly curved, then strongly hooked at apex; fruit 37 x 20 mm, very slightly pedicellate, pedicel and extreme base sericeous, body subcylindric, scarcely at all compressed, base slightly cordate-4-lobed, apex forming a somewhat compressed beak about 1 cm long with 2 slight keels running about 1 cm down fruit from edges of beak, texture hard, woody, surface smooth, brown when dry, fruit floats in fresh water.

The leaves resemble those of T. catappa, but with pubescence like that of T. samoensis; the fruit is not like that of any Pacific species. The plant is unfamiliar to Dr. A. C. Smith

who most recently revised some of the Pacific species (*Brittonia* 23:394-412, 1971) and who kindly examined this specimen.

In Exell's key (*Fl. Males I*, 4:551-554, 1954) this plant runs to *T. foetidissima* Griff. to which it is undoubtedly most closely related. It differs in its broader, much more shortly petiolate leaves with more main veins, much more shortly pedunculate, longer spikes, strongly hooked style, and differently shaped, strongly beaked fruit. In Exell's synopsis (*op. cit.* p. 550) *T. rostrata* would seem to fit in his "Series E" with *T. crassifolia*, *T. samoensis*, and *T. insularis*, but does not seem close to any of these species, which have drupaceous fruits.

A single large tree was found by Marjorie V. C. Falanruw, on Asuncion Island, in forest on lower slopes. Nothing like it is known elsewhere in Micronesia.

The name alludes to the strongly beaked fruit.

Marianas Is.: Asuncion Island, about 400 ft. elevation, July 7, 1972, Falanruw 2290 (US, type).

A NEW VARIETY OF FAGRAEA BERTERIANA (GENTIANACEAE)

by F. R. Fosberg and M.-H. Sacht

Presented below is a brief discussion of the taxonomy of the Pacific Islands collective species, *Fagraea berteriana* Gray ex Benth., and the description of a new variety of this species from the Marquesas Islands.

Fagraea Thunb., *Vet. Acad. Handl. Stockh.* 3:132, t.4, 1782.

This genus is usually placed in the Loganiaceae, but is regarded by us as closer to the Gentianaceae. A discussion of this is reserved for a future, more comprehensive paper.

Fagraea berteriana Gray ex Benth., *Jour. Linn. Soc. Bot.* 1:98, 1856.

This species, first described from Tahiti, has been given an enormously wide circumscription by Leenhouts (*Bull. Jard. Bot. Brux.* 32:419-420, 1962; *Fl. Males I*, 6:335, 1962), with a geographical distribution extending from the Marquesas to New Guinea and Queensland, and north to the Marianas. We agree with

this broad circumscription except that we do not include the quite distinct but related Fagraea ksid Gilg and Bened., of Palau.

However, we cannot agree with Leenhouts that a subdivision into taxa of lower rank is impossible. We have had the greater part of such a subdivision in manuscript for quite a few years, but have not been able to study adequate material of some of the proposed varieties, so have refrained from publishing this work.

It is necessary to include one of the varieties in a forthcoming treatment of certain families for the Flora of the Marquesas, so a description of this variety and a discussion of its relationship to the Tahitian varieties is offered here.

Fagraea berteriana var. marquisensis Fosberg and Sachet, n. var.

Arbor glabra, foliis obovatis, venis obscuris, lobis calycis 5-8 mm longis, tubo corollae 4.3-6 cm longo, pistillo incluso 4 cm longo.

Glabrous tree, leaves obovate, blades up to 20 x 10 cm, rounded at apex with a slight blunt acumen, base cuneate, texture coriaceous, venation obscure, veins 10-12 on a side, petiole 1.2-4 cm long, free portion of intrapetiolar stipules 1.5-2 mm long, thick, blunt; inflorescence with up to 15(-16) flowers; calyx lobes 5, broadly ovate to semicircular, obtuse to subtruncate, 5-8 mm long, margins scarious, corolla tube 4.3-6 cm long, somewhat dilated above into a slightly broader throat 1.5 cm long, the 2 cm below this transversally wrinkled within, lobes (4-)5 about 2 x 1.3 cm, rounded to slightly obovate, spreading to recurved, waxy, very fragrant, white turning yellowish with age, stamens inserted at base of throat, filaments 1 cm long, anthers 1 cm long, broadly linear; pistil included in corolla tube, ovary cylindrical, 1 cm long, style thick-filiform, about 2.5 cm long, stigma 5 mm long, bifid into 2 somewhat spreading flat obovate lobes, rounded at apex; fruit a glossy orange to red berry, globose to subglobose or very broadly elliptic, 3.5-4.5 x 2.5-4.0 cm, not umbonate, not or only slightly beaked, with many seeds.

The Marquesan vernacular name is "Pua."

Marquesas Is.: without data. Herbier S.F.I.M. (P).

Nukuhiva I.: Taiohae Valley, 150 m, Adamson and Mumford 597 (NY); Tovi, Hallé 2062 (US). Ua Pou I.: Poumaka, Haka Hetau Valley, Adamson and Mumford UP-1 (NY, BISH, A). Hiva Oa I.: Puamau village, Decker 918 (US, type); Atuona, Sachet 1310

(US,P); Adamson and Mumford 435 (NY); east of airstrip, F. Hallé 2130 (US).

Herbarium abbreviations are those in Index Herbariorum, ed. V, Regn. Veg. 31, 1964.

This Marquesan population has heretofore been regarded as identical with that of Tahiti, and most descriptions of F. berteriana from eastern Polynesia have been partly based on it. However, the Tahitian plants, themselves, are by no means uniform, and one very distinctive group of these has been segregated as F. longituba Grant (considered a variety of F. berteriana by us).

The remaining Tahitian specimens known to Grant were cited by him as F. berteriana [sensu stricto] and characterized by a corolla tube 6.5-8 cm long with style 5-6 cm long, obviously included, thus differing in longer corolla tube and style from the Marquesan plant described here.

Our notes on Tahitian specimens (which are not now available to us), with one exception, indicate a different variety, characterized by a much shorter corolla, 3.5-6.5 cm, with an exerted style, differing in this latter respect from the Marquesan plant. The exception is one of the two U.S. Expl. Exped. sheets in NY which has corolla tube 7.7 cm long and style 6.7-7.5 cm. The calyx lobes of this are unusually short, only 5 mm long. For the time being we follow Grant in accepting the Tahitian plant with corolla tube 6.5-8 cm long as var. berteriana, though this may be hard to establish until we can examine the material available to Bentham on which this species was founded. Bentham cited four specimens from the Society Islands, one from the Marquesas, and one from the Louisiade Archipelago. Of these Leenhouts (loc. cit.) has indicated that the Bertero specimen is type. This statement we are accepting as lectotypification, though this specimen is said by Guillemin (Ann. Sci. Nat. Bot. II, 7:248, 1937) to lack flowers. This fact will make it very difficult to establish which of the three Tahitian varieties should be called var. berteriana. This problem we may take up in a later paper after we have examined the original specimens.

A NEW SLIPPER FLOWER FROM SOUTHERN PERU

G. Edwin and H. S. Wooden
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CALCEOLARIA FAUCIFOLIA Edwin & Wooden, sp. nov.

herba perennis erecta ad nodosa 20-30 cm alta; caules admodum non ramosis modice instructus pilis multicellularis et 2-3 jugae foliorum opposita, folia pro parte maxima radicalia, ovata ad late lance-ovata, 1.2-7.0 cm longa, 0.6-4.0 cm lata, apice acuta, base late obtusa ad subtruncata, margo duplo dentatus interdum serrulatus inter dentibus magnis, ut supra ut infra plus minusve instructa puncta elevata opaca brunne nigra et supra pilis sparse textura dispersa, infra pilis densioribus in venis elevatis plerumque positus, densissime in marginibus, laminae sessilia ad brevissime petiolata, plerumque usque ad 1 cm, subinde in laminis radicalis vix longioris, ad basin anguste alata, folia suprema amplexicaula; inflorescentia dichasiata ex apicem caules nascentia rare dichasiata vel uniflora axillaris foliis supremis, et pedunculi et pedicelli et calycis lobi pilis mixtis multicellularis et glandularis et eglandularis instructus, et pedunculi et pedicelli ad apicem inflorescentia brevioris et pilia densiore ad apicem pedunculos, pedicellos brevissime et densissime instructi, calycis lobi plerumque ovata subinde oblonga ovata 2.0-4.0 mm longa, 2.0-3.0 mm lata, variabile in flores margine integra vel subinde in medio dente singularis instructi unilateralis; corolla lute virida vel lutea, extus ut videtur granularia, sub lente (45x) densissime pilis brevis egland-vel glandularis intus ut videtur glabra, labium superum quam calycem lobi longiore, 2.5-6.0 mm longum, labium inferum 5.0-12.0 mm longum, circa 2x quam superum longiore, saccata medio ad 2/3 suz longitudina, nectarium annulatum bene evolutum, antherae in graciles filamentos usque ad duplo longitudine cellularia, cellularia divaricata, subaequalia, fere longiora quam latiora, jugo ca 2.5 mm longa, ovarium dense glandularos, stylus gracilis 2.0-3.0 mm longus; fructa ignota.

Erect to nodding perennial herb 20-30 cm tall; stems essentially unbranched with moderate vesture of multicellular hairs and 2-3 pairs of opposite leaves; leaves mostly radicle, ovate to broadly lance-ovate, 1.2-7.0 cm long and 0.6-4.0 cm wide, apex acute, base broadly obtuse to sub-truncate, margin doubly dentate, sometimes serrulate between larger teeth, both leaf surfaces more or less densely beset with raised, gleaming, brownish-black punctations, vesture of multicellular hairs,

above scattered sparsely over surface, below more dense, but located chiefly on elevated veins, most dense on leaf margins; blades sessile to very short petiolate, usually not exceeding 1 cm, occasionally slightly longer on radicle leaves, narrowly winged to base, upper leaves amplexicaul; inflorescences dichasiate, arising from stem apices or (rarely) dichasiate or singly-flowered from upper leaf axils; peduncles, pedicels, and both surfaces of calyx lobes with a mixture of multicellular glandular and eglandular hairs, flower stalks becoming shorter and vesture more dense toward apices of peduncles, pedicels shortest and most densely clothed; calyx lobes mostly ovate, occasionally oblong-ovate, 2.0-4.0 mm long, 2.0-3.0 mm wide, lobes mostly of different sizes on each flower, margins entire, or occasionally with a single tooth at about the middle on one side only; corolla yellow-green to yellow, externally appearing granular, at higher magnification (45x) a very dense vesture of short hairs, gland-tipped hairs also (variously) present, internally appearing glabrous, upper lip 2.5-6.0 mm long, longer than the calyx lobes, lower lip 5.0-12.0 mm long, ca 2x as long as upper, saccate 1/2 to 2/3 its length, nectary annulate, well-developed; anthers on slender filaments up to 2x as long as anther cells, divaricate, cells slightly subequal, little longer than wide, both cells ca 2.5 mm long; ovary densely glandular, style slender, 2-3 mm long; capsule not seen.

Type: PERU: Arequipa: Arequipa-Puno Road above Chiguata, alt. 4050 m, Oct. 23, 1963, Straw 2313 (Holotype F!). Paratype PERU: Arequipa: Pichu Pichu Range, alt. 4050 m, Jan. 5, 1937, Stafford 670, (MO).

Can be confused with caulescent forms of C. corymbosa H & P, but is easily separable by upper lip to lower (lower lip not 4-5x as long as upper) and upper lip to calyx (upper lip not shorter than calyx lobes) relationships.

A RESUME OF THE GENUS TIPUANA (LEGUMINOSAE)

Velva E. Rudd

California State University, Northridge and Smithsonian Institution

In the course of tabulating the numerous species originally assigned to Machaerium, but now excluded from that genus, a number of secondary problems have come to my attention. One such involves the now monotypic genus Tipuana (Benth) Benth.

Tipuana was first published as a section of Machaerium (Benth, in Jour. Bot. Kew Misc. 5: 267. 1853) and it included M. heteropterum Freire Allemão, "M. grandiflorum (Benth. in Hook. Journ. Bot. vol. ii. p. 67), and M. Tipu* a hitherto undescribed species found by Tweedie in the Parana." The asterisk refers to a Latin description of "Machaerium (Tipuana) Tipu" and a paragraph in English, "A large free-flowering handsome tree, known in the Parana by the name of Tipú of Peru, and giving its name to the valley of Tipuana, where the best gold in the Parana is found. Tweedie." The appropriate lectotype of Machaerium section Tipuana would seem to be M. tipu.

In the Latin description of M. tipu the inflorescence and the venation of the legumes are compared to those of "M. grandiflori" and the "Corollae majores, fere Platypodii, flavi." The reference to M. grandiflorum possibly was a lapsus calami, or mentis, with Platypodium grandiflorum Benth in mind. On the page cited by Benth, in Hook. Jour. Bot. 2: 67. 1840, there is the original description of Machaerium macrocarpum Benth, later transferred to Tipuana (Jour. Linn. Soc. 4, suppl.: 72. 1860), and erroneously cited as "Machaerium mucronatum" in Martius, Fl. Bras. 15(1): 259. 1862.

Benth raised Tipuana to generic status in 1860 with the three species, T. macrocarpa, T. heteroptera, and T. speciosa, the latter an illegitimate name based on Machaerium tipu. In 1898 Otto Kuntze made the correct combination, Tipuana tipu (Benth) O. Kuntze, and that species, I believe, automatically became the lectotype of the genus Tipuana, rather than T. speciosa Benth (Ducke, in Arch. Jard. Bot. Rio de Janeiro 5: 137. 1930) or T. macrocarpum (Benth) Benth as cited by Burkart (Las Leguminosas Argentinas, ed. 1. 544. 1943) and followed by the Index Nomina Genericorum. More recently, Burkart correctly cited T. tipu as the sole species of Tipuana and, indirectly, T. macrocarpa as Vatairea macrocarpa.

A few additional species were assigned to Tipuana before splitting of the genus was begun; Vatairea was resurrected; Luetzelburgia was described as new; other leguminous genera with superficially similar, terminally winged, samaroid fruit, such as Ferreirea, Machaerium, Nissolia, Paramachaerium, and Vataireopsis, have added to confusion in identification, a fact that is reflected in the synonymy of the taxa and the physical location of pertinent specimens in most herbaria. Tipuana finally stands as a monotypic genus, as indicated by Ducke in 1930 (Arch. Jard. Bot. Rio de Janeiro 5: 135).

Having had to unravel this tangled nomenclature, it may be useful to present a list of the species published under Tipuana and to indicate their disposition. The species are given in alphabetical order, the synonymy chronological, and, what I currently believe to be the correct name is emphasized with capital letters.

TIPUANA (Benth) Benth, Jour. Linn. Soc. 4, suppl.: 27. 1860; in Martius, Fl. Bras. 15(1): 259. 1862; in Benth & Hooker, Gen. Pl. 1: 546. 1865. Lectotype: Tipuana tipu (Benth) O. Kuntze (Machaerium tipu Benth).
Machaerium section Tipuana Benth, Jour. Bot. Kew Misc. 5: 267. 1853. Lectotype: Machaerium tipu Benth.

Trees; bark gray to brown, with irregular, flat-topped ridges; young stems sericeous, glabrescent; unarmed; leaves alternate to sub-opposite, pinnately compound, about 11-31-foliolate; leaflets alternate to sub-opposite, elliptic or elliptic-oblong, about 2-5 cm. long, 1-2 cm. wide, slightly emarginate, rounded at the base, glabrous above, moderately pubescent below, glabrescent; stipules small, linear, caducous; stipels lacking; inflorescences terminal or axillary, paniculate; bracts and bracteoles minute, caducous; flowers papilionoid, about 2 cm. long; calyx 5-8 mm. long, moderately pubescent to subglabrous, campanulate with 5 subequal lobes; petals yellow to light-orange; stamens 10, diadelphous 9:1, the anthers uniform, dorsifixed; ovary brevi-stipitate, 1-4-ovulate; style glabrous; stigma small, truncate; fruit samaroid, about 6-8 cm. long including stipe 1 cm. long, the basal, fertile body 1.5-2 cm. long, 1-1.5 cm. wide, the terminal wing striate, 3.5-5 cm. long, 2-2.5 cm. wide; $n = 10$.

Distribution: Native to subtropical forests of Bolivia and northwestern Argentina; introduced as an ornamental in warm temperate and subtropical areas of Brazil, Uruguay, Europe, and the United States.

1. T. amazonica Ducke, Arch. Jard. Bot. Rio de Janeiro 1: 35. 1915
= VATAIREA MACROCARPA (Benth) Lucke, fide Ducke, Arch. Jard.
Bot. Rio de Janeiro 5: 192, 197. 1930.
2. T. auriculata Freire Allemão, Trab. Comm. Sc. Expl. Bot. Rio de
Janeiro 21. 1862-66.
Luetzelburgia pterocarpoides Harms, Bericht. Deutsch. Bot. Ges.
40: 178. 1922.
Bowdichia (?) freirei Lucke, Arch. Bot. Rio de Janeiro 3: 133.
1922.
LUETZELBURGIA AURICULATA (Freire Allemão) Ducke, Notizbl. 11. 584.
1932.
3. T. cinerascens (Benth) Malme, Arkiv. Bot. 18, no. 17: 14. 1924.
Andira cinerascens Martius ex Benth, Jour. Linn. Soc. 4, suppl.:
72. 1860, nomen in synon.
T. macrocarpa var. cinerascens Benth, in Martius, Fl. Bras.
15 (1): 260. 1862.
VATAIREA MACROCARPA var. CINERASCENS (Benth) Ducke, Arch. Jard.
Bot. Rio de Janeiro 5: 139. 1930.
4. T. erythrocarpa Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 152,
pl. 11a. 1922.
VATAIREA ERYTHROCARPA (Ducke) Ducke, Arch. Jard. Bot. Rio de Jan-
eiro 5: 139, 192, pl. 12, fig. 25. 1930.
5. T. fusca Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 78. 1925.
VATAIREA FUSCA (Ducke) Ducke, Arch. Jard. Bot. Rio de Janeiro 5:
139, 192. 1930.
6. T. heteroptera (Freire Allemão) Benth, Jour. Linn. Soc. 4,
suppl.: 72. 1860.
Machaerium heteropterum Freire Allemão, Trab. Soc. Vell. 4. 1852.
VATAIREA HETEROPTERA (Freire Allemão) Ducke ex de Assis Iglesias,
Album Floristico, Minist. Agric. Serv. Flor. Brasi. 51. 1940.
7. T. lundellii Standley, Carnegie Inst. Wash. Publ. 461: 65. 1935.
VATAIREA LUNDELLII (Standley) Killip ex record, Trop. Woods no. 63.
5. 1940.
8. T. macrocarpa (Benth) Benth, Jour. Linn. Soc. 4, suppl.: 72.
1860.
Machaerium macrocarpum Benth, Hook. Jour. Bot. 2: 67. 1840.
VATAIREA MACROCARPA (Benth) Ducke var. MACROCARPA, Arch. Jard.
Bot. Rio de Janeiro 5: 141. 1930.

9. T. macrocarpa var. cinerascens Benthams, in Martius, Fl. Bras. 15(1): 260. 1862.
Andira cinerascens Martius ex Benthams, Jour. Linn. Soc. 4, suppl.: 72. 1860, nomen in synonym.
Tipuana cinerascens (Benthams) Malme, Arkiv. Bot. 18, no. 17: 14. 1924.
VATAIREA MACROCARPA var. CINERASCENS (Benthams) Ducke, Arch. Jard. Bot. Rio de Janeiro 5: 139. 1930.
10. T. mucronata (Benthams) Macbride, Candollea 6: 10. 1934.
Machaerium mucronatum Benthams, in Martius, Fl. Bras. 15(1): 259. 1862, nomen in synonym., a typographical error for M. macrocarpum Benthams, non M. mucronatum Vogel, 1837.
 = VATAIREA MACROCARPA (Benthams) Ducke.
11. T. (?) praecox Harms, in O. Kuntze, Rev. Gen. 3(2): 72. 1898.
Machaerium praecox (Harms) K. Schumann, Just. Bot. Jahresb. 26: 354. 1900.
Ferreirea praecox (Harms) Malme, Arkiv. Bot. Stockh. 18, no. 17, 18. 1924.
LUETZELBURGIA PRAECOX (Harms) Harms, Ber. Deutsch. Bot. Ges. 40: 177. 1922; 43: 595. 1926.
12. T. sericea Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 79. 1928.
VATAIREA SERICEA (Ducke) Ducke, Arch. Jard. Bot. Rio de Janeiro 5: 139, 192, pl. 12, fig. 27. 1930.
13. T. speciosa Benthams, Jour. Linn. Soc. 4, suppl.: 72. 1860. Based on Machaerium tipu Benthams = TIPUANA TIPU (Benthams) O. Kuntze.
14. T. TIPU (Benthams) O. Kuntze, Rev. Gen. 3(2): 72. 1898.
Machaerium tipu Benthams, Jour. Bot. Kew Misc. 5: 267. 1853.
Tipuana speciosa Benthams, Jour. Linn. Soc. 4, suppl. 72. 1860.
Machaerium fertile Grisebach, Goett. Abh. 19: 127. 1874.
Tipuana tipa Lillo, Contrib. Conoc. Arb. Argent. 58. 1910.

BULBOTHRIX, PARMELINA, RELICINA, AND XANTHOPARMELIA,
FOUR NEW GENERA IN THE PARMELIACEAE (LICHENES)*

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BULBOTHRIX Hale, gen. nov.

Syn.: *Parmelia* subgenus *Parmelia* section *Imbricaria* sub-section *Bicornutae* (Lyngé) Hale & Kurok. Contr. U.S. Nat. Herb. 36:135. 1964.

Thallus adnatus, orbicularis, cinereo-albidus, lobis sub-linearibus vel raro subirregularibus, saepe angustis, margine bulbato-ciliatis; subtus niger vel brunneus, rhizinosus, rhizinis simplicibus vel ramosis. Apothecia adnata, disco imperforato, sporis octonis, raro bicornutis, simplicibus.

Type species: *Bulbothrix semilunata* (Lyngé) Hale, comb. nov.
Basionym: *Parmelia semilunata* Lyngé, Ark. Bot. 13(13):23. 1914.

Bulbothrix is easily recognized by the black marginal bulbate cilia. Some of the South American species, as *B. schiffneri* and *B. semilunata*, are extremely small with lobes no more than 0.5 mm wide. A few Asian species, on the other hand, as *B. meizospora* and *B. setschwanensis*, have rather broad (to 5 mm wide), almost subirregular lobes. The upper cortex is typically composed of palisade plectenchyma with a pored epicortex (Hale, 1973). All species contain only atranorin in the cortex and are whitish to brownish mineral gray. The species are about equally divided between the Old World and the New World, occurring predominantly on trees in lowland rain forest and in scrub or secondary forests at lower elevations in subtropical to temperate regions.

*This work was supported by a grant from the Smithsonian Research Foundation.

Bulbothrix is obviously related to the genus *Relicina*, which has similar bulbate cilia. The two genera, however, have quite different chemical profiles and phytogeographic affinities. The 33 known species (including the type of the genus) include the following:

- Bulbothrix affixa* (Hale & Kurok.) Hale, comb. nov. Basionym:
Parmelia affixa Hale & Kurok. Contr. U.S. Nat. Herb. 36:137. 1964.
- Bulbothrix apophysata* (Hale & Kurok.) Hale, comb. nov. Basionym:
Parmelia apophysata Hale & Kurok. Contr. U.S. Nat. Herb. 36:138. 1964.
- Bulbothrix atrichella* (Nyl.) Hale, comb. nov. Basionym: *Parmelia atrichella* Nyl. Flora 68:614. 1885.
- Bulbothrix bicornuta* (Müll. Arg.) Hale, comb. nov. Basionym:
Parmelia bicornuta Müll. Arg. Flora 74:377. 1891.
- Bulbothrix bulbochaeta* (Hale) Hale, comb. nov. Basionym: *Parmelia bulbochaeta* Hale in Hale & Kurok. Contr. U.S. Nat. Herb. 36:138. 1964.
- Bulbothrix chowoensis* (Hale) Hale, comb. nov. Basionym: *Parmelia chowoensis* Hale, Phytol. 23:343. 1972.
- Bulbothrix confoederata* (Culb.) Hale, comb. nov. Basionym: *Parmelia confoederata* Culb. Amer. Journ. Bot. 48:169. 1961.
- Bulbothrix continua* (Lyngé) Hale, comb. nov. Basionym: *Parmelia continua* Lyngé, Ark. Bot. 13(13):109. 1914.
- Bulbothrix coronata* (Fée) Hale, comb. nov. Basionym: *Parmelia coronata* Fée, Essai Crypt. 123. 1824.
- Bulbothrix decurtata* (Kurok.) Hale, comb. nov. Basionym: *Parmelia decurtata* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:139. 1964.
- Bulbothrix fungicola* (Lyngé) Hale, comb. nov. Basionym: *Parmelia fungicola* Lyngé, Ark. Bot. 13(13):129. 1914.
- Bulbothrix hypocraea* (Vainio) Hale, comb. nov. Basionym: *Parmelia hypocraea* Vainio, Cat. Welw. Pl. 2(2):400. 1901.
- Bulbothrix imshaugii* (Hale) Hale, comb. nov. Basionym: *Parmelia imshaugii* Hale, Phytol. 22:31. 1971.
- Bulbothrix isidiza* (Nyl.) Hale, comb. nov. Basionym: *Parmelia isidiza* Nyl. Bull. Soc. Broter. 3:130. 1884.
- Bulbothrix laevigatula* (Nyl.) Hale, comb. nov. Basionym: *Parmelia laevigatula* Nyl. Flora 68:614. 1885.
- Bulbothrix meizospora* (Nyl.) Hale, comb. nov. Basionym: *Parmelia tiliacea* var. *meizospora* Nyl. Syn. Lich. 383. 1860.
- Bulbothrix papyrina* (Fée) Hale, comb. nov. Basionym: *Parmelia papyrina* Fée, Essai Crypt. Suppl. 121. 1837.
- Bulbothrix pigmentacea* (Hale) Hale, comb. nov. Basionym: *Parmelia pigmentacea* Hale, Journ. Jap. Bot. 43:325. 1968.
- Bulbothrix pustulata* (Hale) Hale, comb. nov. Basionym: *Parmelia pustulata* Hale in Hale & Kurok. Contr. U.S. Nat. Herb. 36:140. 1964.

- Bulbothrix schiffneri* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia schiffneri* Zahlbr. Denkschr. Akad. Wiss. Wien 83:167. 1909.
- Bulbothrix scortella* (Nyl.) Hale, comb. nov. Basionym: *Parmelia scortella* Nyl. Flora 68:615. 1885.
- Bulbothrix sensibilis* (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia sensibilis* Stein. & Zahlbr. Bot. Jahrb. 60: 522. 1926.
- Bulbothrix setschwanensis* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia setschwanensis* Zahlbr. Symb. Sin. 3:184. 1930.
- Bulbothrix subcoronata* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia subcoronata* Müll. Arg. Rev. Mycol. 9:135. 1887.
- Bulbothrix subdissecta* (Nyl.) Hale, comb. nov. Basionym: *Parmelia subdissecta* Nyl. in Nyl. & Cromb. Journ. Linn. Soc. London 20:51. 1883.
- Bulbothrix subglandulifera* (Hue) Hale, comb. nov. Basionym: *Parmelia subglandulifera* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:144. 1899.
- Bulbothrix subinflata* (Hale) Hale, comb. nov. Basionym: *Parmelia subinflata* Hale, Journ. Jap. Bot. 40:201. 1965.
- Bulbothrix suffixa* (Stirt.) Hale, comb. nov. Basionym: *Parmelia suffixa* Stirt. Scot. Nat. 4:299. 1877-78.
- Bulbothrix tabacina* (Mont. & v.d. Bosch) Hale, comb. nov. Basionym: *Parmelia tabacina* Mont. & v.d. Bosch, in Mont. Sylloge Gen. Spec. Crypt. 327. 1856.
- Bulbothrix ventricosa* (Hale & Kurok.) Hale, comb. nov. Basionym: *Parmelia ventricosa* Hale & Kurok. Contr. U.S. Nat. Herb. 36:140. 1964.
- Bulbothrix viridescens* (Lynge) Hale, comb. nov. Basionym: *Parmelia viridescens* Lynge, Ark. Bot. 13(13):117. 1914.

PARMELINA Hale, gen. nov.

Thallus adnatus, orbicularis, cinereo-albidus vel raro viridiflavicans, lobis sublinearibus vel subirregularibus, margine ciliatis, ciliis simplicibus; subtus niger vel raro brunneus, modice rhizinosus usque ad marginem, rhizinis simplicibus vel raro squarrose ramosis. Apothecia adnata, disco imperforato, sporis octonis, simplicibus.

Type species: *Parmelina tiliacea* (Hoffm.) Hale, comb. nov. Basionym: *Lichen tiliaceus* Hoffm. Enum. Lich. 96. 1784.

This generic segregate of *Parmelia* is characterized by marginal cilia, usually well developed but sometimes confined mostly to the sinuses of lobes. Only two species, *P. enormis* and *P. expallida*, have a uniformly pale brown rather than black lower surface. The upper cortex has palisade plectenchyma and a pored epicortex (Hale, 1973). Only one species produces the cortical pigment usnic acid (*P. nylanderii*).

The 41 species recognized in *Parmelina* were formerly classified in *Parmelia* subgenus *Parmelia* section *Imbricaria* (Schreb.) Fr. (Hale & Kurokawa, 1964). The generic name *Imbricaria*, which was used by a number of lichenologists in the 19th century, is a later homonym of *Imbricaria* Jussieu (phanerogams).

In addition to the type, the following 40 species are recognized in the genus.

- Parmelina antillensis* (Nyl.) Hale, comb. nov. Basionym: *Parmelia antillensis* Nyl. Bull. Soc. Linn. Normand. ser. 2, 3:264. 1868.
- Parmelina aurulenta* (Tuck.) Hale, comb. nov. Basionym: *Parmelia aurulenta* Tuck. Journ. Amer. Acad. Arts Sci. ser. 2, 25:424. 1858.
- Parmelina baguioensis* (Hale) Hale, comb. nov. Basionym: *Parmelia baguioensis* Hale, Bryol. 75:97. 1972.
- Parmelina carporhizans* (Tayl.) Hale, comb. nov. Basionym: *Parmelia carporhizans* Tayl. Lond. Journ. Bot. 6:163. 1847.
- Parmelina consors* (Nyl.) Hale, comb. nov. Basionym: *Parmelia consors* Nyl. Flora 68:613. 1885.
- Parmelina cryptochlora* (Vainio) Hale, comb. nov. Basionym: *Parmelia cryptochlora* Vainio, Journ. Bot. Brit. & For. 34:34. 1896.
- Parmelina crystallorum* (Lyng.) Hale, comb. nov. Basionym: *Parmelia crystallorum* Lyng. Ark. Bot. 13(13):128. 1914.
- Parmelina denegans* (Nyl.) Hale, comb. nov. Basionym: *Parmelia denegans* Nyl. Acta Soc. Sci. Fenn. 26(10):6. 1900.
- Parmelina dissecta* (Nyl.) Hale, comb. nov. Basionym: *Parmelia dissecta* Nyl. Flora 65:451. 1882.
- Parmelina enormis* (Hale) Hale, comb. nov. Basionym: *Parmelia enormis* Hale, Phytol. 23:344. 1972.
- Parmelina entotheiochroa* (Hue) Hale, comb. nov. Basionym: *Parmelia entotheiochroa* Hue, Nouv. Arch. Mus. Paris, ser. 4, 1:161. 1899.
- Parmelina expallida* (Kurok.) Hale, comb. nov. Basionym: *Parmelia expallida* Kurok. Bull. Nat. Sci. Mus. Tokyo 11:191. 1968.
- Parmelina galbina* (Ach.) Hale, comb. nov. Basionym: *Parmelia galbina* Ach. Syn. Lich. 195. 1814.
- Parmelina hayachinensis* (Kurok.) Hale, comb. nov. Basionym: *Parmelia hayachinensis* Kurok. Journ. Jap. Bot. 43:350. 1968.
- Parmelina heteroloba* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia heteroloba* Zahlbr. Denkschr. Wiss. Akad. Wien 83:171. 1909.
- Parmelina homogenes* (Nyl.) Hale, comb. nov. Basionym: *Parmelia homogenes* Nyl. Flora 68:607. 1885.
- Parmelina horrescens* (Tayl.) Hale, comb. nov. Basionym: *Parmelia horrescens* Tayl. Fl. Hibern. 144. 1836.
- Parmelina immiscens* (Nyl.) Hale, comb. nov. Basionym: *Parmelia immiscens* Nyl. Flora 68:606. 1885.
- Parmelina leucotyliza* (Nyl.) Hale, comb. nov. Basionym: *Parmelia leucotyliza* Nyl. Lich. Japon. 27. 1890.

- Parmelina lindmanii* (Lynge) Hale, comb. nov. Basionym: *Parmelia lindmanii* Lynge, Ark. Bot. 13(13):74. 1914.
- Parmelina melanochaeta* (Kurok.) Hale, comb. nov. Basionym: *Parmelia melanochaeta* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:133. 1964.
- Parmelina metarevoluta* (Asah.) Hale, comb. nov. Basionym: *Parmelia metarevoluta* Asah. Journ. Jap. Bot. 35:97. 1960.
- Parmelina muelleri* (Vainio) Hale, comb. nov. Basionym: *Parmelia muelleri* Vainio, Acta Soc. Faun. Fl. Fenn. 7(7):49. 1890.
- Parmelina nylanderii* (Lynge) Hale, comb. nov. Basionym: *Parmelia nylanderii* Lynge, Ark. Bot. 13(13):82. 1914.
- Parmelina obsessa* (Ach.) Hale, comb. nov. Basionym: *Parmelia obsessa* Ach. Syn. Lich. 195. 1814.
- Parmelina perisidians* (Nyl.) Hale, comb. nov. Basionym: *Parmelia perisidians* Nyl. Acta Soc. Sci. Fenn. 26(10):6. 1900.
- Parmelina phlyctina* (Hale) Hale, comb. nov. Basionym: *Parmelia phlyctina* Hale, Bryol. 62:129. 1959.
- Parmelina pilosa* (Stizb.) Hale, comb. nov. Basionym: *Parmelia pilosa* Stizb. Ber. St. Gall. Naturw. Ges. 1888-89:165. 1890.
- Parmelina pruinata* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia pruinata* Müll. Arg. Flora 66:46. 1883.
- Parmelina quercina* (Willd.) Hale, comb. nov. Basionym: *Lichen quercinus* Willd. Fl. Berol. Prod. 353. 1787.
- Parmelina simplicior* (Hale) Hale, comb. nov. Basionym: *Parmelia simplicior* Hale, Bryol. 75:99. 1972.
- Parmelina spathulata* (Kurok.) Hale, comb. nov. Basionym: *Parmelia spathulata* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:133. 1964.
- Parmelina spumosa* (Asah.) Hale, comb. nov. Basionym: *Parmelia spumosa* Asah. Journ. Jap. Bot. 26:259. 1951.
- Parmelina subaurulenta* (Nyl.) Hale, comb. nov. Basionym: *Parmelia subaurulenta* Nyl. Flora 68:606. 1885.
- Parmelina subfaticens* (Kurok.) Hale, comb. nov. Basionym: *Parmelia subfaticens* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:134. 1964.
- Parmelina swinscowii* (Hale) Hale, comb. nov. Basionym: *Parmelia swinscowii* Hale, Phytol. 27:4. 1973.
- Parmelina usambarensis* (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia usambarensis* Stein. & Zahlbr. Bot. Jahrb. 60:524. 1925.
- Parmelina versiformis* (Kremph.) Hale, comb. nov. Basionym: *Parmelia versiformis* Kremph. Flora 61:464. 1878.
- Parmelina wallichiana* (Tayl.) Hale, comb. nov. Basionym: *Parmelia wallichiana* Tayl. London Journ. Bot. 6:176. 1847.
- Parmelina xantholepis* (Mont. & v.d. Bosch) Hale, comb. nov. Basionym: *Parmelia xantholepis* Mont. & v.d. Bosch. Pl. Jungh. 428. 1855.

RELICINA (Hale & Kurok.) Hale, comb. et stat. nov.

Basionym: *Parmelia* subgenus *Parmelia* section *Bicornutae* series *Relicinae* Hale & Kurok. Contr. U.S. Nat. Herb. 36:135. 1964.

Type species: *Relicina eumorpha* (Hepp) Hale, comb. nov.

Basionym: *Parmelia eumorpha* Hepp in Zollinger, Pl. Jungh. 9. 1854. (The designated type of series *Relicinae* is *Parmelia relicina* Fr., which would be invalid in the genus *Relicina* as a tautonym.)

The characteristic features of this generic segregate of *Parmelia* are the marginal bulbate cilia and presence of usnic acid in the cortex. All species have rather small, adnate to closely adnate thalli and are predominantly corticolous in the lowland to mid elevation tropical rain forest, particularly in Southeast Asia. The upper cortex has palisade plectenchyma and a pored epicortex (Hale, 1973). The apothecia are adnate, small, and frequently coronate with small black bulbils. The lower surface may be black or pale brown and the rhizines simple to densely branched. There are 22 species, including the type, presently recognized in the genus, as follows:

- Relicina abstrusa* (Vainio) Hale, comb. nov. Basionym: *Parmelia abstrusa* Vainio, Acta Soc. Faun. Fl. Fenn. 7(7):64. 1890.
- Relicina acrobotrys* (Kurok.) Hale, comb. nov. Basionym: *Parmelia acrobotrys* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:142. 1964.
- Relicina circumnodata* (Nyl.) Hale, comb. nov. Basionym: *Parmelia circumnodata* Nyl. in Nyl. & Cromb. Journ. Linn. Soc. London 20:51. 1883.
- Relicina connivens* (Kurok.) Hale, comb. nov. Basionym: *Parmelia connivens* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:142. 1964.
- Relicina decaryana* (Gyel.) Hale, comb. nov. Basionym: *Parmelia decaryana* Gyel. Fedde Repert. Sp. Nov. 36:153. 1934.
- Relicina echinocarpa* (Kurok.) Hale, comb. nov. Basionym: *Parmelia echinocarpa* Kurok. Journ. Jap. Bot. 40:265. 1965.
- Relicina eximbricata* (Gyel.) Hale, comb. nov. Basionym: *Parmelia samoensis* var. *eximbricata* Gyel. Ann. Mycol. 36:288. 1938.
- Relicina fluorescens* (Hale) Hale, comb. nov. Basionym: *Parmelia fluorescens* Hale, Journ. Jap. Bot. 40:202. 1965.
- Relicina limbata* (Laurer) Hale, comb. nov. Basionym: *Parmelia limbata* Laurer, Linnaea 2:39. 1827.
- Relicina luteoviridis* (Kurok.) Hale, comb. nov. Basionym: *Parmelia luteoviridis* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:144. 1964.
- Relicina malesiana* (Hale) Hale, comb. nov. Basionym: *Parmelia malesiana* Hale, Journ. Jap. Bot. 40:203. 1965.
- Relicina planiuscula* (Kurok.) Hale, comb. nov. Basionym: *Parmelia planiuscula* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:144. 1964.

- Relicina ramosissima* (Kurok.) Hale, comb. nov. Basionym: *Parmelia ramosissima* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:145. 1964.
- Relicina relicinella* (Nyl.) Hale, comb. nov. Basionym: *Parmelia relicinella* Nyl. Flora 68:615. 1885.
- Relicina relicina* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia relicina* Müll. Arg. Flora 65:317. 1882.
- Relicina samoensis* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia samoensis* Zahlbr. Denkschr. Kais. Wiss. Akad. Wien 81:272. 1908.
- Relicina schizospatha* (Kurok.) Hale, comb. nov. Basionym: *Parmelia schizospatha* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:146. 1964.
- Relicina subabstrusa* (Gyel.) Hale, comb. nov. Basionym: *Parmelia subabstrusa* Gyel. Fedde Repert. Sp. Nov. 29:288. 1931.
- Relicina sublanea* (Kurok.) Hale, comb. nov. Basionym: *Parmelia sublanea* Kurok. in Hale & Kurok. Contr. U.S. Nat. Herb. 36:146. 1964.
- Relicina sublimbata* (Nyl.) Hale, comb. nov. Basionym: *Parmelia sublimbata* Nyl. Flora 68:615. 1885.
- Relicina subturgida* (Kurok.) Hale, comb. nov. Basionym: *Parmelia subturgida* Kurok. Journ. Jap. Bot. 40:268. 1965.
- Relicina sydneyensis* (Gyel.) Hale, comb. nov. Basionym: *Parmelia sydneyensis* Gyel. Ann. Mycol. 36:292. 1938.

XANTHOPARMELIA (Vainio) Hale, stat. & comb. nov.

Basionym: *Parmelia* section *Xanthoparmelia* Vainio, Acta Soc. Faun. Fl. Fenn. 7(7):60. 1890.

Type species: *Xanthoparmelia conspersa* (Ach.) Hale, comb. nov. Basionym: *Lichen conspersus* Ach. Prod. Lich. Suec. 118. 1798.

Xanthoparmelia was first proposed by Vainio as a section under *Parmelia* to accommodate all narrow-lobed yellow species. We know now that the yellow or yellow-green color is caused by the cortical pigment usnic acid, but by using this criterion alone Vainio included several diverse elements, not only typical saxicolous species with simple rhizines, such as *X. conspersa*, but also *Parmelia flavida* and *P. velloziae* both of which have dichotomously branched rhizines, and *P. abstrusa* (= *Relicina abstrusa* (Vainio) Hale), which has bulbate cilia. Recent workers have put more reliance on cilia and rhizine characters (cf. Hale & Kurokawa, 1964), including in *Xanthoparmelia* only those saxicolous species with simple rhizines, no cilia, and usnic acid in the cortex. The upper cortex has palisade plectenchyma and a pored epicortex (Hale, 1973). This combination of characters seems to me to form a reasonable basis for segregating *Xanthoparmelia* from the collective genus *Parmelia*.

The following list contains the 93 species (in addition to the type) presently classified in *Parmelia* subgenus *Xanthoparmelia*.

- Xanthoparmelia adhaerens (Nyl.) Hale, comb. nov. Basionym: *Parmelia adhaerens* Nyl. in Cromb. Journ. Bot. Brit. & For. 14:19. 1876.
- Xanthoparmelia albornii (Hale) Hale, comb. nov. Basionym: *Parmelia albornii* Hale, Bot. Not. 124:345. 1971.
- Xanthoparmelia amphixantha (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia amphixantha* Müll. Arg. Flora 71:139. 1888.
- Xanthoparmelia amphixanthoides (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia amphixanthoides* Stein. & Zahlbr. Engl. Bot. Jahrb. 60:505. 1926.
- Xanthoparmelia arseneana (Gyel.) Hale, comb. nov. Basionym: *Parmelia arseneana* Gyel. Ann. Mycol. 36:269. 1938.
- Xanthoparmelia atroventralis (Hale) Hale, comb. nov. Basionym: *Parmelia atroventralis* Hale, Bot. Not. 124:346. 1971.
- Xanthoparmelia australiensis (Cromb.) Hale, comb. nov. Basionym: *Parmelia australiensis* Cromb. Journ. Linn. Soc. London 17: 395. 1879.
- Xanthoparmelia austroafricana (Stirt.) Hale, comb. nov. Basionym: *Parmelia austroafricana* Stirt. Trans. Glasgow Soc. Field Nat. 5:212. 1877.
- Xanthoparmelia benyovyszkjana (Gyel.) Hale, comb. nov. Basionym: *Parmelia benyovyszkjana* Gyel. Fedde Repert. Sp. Nov. 36:153. 1934.
- Xanthoparmelia brunthaleri (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia brunthaleri* Stein. & Zahlbr. Engl. Bot. Jahrb. 60:505. 1926.
- Xanthoparmelia camtschadalis (Ach.) Hale, comb. nov. Basionym: *Borreria camtschadalis* Ach. Syn. Lich. 223. 1814.
- Xanthoparmelia centrifuga (L.) Hale, comb. nov. Basionym: *Lichen centrifugus* L. Sp. Pl. 1142. 1753.
- Xanthoparmelia chalybeizans (Stein. & Zahlbr.) Hale, comb. nov. Basionym: *Parmelia chalybeizans* Stein. & Zahlbr. Engl. Bot. Jahrb. 60:509. 1926.
- Xanthoparmelia cheelii (Gyel.) Hale, comb. nov. Basionym: *Parmelia cheelii* Gyel. Ann. Mycol. 36:271. 1938.
- Xanthoparmelia chlorea (Stizb.) Hale, comb. nov. Basionym: *Parmelia chlorea* Stizb. Ber. St. Gall. Naturw. Gesell. 1888-89: 151. 1889.
- Xanthoparmelia chlorochroa (Tuck.) Hale, comb. nov. Basionym: *Parmelia chlorochroa* Tuck. Proc. Amer. Acad. Arts. Sci. 4:383. 1860.
- Xanthoparmelia colorata (Gyel.) Hale, comb. nov. Basionym: *Parmelia colorata* Gyel. Ann. Mycol. 36:272. 1938.
- Xanthoparmelia concolor (Spreng.) Hale, comb. nov. Basionym: *Parmelia concolor* Spreng. Syst. Veg. 4(2):328. 1827.
- Xanthoparmelia congensis (Stein.) Hale, comb. nov. Basionym: *Parmelia congensis* Stein. Jahresber. Schles. Gesell. Vaterl. Kultur 1888:140. 1888.
- Xanthoparmelia conspersula (Nyl.) Hale, comb. nov. Basionym: *Parmelia conspersula* Nyl. in Crombie, Journ. Bot. Brit. & For. 14:19. 1876.
- Xanthoparmelia constrictans (Nyl.) Hale, comb. nov. Basionym:

- Parmelia constrictans* Nyl. in Crombie, Journ. Bot. Brit. & For. 14:19. 1876.
- Xanthoparmelia convoluta* (Kremph.) Hale, comb. nov. Basionym: *Parmelia convoluta* Kremph. Verh. Zool.-Bot. Gesell. Wien 30: 337. 1881.
- Xanthoparmelia cordilleriana* (Gyel.) Hale, comb. nov. Basionym: *Parmelia cordilleriana* Gyel. Ann. Mycol. 36:276. 1938.
- Xanthoparmelia cumberlandia* (Gyel.) Hale, comb. nov. Basionym: *Parmelia subconspersa* var. *cumberlandia* Gyel. Fedde Repert. Sp. Nov. 36:164. 1934.
- Xanthoparmelia diadeta* (Hale) Hale, comb. nov. Basionym: *Parmelia diadeta* Hale, Bot. Not. 124:346. 1971.
- Xanthoparmelia dichotoma* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia dichotoma* Müll. Arg. Flora 69:257. 1886.
- Xanthoparmelia dichromatica* (Hale) Hale, comb. nov. Basionym: *Parmelia dichromatica* Hale, Bot. Not. 124:348. 1971.
- Xanthoparmelia dierythra* (Hale) Hale, comb. nov. Basionym: *Parmelia dierythra* Hale, Bryol. 67:470. 1964.
- Xanthoparmelia dissensa* (Nash) Hale, comb. nov. Basionym: *Parmelia dissensa* Nash, Bryol. 76:214. 1973.
- Xanthoparmelia distincta* (Nyl.) Hale, comb. nov. Basionym: *Parmelia distincta* Nyl. Ann. Sci. Nat. Bot., ser. 4, 15:374. 1861.
- Xanthoparmelia domokosii* (Gyel.) Hale, comb. nov. Basionym: *Parmelia domokosii* Gyel. Ann. Mycol. 36:277. 1938.
- Xanthoparmelia encrustans* (Hale) Hale, comb. nov. Basionym: *Parmelia encrustans* Hale, Bot. Not. 124:348. 1971.
- Xanthoparmelia endomiltoides* (Nyl.) Hale, comb. nov. Basionym: *Parmelia endomiltoides* Nyl. in Crombie, Journ. Linn. Soc. London 15:168. 1876.
- Xanthoparmelia eradicata* (Nyl.) Hale, comb. nov. Basionym: *Parmelia constrictans* var. *eradicata* Nyl. in Crombie, Journ. Bot. Brit. & For. 14:19. 1876.
- Xanthoparmelia filarszkyana* (Gyel.) Hale, comb. nov. Basionym: *Parmelia filarszkyana* Gyel. Ann. Mycol. 36:278. 1938.
- Xanthoparmelia flavobrunnea* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia flavobrunnea* Müll. Arg. Flora 74:379. 1891.
- Xanthoparmelia furcata* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia furcata* Müll. Arg. Flora 69:256. 1886.
- Xanthoparmelia gerlachei* (Zahlbr.) Hale, comb. nov. Basionym: *Parmelia gerlachei* Zahlbr. Cat. Lich. Univ. 6:137. 1929.
- Xanthoparmelia heterodoxa* (Hale) Hale, comb. nov. Basionym: *Parmelia heterodoxa* Hale, Bot. Not. 124:349. 1971.
- Xanthoparmelia hypoclystoides* (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia conspersa* var. *hypoclystoides* Müll. Arg. Flora 66:48. 1883.
- Xanthoparmelia hypoleia* (Nyl.) Hale, comb. nov. Basionym: *Parmelia hypoleia* Nyl. Syn. Lich. 393. 1860.
- Xanthoparmelia hypomelaena* (Hale) Hale, comb. nov. Basionym: *Parmelia hypomelaena* Hale, Bryol. 70:416. 1967.
- Xanthoparmelia hypoprotocetrarica* (Kurok.) Hale, comb. nov. Basionym: *Parmelia hypoprotocetrarica* Kurok. in Kurokawa & Elix, Journ. Jap. Bot. 46:113. 1971.

- Xanthoparmelia hypopsila (Müll. Arg.) Hale, comb. nov. Basionym: *Parmelia hypopsila* Müll. Arg. Flora 70:317. 1887.
- Xanthoparmelia hyporhytida (Hale) Hale, comb. nov. Basionym: *Parmelia hyporhytida* Hale, Bot. Not. 124:349. 1971.
- Xanthoparmelia incurva (Pers.) Hale, comb. nov. Basionym: *Lichen incurvus* Pers. Usteri Ann. Bot. 7:24. 1794.
- Xanthoparmelia ionnis-simae (Gyel.) Hale, comb. nov. Basionym: *Parmelia ionnis-simae* Gyel. Fedde Repert. Sp. Nov. 29:283. 1931.
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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXVI.

A NEW SPECIES OF AGERATUM.

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The preparation of a floristic treatment of the Eupatorieae of Panama has resulted in recognition of an endemic and previously undescribed species of Ageratum. The species is notable for its completely glabrous involucre and rather cordate lower leaves. The species has the leaf, achene and involucral structures of the section Coelestina but has coarser and more pilose stems as in many members of the section Ageratum.

The new species is named for Royce L. Oliver, formerly on the staff of the Missouri Botanical Garden, whose many collections have contributed to our knowledge of the Flora of Panama.

Ageratum oliveri R. M. King & H. Robinson, sp. nov.

Plantae annuae vel subperennes herbaceae vel suffrutescentes erectae usque ad 1 m altae paucè ramosae. Caules brunneoli vel rubescentes teretes leniter striati saepe late fistulosi parce vel dense longe pilosi et saepe parce puberuli. Folia plerumque opposita, petiolis usque ad 4 cm longis; laminae late ovatae usque ad 9 cm longae et 8 cm latae, base saepe leniter cordatae margine crenatae vel serrato-crenatae apice breviter vel distincte acuminatae supra flavo-vel obscuro-virides laeves longe sparse pilosae subtus pallidae carnosae immerse glandulo-punctatae in nervis et nervulis longe pilosae prope basem valde trinervatae. Inflorescentiae cymosae vel subcymosae, ramis conferte corymbosis vel subumbellatis dense breviter puberulis, pedicellis 1-9 mm longis superne non crassioribus. Capitula ca. 5 mm alta, squamae involucri 20-25 eximbricatae biseriatae 3-4 mm longae lanceolatae bicostatae margine non scariosae apice argute acutae extus glabrae; receptacula glabra. Flores ca. 60-75 plerumque lavenduli. Corollae 2.3-2.7 mm longae anguste infundibulares, tubis aliquantum latis ca. 1 mm longe paucè minute glanduliferis, limbis glabris, lobis ca. 0.5 mm longis extus paucè breviter piliferis superne paucè papillosis; thecae antherarum 0.8-0.9 mm longae, appendicibus rotundatis ca. 150 μ longis et latis; rami stylorum longi superne non vel vix crassiores minute acute papillosi. Achaenia ca. 1.5 mm longa glabra; carpodia excentrica, pappis nullis vel breviter coroniformibus usque ad 0.3 mm altis. Grana pollinis

18-20 μ diam.

Type: PANAMA: Panama: Cerro Jefe along main road before turnoff to summit, Croat 13062 (Holotype MO! Isotype US). Paratypes: PANAMA: Panama: 7 mi N of Cerro Azul on road to Cerro Jefe, 2600 ft, Blum et al 1771 (FSU); Goofy Lake to about 8 mi S of Goofy Lake toward Cerro Jefe, Dwyer 7055 (MO); Cerro Jefe, Gentry 2867 (MO); along road to Cerro Azul, 1600 ft, Tyson 6328 (FSU, MO).

Acknowledgement

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Ageratum oliveri R.M.King & H.Robinson, Holotype,
Missouri Botanical Garden.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXXVIII.
FOUR ADDITIONS TO THE GENUS AGERATINA FROM MEXICO AND
CENTRAL AMERICA.

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Smithsonian Institution, Washington, D.C. 20560

Ageratina austin-smithii R.M.King & H.Robinson, sp. nov.

Plantae suffruticentes usque ad 2 m altae pauce ramosae. Caules teretes vel subhexagonales hirsuti. Folia opposita, petiolis plerumque 1.5-3.5 cm longis; laminae ovatae papyraceae usque ad 16 cm longae et 9 cm latae base cuneatae margine multo crenato-serratae apice argute acuminatae supra et subtus sparse puberulae subtus in nervis subhirtellae, nervis secundariis paucis subpinnatis mediis valde ascendentibus. Inflorescentiae corymboso-paniculatae, ramis corymbosis, pedicellis plerumque 3-6 mm longis dense hirtellis. Capitula ca. 6-7 mm alta; floribus ca. 23; squamae involucris ca. 15-18 eximbricatae biseriatae lineares 4-5 mm longae 0.5-0.7 mm latae bicostatae apice attenuatae pilosae margine distincte anguste scariosae extus dense puberulae vel hirtellae; corollae ca. 4.0 mm longae, tubis perangustatis 1.0-1.5 mm longis, limbis anguste campanulatis pauce setiferis, lobis anguste triangularibus 0.7-0.9 mm longis intus glabris extus dense setiferis, setis simplicibus; filamenta antherarum in parte superiore ca. 400 μ longa; thecae antherarum ca. 0.8 mm longae, appendicibus ca. 200 μ longis et 150 μ latis; styli inferne distincte nodulosi, appendicibus dense papillosis, ramis non vel indistincte glanduliferis; achaenia 1.5-2.0 mm longa in costis setifera; carpodia breviter cylindrica ca. 150 μ longa, cellulis anguste oblongis ca. 10 μ latis usque ad 75 μ longis; setae pappi ca. 25 fragiles ad apicem non dilatatae; series secundaria brevia. Grana pollinis ca. 23 μ diam.

Type: COSTA RICA: Alajuela: Palmira, 2400 meters, January 8, 1940. Austin Smith P2242 (Holotype US!).

The new species would key to A. badia (Klatt) K. & R. in the recent key to Costa Rican species (K. & R., 1972). The later species differs by the less acuminate leaf tips, the more pilose tips of the phyllaries and

by the lack of indurated glands on the inner surfaces of the style branches. The species does not have oil droplets in the leaves such as occur in the related A. barbensis K. & R.

Ageratina fosbergii R.M.King & H.Robinson, sp. nov.

Plantae suffrutescentes ca. 1 m altae pauce ramosae. Caules dense minute puberuli. Folia opposita, petiolis angustis plerumque 1-2 cm longis; laminae late ovatae vel deltoideae papyraceae plerumque 4-5 cm longae 2.0-3.5 cm latae base truncatae vel subcordatae valde trinervatae margine serratae apice argute anguste acuminate supra et subtus subglabrae, nervis minute puberulis. Inflorescentiae corymboso-paniculatae, pedicellis plerumque 5-10 mm longis minute subtiliter puberulis. Capitula 4.5-5.5 mm alta; floribus ca. 25; squamae involucri ca. 15-17 eximbricatae biserialatae oblongae plerumque 2.5-3.0 mm longae 0.8-1.0 mm latae bicostatae apice obtusae margine late scariosae extus sparse minute puberulae; corollae albae 2.5-3.0 mm longae, tubis perangustatis 1.0-1.5 mm longis glabris, limbis cylindricis vel anguste campanulatis extus sparse setiformis, lobis anguste triangularibus ca. 0.5 mm longis intus glabris extus setiferis, setis simplicibus; filamenta antherarum in parte superiore ca. 250 μ longa; thecae antherarum ca. 0.6-0.8 mm longae, appendicibus ca. 200 μ longis et 150 μ latis; styli inferne distincte nodulosi, appendicibus dense papillois, ramis intus obscure pauce glanduliferis; achaenia ca. 1.5 mm longa fusiformia profuse setifera; carpodia breviter stipitata, breviter cylindrica ca. 100 μ longa, cellulis oblongis ca. 12 μ latis usque ad 25 μ longis; setae pappi ca. 25 fragiles ad apicem aliquantum dilatatae, series secundaria subnulla. Grana pollinis ca. 25 μ diam.

Type: GUATEMALA: Concepcion Pinola, headwaters of Rio Pinola, 4 km ESE San Jose Pinola, 20 km ESE Guatemala City, 1700 meters, April 13, 1947, F. R. Fosberg 27263 (Holotype US!).

Ageratina fosbergii is distinctive in the rather deltoid strongly trinervate strongly acuminate leaves which are more like some species in the genera Koanophyllon or Chromolaena.

Ageratina hintonii R. M. King & H. Robinson, sp. nov.

Plantae herbaceae vel suffrutescentes usque ad 4 dm altae inferne ramosae. Caules teretes rubescentes parce pilosi. Folia opposita breviter petiolata, petiolis 1-3 mm longis, laminis lineari-lanceolatis 18-45 mm longis 3-6 mm latis margine subintegris ad apicem anguste obtuse acutis base cuneatis fere ad basem trinervatis supra glabris subtus parce puberulis. Inflorescentiae terminales corymbosae, pedicellis 4-9 mm longis flavis glabris. Capitula 6-7 mm alta ca. 5 mm lata; floribus ca. 35; squamae involucris 17-20 subimbricatae chartaceae 2-3-seriatae subaequilongae 2-4 mm longae 1.0-1.5 mm latae oblongae ad apicem late rotundatae extus glabrae; corollae albae ca. 5 mm longae inferne anguste tubulares, tubis ca. 2 mm longis glabris, lobis ca. 1.2 mm longis anguste triangularibus extus setiferis; thecae antherarum ca. 1.1 mm longae, appendices ovatis 250 μ longis; achaenia fusiformia ca. 2 mm longa in costis dense breviter setifera; carpodia cylindrica, cellulis oblongis ca. 15 μ latis 15-40 μ longis; setae pappi ca. 25 base subfragiles ad apicem distincte clavatae leniter scabrae, series secundaria subnulla. Grana pollinis ca. 25 μ diam.

Type: MEXICO: Guerrero: Galeana District: Teotepec, 3300 meters, December 25, 1937, George B. Hinton 11123 (Holotype US!).

The new species is similar to A. amblyolepis (B.L.R.) K. & R. in the narrow leaves and in the broad subimbricate phyllaries. The latter species is distinct in the leaves not being as narrow or as entire, in the pedicels and the phyllaries being glabrous and in the tips of the pappus setae being more hispid.

Ageratina whitei R. M. King & H. Robinson, sp. nov.

Plantae frutescentes usque ad 1.7 m altae multo ramosae. Caules teretes vel subhexagonales sparse minute puberuli. Folia opposita, petiolis 3-7 mm longis; laminae anguste ovatae subcoriaceae plerumque 3-5 cm longae et 1.0-2.5 cm latae base cuneatae vel leniter acuminatae margine multo crenato-serratae apice leniter argute acuminatae supra et subtus sparse minute puberulae, nervis densius puberulis secundariis paucis pinnatis valde ascendentibus. Inflorescentiae laxae late corymboso-paniculatae, ramis dense corymbosis, pedicellis 1-6 mm longis appresse puberulis. Capitula ca. 5 mm alta; floribus 25-29; squamae involucris ca. 20

eximbricatae vel parum subimbricatae ca. 3-seriatae lanceolatae vel lineares 1.5-4.0 mm longae 0.5-0.7 mm latae bicostatae argute acutae superne non scariosae extus sparse appresse puberulae; corollae roseae 3.5-4.0 mm longae, tubis perangustatis 1.0-1.5 mm longis, limbis anguste campanulatis extus pauce setiferis, lobis anguste triangularibus 0.6-0.7 mm longis intus glabris extus dense setiferis, setis simplicibus; filamenta antherarum in parte superiore ca. 400 μ longa; thecae antherarum ca. 0.8 mm longae, appendicibus longioribus quam latioribus; styli inferne leniter nodulosi, appendicibus longe dense papillosis; achaenia ca. 1 mm longa in costis breviter setifera non glandulifera; carpopodia cylindrica ca. 0.2-0.3 mm longa, cellulis anguste oblongis ca. 12 μ latis usque ad 80 μ longis; setae pappi ca. 25 fragiles ad apicem non dilatatae, series secundaria nulla. Grana pollinis ca. 23 μ diam.

Type: PANAMA: Chiriqui: Valley of the upper Rio Chiriqui Viejo, January 20, 1938, White & White 118 (Holotype MO!).

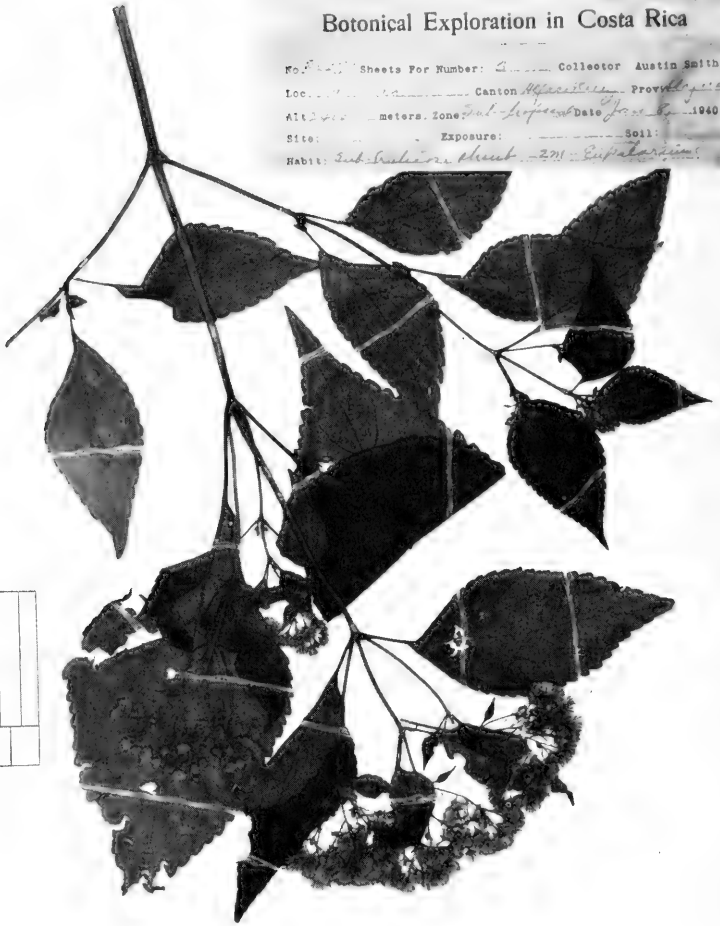
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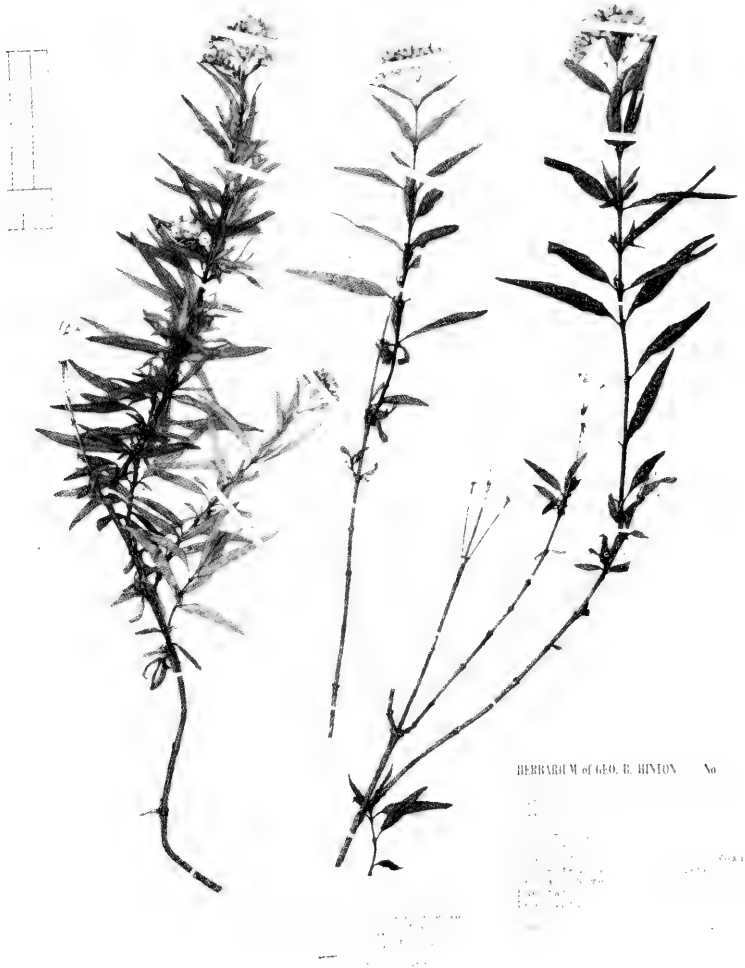
Ageratina ixioeladon (Benth. ex DC.) R. M. King & H. Robinson
Det. H. Robinson, 11-1971

Botanical Exploration in Costa Rica

No. of Sheets For Number: 2 Collector Austin Smith.
Loc. _____ Canton Alajuela Province Alajuela
Alt. _____ meters. Zone Sub-tropical Date Jan 1960
Site: _____ Exposure: _____ Soil: _____
Habit: Sub-tropical shrub 2m Euphorbia



Ageratina austin-smithii R.M.King & H. Robinson,
Holotype, United State National Herbarium. Photos by
Victor E. Krantz, Staff Photographer, National Museum
of Natural History.



Ageratina hintonii R.M.King & H.Robinson, Holotype,
 United States National Herbarium.



Ageratina whitei R.M.King & H.Robinson, Holotype,
Missouri Botanical Garden.



Enlargements of heads of Ageratina. Upper left; A. austin-smithii. Upper right; A. fosbergii. Lower left; A. hintonii. Lower right; A. whitei.

BOOK REVIEWS

Alma L. Moldenke

"BIRD STUDIES AT OLD CAPE MAY. An Ornithology of Coastal New Jersey. Volumes I & II by Wilmer Stone, xliii & vii & 941 pp., illus., Facsimile Replication by Dover Publications, Inc., New York, N. Y. 10014. 1965. \$3.50 each volume paperbound.

This is an unabridged replication of the work first published [and now so rare and cherished] by the Delaware Valley Ornithological Club in 1937 to which has been added a new Introduction [a valuable contribution in its own right] especially for this edition by Roger Tory Peterson; a List of Additional Species Recorded in Cape May County...by Ernest A. Choate; a biographical note on Witmer Stone by James A. G. Rehn, all adding appreciably to the value of this now readily and reasonably available gem of description of the bird life and living as it was and some still remains to be observed in this interesting, well described and well photographed part of our world.

"FUNDAMENTALS OF PLANT PATHOLOGY" by Daniel A. Roberts & Carl W. Boothroyd, xii & 402 pp., illus., W. H. Freeman & Company, Reading, England RG1 3AA & San Francisco, California 94104. 1972. \$15.00.

Planned for a survey course for undergraduate students, the opening paragraph sets the orientation with "Every crop plant is in jeopardy [but so is every other form of life!] from the moment its seed is sown: if it is to yield full measure, a plant must endure the buffeting of the elements, competition from weeds, plagues of insects, and the ravages of disease. Plant diseases alone exacted an annual toll of some \$3 billion in the United States during the mid-twentieth century — this despite disease-control efforts based on science and technology that are considered to be highly advanced."

The terminology mainly follows Whetzel and the disease classification follows McNew. Part I is devoted to theoretical considerations of plant disease as "continuous dysfunction" and Part II to the practical specifics of impaired physiology affecting photosynthesis, translocation and conduction, absorption and accumulation, meristematic activity, etc.

The illustrations and diagrams are helpful, as are the glossary, bibliography and indexing. Because of its orientation, this is definitely one of the better phytopathology texts.

"CONTINENTS ADRIFT: Readings from SCIENTIFIC AMERICAN" edited by J. Tuzo Wilson, iv & 172 pp., illus., W. H. Freeman & Company, Reading, England RG1 3AA & San Francisco, California 94104. 1972. \$7.00 clothbound, \$3.50 paperbound.

Like the other excellent topical collections of separately republished SCIENTIFIC AMERICAN papers, this one is well chosen and effectively integrated with preface, introductions to each of the three sections, conclusions, biographical notes, bibliography, cross references, and index.

The historically earliest five papers are grouped as section I, "Mobility in the earth". The next five papers starting with the editor's own on continental drift are grouped as Section II, "Continental drift, sea-floor spreading and plate tectonics". The last five papers are grouped as Section III, "Some consequences and examples of continental drift", such as Pangaea fragmentation, biological evolution, mountain and continent formation generally, and the Afar Triangle and the San Andreas Fault specifically.

"Today many earth scientists believe that, within the past decade, a scientific revolution has occurred in their own subject" holding "out the promise of great practical advances for the future."

The many impressive illustrations add so much to the understanding of these new ideas important to so many fields of science and technology.

"MANUAL OF THE TREES OF NORTH AMERICA" by Charles Sprague Sargent, xxvi & xxiv & 934 pp., illus., Facsimile Replication in Volumes I & II by Dover Publications, New York, N. Y. 10014. 1965. \$3.00 each volume paperbound.

It certainly is good to have this excellent work readily available again and in inexpensive form.

The back of the title page states that this edition first published in 1961 "is an unabridged and unaltered republication of the 2nd (1922) edition" of the original, but the back cover mentions the source as the 2nd enlarged 1926 edition with a new appendix by E. S. Harrar giving modern (1965) nomenclature. This minor bibliographic quandary will prove of little importance to most of the current and future users of this reprinting -- foresters, arborists, naturalists, etc.

The Harrar appendix basically adds considerable value to Sargent's original work which is almost seven decades old now, but among its faults is the failure to modernize the spelling of the generic name of Citharexylum and the specific name of Avicennia germinans.

The many original line drawings are still clear, definitive and therefore definitely helpful.

"ELECTRON MICROSCOPY OF ENZYMES: Principles and Methods" Volume 2 edited by M. A. Hayat, xvi & 158 pp., illus., Van Nostrand Reinhold Company, Cincinnati, Toronto, London, Melbourne, & New York, N. Y. 10001. 1974. \$16.50.

Any Volume 2 that follows a valuable and needed Volume 1 starts with a deserved advantage, as in this case.

The book completely evaluates in its seven papers E-M. preparations, methods, limitations, prospects and interpretations for hemoproteins, acyltransferases, polyphenoloxidases in some plants, tyrosinase, sulfatases, adenylate cyclase and lipase. Some of this original source material is scattered far and wide in assorted journals. This is the only comprehensive treatment.

Volumes 3 and 4, now in the preparation stages, will be at such deserved advantage because of the useful contributions made by Volumes 1 and 2 to many different kinds of students, technicians, and scientists.

"BASIC ELECTRON MICROSCOPY TECHNIQUES" by M. A. Hayat, xii & 119 pp., illus., Van Nostrand Reinhold Company, Cincinnati, Toronto, London, Melbourne, & New York, N. Y. 10001. 1972. \$9.95.

This small book gives the best coverage to date of the tested and most commonly used procedures clearly in stepwise presentations for fixatives, embedding media, stains, etc. It makes an excellent and efficient "text for beginning technique courses as well as a guide to the worker who has not had a technique course or who faces the problem of preparing the specimens after a long absence from the laboratory..... [and] useful to busy research workers who cannot afford to spend time searching for procedures in the literature." This is true also of more detailed subsequent works in this field by the same author.

The detailed table of contents sufficiently covers the omission of an index. Final chapters give details of paraformaldehyde and molar solutions, solution chemicals with their formulas and molecular weights, supply sources, and annotated bibliography.

Outlined directions are recorded for (1) fixation by immersion for a great variety of cells, their groups, their chromosomes and other organelles and for (2) fixation by vascular perfusion of vertebrate tissues,

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