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NOTEWORTHY GRASSES FROM MEXICO XI.

Alan A. Beetle, APDO Postal
Hermosillo, Sonora, Mexico

These are results from continuing studies sponsored by the Comision Tecnico Consultiva para la determinacion Regional de los coeficientes de Agostadero, fundada en 1966, under the Secretaria de Agricultura y recursos hidraulicos.

For previous papers see Phytologia 27:1974; 28:1974; 30:1975; 35:1977; 38:1978; 47:1981; 49:33-43; and 52:11-17, 1981.

Bouteloua barbata Lag. var. arenosa (Vasey) comb. nov.

Bouteloua arenosa Vasey, U.S. Div. Bot. Bull. 12(1): Pl. 34. 1890.

Bouteloua hirsuta Lag. var. Cienc. 4:141. 1805.

f. vivipara form. nov.

"Haec forma a forma typica speciei spiculae viviparae"

Plants similar to Bouteloua hirsuta Lag. but the spikelets proliferating.

Type: G. Galván 481 collected Mexico, State of Tamaulipas, Ejido 5 de Mayo, mpio de Soto La Marina, Palmar de Sabal Mexicana a 140 msnm.

Eragrostis secundiflora Presl var. capitata (Fourn.) comb. nov.

Poa oxylepis Torr. in Marcy, Expl. Red River 301, Pl. 19. 1853.

Eragrostis oxylepis (Torr.)Torr. U.S. Expl. Miss. Pacific. Rept. 4:156. 1857.

Eragrostis secundiflora Presl. ssp. oxylepis (Torr.) Koch, Rhodora 80:397. 1978.

Eragrostis verae-crucis Rupr. Bull. Acad. Brux. 9:235. 1842, nomen; Fourn. Mex. Pl. 2:118. 1886, nomen.

Megastachya oxylepis var. capitata Fourn. Mex. Pl. 2:118. 1886.

Megastachya oxylepis (Torr.) Fourn. Mex. Pl. 2:118. 1886.

Sheaths and blades glabrous, except for a tuft of hairs flanking the base of the blade at the top of the sheath.

E. secundiflora var. capitata

Sheaths and both sides of the blades typically densely covered with long pustulate-based hairs.

E. secundiflora var. secundiflora

Eriochloa lemmoni Vasey & Scribn. Bot. Gaz. 9:185. Pl. 2. 1884. var. minor (Vasey) comb. nov.

Eriochloa punctata (L.)Desv. ex Hamilton var. minor Vasey, Contrib. U.S. Nat. Herb. 3:21. 1892.

Eriochloa gracilis var. minor (Vasey)Hitchc. Jour. Wash. Acad. Sci. 23:456. 1933.

Helopus gracilis Fourn. Mex. Pl. 2:13. 1886.

Eriochloa lemmoni var. gracilis (Fourn.)Gould, Leafl. West. Bot. 6:51. 1950.

Ichnanthus pallens (Sw.)Munro f. monstrosum (Fourn.) comb. nov.

Panicum schlechtendalii Fourn. var. monstrosum Fourn. Mex. Pl. 2:31. 1886.

Ixophorus Schlecht has usually been treated as a monotypic genus but it appears that there are two species which may be keyed as follows:

Slender annual with culm base 1-2 mm wide, not succulent; leaves less than 5 mm broad; raceme branches 2-5.

Ixophorus palmeri

Robus annual or short-lived perennial with culm base 5 mm or more wide, succulent; some leaves more than 1 cm wide; raceme branches 10 to many.

Ixophorus unisetus

Ixophorus palmeri (Vasey) comb. nov.

Panicum palmeri Vasey, Contr. U.S. Nat. Herb. 1:281. 1893.

Panicum pringlei Vasey, Contr. U.S. Nat. Herb. 1:363. 1895.

Panicum schiedeanum Trin.; Beal, Grasses N. Amer. 2:119. 1896.

Ixophorus pringlei (Vasey)Scribn. U.S. Dept. Agr. Div. Agrost. Bull. 4:6. Pl. 2. 1897.

Ixophorus pringlei var. minor Scribn. U.S. Dept. Agr. Div. Agrost. Bull. 4:7. 1897.

Ixophorus palmeri (Vasey) comb. nov.

Panicum palmeri Vasey, Contr. U.S. Nat. Herb. 1:281. 1893.

Annual, culms slender epehemeral, 1-2 mm broad at base, sheaths glabrous; ligule membranaceous, ca. 1 mm long, somewhat erose or finged, sometimes with a few long white hairs at the collar; blades glabrous, up to 10 cm long, less than 5 mm broad.

Panicle composed of two to five racemose branches well exserted above the blades, each spikelet subtended by a single awn-like projection up to 8 mm long; first glume ca. 1 mm long, second glume and lemma of the lower staminate floret 3-4 mm long, concealing the lemma of the upper pistillate floret.

Described from Jalisco (Tequila); native, endemic, apparently confined to the Jalisco-Colima area.

Koeleria cristata (L.)Pers. var. elegantula (DomIN) comb. nov.

Koeleria elegantula Domin, Bibl. Bot. 65:172. Pl. 14, f. 10. 1907.

This small-flowered type is a good geographical variety. Type collection, C. F. Baker 576 from Gunnison Colorado, seen in the U.S. Nat. Herb. The United States Forest Service herbarium now at Laramie, Wyoming has an excellent series of collections of this variety.

Leptochloa dubia (HBK)Nees, Syll. Pl. Ratisb. 1:4. 1824.

var. humboldtiana (Kuntze) comb. nov.

Diplachne dubia (HBK)Scribn. var. humboldtiana Kuntze Rev. Gen. Pl. 3:349. 1898.

Panicum decolorans HBK. Nov. Gen. & Sp. 1:100. 1815.

var. parcum (Hitchc. & Chase) comb. nov.

Panicum parcum Hitchc. & Chase, Contr. U.S. Nat. Herb. 15:68. f. 53. 1910.

Piptochaetium leianthum (Hitchc.) comb. nov.

Stipa leiantha Hitchc. Contr. U.S. Nat. Herb. 24:236. Pl. 51. fig. 8, 9. 1925, described from Mexico: Puebla, near Esperanza; cf. Beetle M-3000, a topotype.

Piptochaetium mexicanum (Hitchc.) comb. nov.

Stipa mexicana Hitchc. Contr. U.S. Nat. Herb. 24:247. Pl. 52, fig. 5, 6. 1925, described from Mexico: State of Mexico, Sierra de las Cruces; cf. Beetle M-254, a topotype.

Piptochaetium virescens (HBK)Parodi, Rev. Mus. La Plata, Bot. n.ser. 6:223, 230. f. 10. 1944.

Stipa virescens HBK Nov. Gen. & Sp. 1:126. 1815.

Piptochaetium virescens (HBK)Parodi var. arsenii (Hack.) comb. nov.

Stipa arsenii Hack. Repert. Sp. Nov. Fedde 8:515. 1910, described from Mexico: Michoacan, near Morelia.

Setaria variifolium (Swallen) comb. nov.

Panicum variifolium Swallen, Carnegie Inst. Wash. Publ. 436:345. f. 7. 1934.

Described from Mexico: Yucatan, Chichen Itzá.

Sporobolus airoides var. minor (Vasey) comb. nov.

Sporobolus altissimus Vasey var. minor, Vasey, Calif. Acad. Sci. Proc. II. 2:213. 1889.

Trachypogon plumosus (H. & B. ex Willd.)Nees var. secundus (Anderss.) comb. nov.

Trachypogon preslii var. secundus Anderss. Ofvers Svensk. Vetensk. Akad. Forhandl. 14:50. 1857.

Triplasis caribensis (Pohl) comb. nov.

Triplasis purpurea (Walt.)Chapm. var. caribensis Pohl, Iowa State Jour. Res. 47:76. 1972.

Now added to the Mexican grass flora. Collected by Andres Suarez, coastal dues, Cuauhtemotzin, Tabasco.

A NOTE ON THE ANDROECIUM OF THE GENUS CROTON AND FLOWERS IN GENERAL OF THE FAMILY EUPHORBIACEAE

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The occurrence of haplostemony, diplostemony, and triplostemony represents a regular sequence in the Angiosperm flower. The reverse of these arrangements (obhaplostemony, obdiplostemony, and obtriplostemony) brings interruptions in the usual arrangement. Many hypotheses have been proposed in the past to explain these reversal arrangements. The most acceptable one has been the "reduction concept." According to this concept, in all flowers exhibiting obhaplostemony, obdiplostemony, or obtriplostemony, the present outer whorl represents what was once the second whorl of stamens. Thus all obhaplostemony flowers were once diplostemony ones and so on (Eames 1961). This reduction concept derives support from the presence of some rudiments of staminal structures in a few flowers of this kind. People who resent the concept of reduction believe that the staminal arrangement in the Angiosperm flower is only a matter of spatial and mechanical possibilities and that it has nothing to do with the morphological modifications in the flower.

A study of the flowers of Euphorbiaceae in general and of Croton L. in particular adds some insight into this problem. The flowers of Euphorbiaceae are usually unisexual, but bisexual flowers (said to be atavistic) have been reported in Cicca L. (Rao 1973). The flowers of Euphorbiaceae are often apetalous or even achlamydeous (Euphorbia L., Anthostema Juss., and Synandenium Boiss.). Generally the number of staminate flowers, when compared to the number of pistillate ones, is numerous. This strongly suggests that anemophily was once prevalent in this family. Even today, Mercurialis L. is pollinated by the wind. Certain features suggest that this family is returning to the entomophily type of pollination. These include the aggregation of achlamydeous flowers in the form of cyathia bearing one to five extra floral nectaries on the involucre cup, the presence of brightly colored bracts or leaves subtending the flowers, and the presence of nectariferous glands in both male and female flowers. Although the grasses are wind pollinated and are most successful, they have intercalary growth and rhizomes both of which are absent from the euphorbs. Thus it would seem to be a selective advantage to the spurge family to return to entomophily. In most of its members, there has been a total loss of genes for the

development of a conspicuous corolla and even those few taxa with corollas have small inconspicuous ones (Jatropa L., with its bright corolla, is an exception.). The absence of the corolla is balanced in various taxa with conspicuous sepals, bracts, or stamens. It is also noteworthy that the number and nature of stamens are very variable in the Euphorbiaceae (eg., 1 in Euphorbia L., 3 and synandrous in Phyllanthus L., 8 to 10 in 2 whorls but all monadelphus in Jatropa L., many and dendroid in Ricinus L., etc.). However, in contrast, the number of ovaries is usually one with three fused carpels.

Croton L. generally has dichlamydeous and heterochlamydeous male flowers and the corolla is inconspicuous. The stamens range in number from 4 to 16 or even more. There are four or five antesepalous nectariferous glands or scales between the corolla and the androecium. The female flowers are generally apetalous and have the staminal scales or glands but no well developed staminodes.

The authors made a study of the staminal arrangement in six species of Croton. Croton monanthogynus Michx. has six stamens per flower. Each flower has one stamen in the center and the five remaining ones are in an antepetalous whorl (obhaplostemony). C. argyranthemus Michx., C. capitatus Michx., and C. glandulosus L. have eleven stamens per flower. Each flower has one stamen in the center and the remaining ten occur in two whorls of five each. The outer whorl is antesepalous (obdiplostemony). C. bonplandianus Baill. and C. punctatus Jacq. have sixteen stamens per flower. Each flower has one stamen in the center and the remaining fifteen stamens occur in three whorls of five each. The outer whorl is antesepalous (obtriplostemony).

In all the above taxa the staminal primordia can proliferate and lead to one or two more stamens per flower or the primordia can fail to develop and lead to one to four fewer stamens per flower. When there is an increase in stamen number, there are two stamens in the center rather than one. Often, all the stamens are attached to a rudimentary stalk in the center of the flower. The central stamen(s) may be functional or sterile. Obviously, the meristem that is generally consumed in the formation of a sterile or fertile gynoecium in other unisexual or bisexual flowers terminates here in a fertile or sterile stamen. This sort of development, coupled with the absence of staminodes in female flowers (scales or nectaries excluded), indicates the strong unisexuality attained by Croton L., and perhaps by the whole family. The occurrence of all three types of unusual staminal arrangements in a single

genus is extraordinary. (Its pollen is also characteristic and is called Croton type: spherical, bearing minute projections, and without any aperature) (Punt 1962). Perhaps this situation is comparable to the one existing in Mitella L. (Saxifragaceae) in which three different staminal arrangements occur: haplostemony (M. breweri L.), obhaplostemony (M. pentandra Hook.), and diplostemony (M. nuda L.)(Cronquist 1968). This reversal staminal arrangement is also seen in Manihot Mill. and Tragia L., and it is quite possible that other taxa in Euphorbiaceae also exhibit this arrangement; if so, it would strengthen the concept of associating the Euphorbiaceae with the Geraniales.

We conclude that the occurrence of the unusual staminal arrangement in the Angiosperm flower is well explained by the "reduction concept." This conclusion is based on the presence of antesepalous nectaries or scales (all staminal in origin) found between the corolla and the androecium.

We are thankful to Miss V. Shobba, Mr. C. M. Ranjith Singh and Mr. Jayaram of The National College, Bangalore-4, India for providing the flowering material of Croton bonplandianus Baill. and for the discussion on its obtriplostemonous nature.

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Cronquist, A. J. 1968. The evolution and classification of flowering plants. Houghton Mifflin Co., Boston. 396 pp.

Eames, A. J. 1961. Morphology of the Angiosperms. McGraw-Hill Book Co., New York. 518 pp.

Punt, W. 1962. Pollen morphology of the Euphorbiaceae with special reference to taxonomy. Wentia 7:47-53.

Rao, C. K. 1973. Hermaphrodite flowers in Euphorbiaceae: Cicca acida (L.) Merr. Curr. Sci. 42(8): 295.

THE TEXAS SPECIES OF PARONYCHIA (CARYOPHYLLACEAE)

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Attempts to ascertain the biological and/or nomenclatural status of putative endangered taxa of Paronychia for the state of Texas occasioned the present paper. In particular, I wanted to know if the several species described by the late D. S. Correll subsequent to the monograph of Paronychia by Chaudhri (1968) were valid taxa. The names concerned are P. maccartii, P. congesta and P. nudata. In my efforts to ascertain their status I was inevitably led to an overall study of the genus in Texas and adjacent regions, especially Mexico. This was accomplished by drawing heavily upon the treatment of Chaudhri (1968) and upon that of Correll (1970) for the Flora of Texas. In addition, I studied all of the Texas and Mexico collections of Paronychia from the four largest herbaria in the state of Texas, namely LL, SMU, TAES and TEX. Altogether over 800 sheets from Texas and Mexico were examined, as follows:

LL, C. L. Lundell Herbarium, Austin	250
SMU, Southern Methodist University, Dallas	153
TAES, Texas A & M University, College Station	95
TEX, University of Texas, Austin	310

All of the material was duly annotated and Figures 1 and 2, showing the distribution of the species in Texas have been prepared from these. Where collections are relatively few in herbaria these are represented in the figures by appropriate site-symbols; where collections are numerous over a broad area, these are shown by general shading or lining.

In the presentation here I saw no reason to duplicate again the careful descriptions rendered by Chaudhri and Correll. At most any "emended" description would merely call attention to a relatively minor, usually highly variable, character which this or that key empasized to vouchsafe a given species. I have therefore confined my observations to the major questions: How many species of Paronychia are there in Texas? How can they be recognized? And what are their distributional relationships?

In my pursuit of the answers I have examined types of all of the critical taxa, visited their type localities several times and observed numerous populations elsewhere. Because of this I feel confident that the treatment rendered here is biologically sound.

The last comprehensive treatment of Paronychia for Texas was that of Correll (1970) who recognized 15 species for the state. In this he more or less accepted the same species as Chaudhri (1968) but added, as already noted, an additional three species: P. congesta, P. maccartii and P. nudata. I have reduced the latter name to synonymy under the relatively widespread P. monticola but have had to accept, albeit reluctantly, the specific status of the former two.

Paronychia maccartii is known only from the type collection. It is quite distinct, superficially resembling the more western P. wilkinsonii, but readily distinguished by a number of characters. Paronychia congesta, is also known only by collections from the type locality. It is superficially similar to the widespread, variable, P. jamesii, but is isolated from the range of that species and possesses several quite distinct characters. In spite of numerous attempts to locate again populations of P. maccartii, I have not succeeded in this endeavor. I was able to relocate a few living plants of P. congesta, but only with much effort.

I am confident that P. maccartii still lives on somewhere in the vicinity of its type locality and urge future workers, interested amateurs even, to locate living plants of the species so that the plant might legitimately be listed as an "endangered" taxon. Without recently sighted populations (i.e., an authoritative recent account of its existence in nature) the U. S. Wildlife Service will not submit such plants for listing. At least such is the case for another south-Texas endemic, Manihot walkerae Croizat. In spite of the potential of the latter species for the genetic improvement of the important crop plant, M. esculenta (cassava), this agency would not list the plant as "endangered" since the present author could not locate natural populations of the species in his preparation of a report for that agency. The species was last collected in 1947 in La Jolla, Texas; while rare at the time it surely exists somewhere in that area today, and were sufficient efforts made to locate the plant the species might still be placed on the "endangered" list. But such are the foibles of government agencies.

Incidental to my excursion into the status of Correll's several names, I found it necessary to sink yet two other names recognized by Correll (P. chorizanthoides and P. parksii) and add a new species to the genus, P. lundellorum, described herein.

Overall then, I recognize 13 species for the state. Their distribution is shown in Figures 1 and 2. The taxa are keyed below and additional comments upon the treatment rendered are given in the specific discussions that follow.

I am grateful to the Directors concerned for the loan of

herbarium materials, to Dr. M. C. Johnston for the Latin diagnosis and to Gayle Turner for the sketches provided. However inadequate, the U. S. Department of the Interior, U. S. Fish and Wildlife Service, Albuquerque, New Mexico, supported, in part, field work for the present study.

Key to Texas species of Paronychia

1. Annual species, stems arising from a single, usually unbranched taproot.

    2. Leaves variously elliptical to oblanceolate, 2-5 mm wide.

        3. Calyx glabrous or nearly so, 0.8-1.2 mm long; sepals unmargined with an ill defined mucro 0.1 mm long or less..... 1. P. fastigiata

        3. Calyx variously pubescent, especially below, 1.5-2.5 mm long; sepals with prominent white scarious margins.

            4. Stems prostrate; calyx with at least a few decidedly enlarged, uncinate hairs..... 2. P. jonesii

            4. Stems erect; calyx rather uniformly pubescent with uncinate hairs..... 3. P. drummondi

    2. Leaves narrowly linear, 1 mm wide or less

        5. Sepals with definite and distinctive white scarious margins; stems very hispid throughout; plants of sandy soils in eastern southcentral Texas.....4. P. setacea

        5. Sepals not as above; stems mostly minutely hispid to nearly glabrous; plants of

various soils on the Edwards Plateau in central Texas.....5. *P. lindheimeri*

1. Perennial species, stems usually arising from a branched, thickened, caudex or persistent root-stock.

   6. Flowers sessile at the tips of *Lycopodium* like stems; stems short with uniformly shortened internodes, each leaf overlapping at least 2 or more nodes.

      7. Apex of sepals merely mucronate or short awned, not at all snowy white; margin of the sepals not noticeably scarious; panhandle Texas.....6. *P. sessiliflora*

      7. Apex of sepals terminated by a snowy white appendage; margins of sepals scarious and snowy white

         8. Leaves shorter than the stipules; sepals without an inner tuft of white hairs below the hood; awns of calyx 1.5-2.0 mm long; plants of trans-Pecos Texas.....7. *P. wilkinsonii*

         8. Leaves longer than the stipules; sepals with an inner tuft of white hairs below the hood; awns of calyx 0.9-1.2 mm long; plants of southern Texas..8. *P. maccartii*

   6. Flowers not as above, clearly borne in terminal, open or somwhat congested numerous flowered, corymbose panicles.

      9. Sepals triangular lanceolate, prominently 3 ribbed, 3.0-5.0 mm long; plants mostly 30-50 cm tall.....9. *P. virginica*

      9. Sepals not as above; plants mostly 5-20 cm tall

         10. Calyx evenly hispid

pubescent throughout; sepals gradually tapering into a straight awn.....10. P. congesta

10. Calyx glabrous or unevenly pubescent, the united portions more prominently strigose; sepals usually abruptly terminated by a divergent awn.

11. Sepals, excluding the awn, less than 2 mm long with a clearly defined scarious yellow margin; plants of sandy soils in southern Texas.....11. P. lundellorum

11. Sepals, excluding the awn, 2-3 mm long, without a clearly defined scarious yellow margin; plants of various soils in western Texas.

12. Foliage glabrous or nearly so; sepals glabrous; plants with usually a single unbranched tap root.....12. P. monticola

12. Foliage variously hispid or hispidulous; sepals pubescent; plants with usually a well developed branched caudex.13. P. jamesii

1. PARONYCHIA FASTIGIATA Fern. (1936)

This is a widespread delicate annual of the eastern United States. It is represented in Texas by relatively few collections (Fig. 1) from the northeastern most regions of the state where it occurs in sandy soils.

2. PARONYCHIA JONESII M. C. Johnst. (1963)

This species is recognized by both Chaudhri (1968) and Correll (1970). It is a weakly differentiated taxon very closely

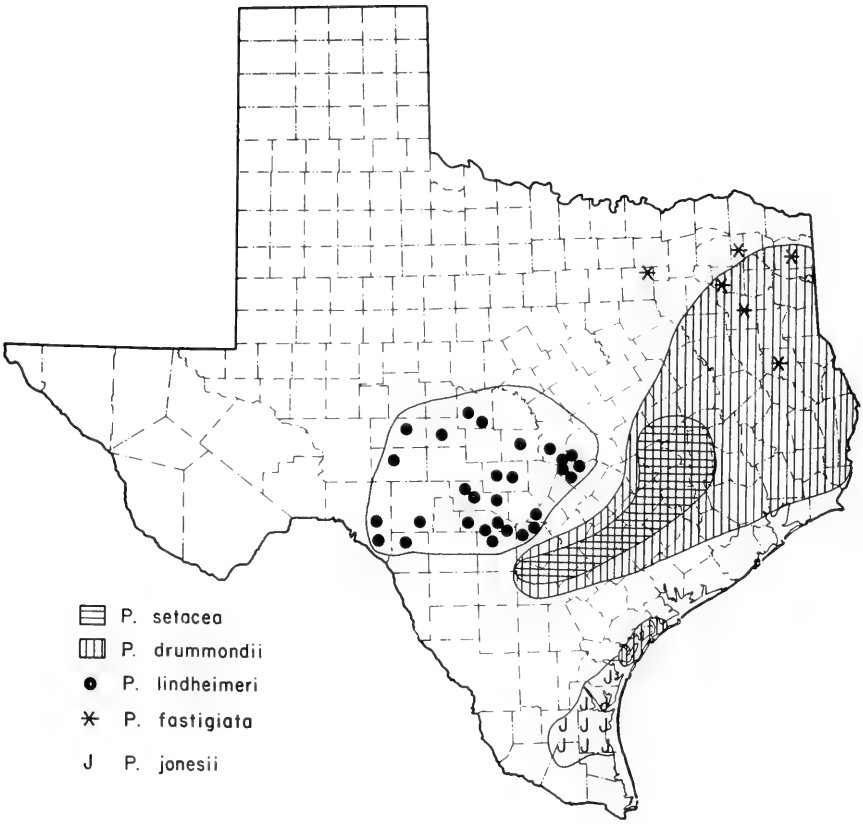

Fig. 1. Distribution of annual species of Paronychia in Texas.

related to P. drummondii but readily distinguished by its prostrate stems and somewhat enlarged strigose calyx hairs. In the dune sands just north of Corpus Christi, erect-stemmed populations referrable to P. drummondii occur but it is likely that these are relic progenitor populations that gave rise to P. jonesii there being otherwise no clear distinctions between the two taxa in this area.

3. PARONYCHIA DRUMMONDII T. & G. (1838)
Paronychia drummondii subsp. parviflora Chaudhri (1968)

Chaudhri recognized two weakly differentiated subspecies (subsp. drummondii and subsp. parviflora) within this taxon and these are "keyed" by Correll (1970, quoting Chaudhri, 1968). In my opinion the "subspecies" are not deserving of nomenclatural rank, there being a wide range of intermediates over a broad area between the putative taxa. In general, less pubescent plants with smaller flowers occur in the northeastern regions of the state (northwest of about Austin, Texas) while somewhat more pubescent plants with larger flowers occur in central and south central Texas. This might suggest varietal status for the populations concerned but such regional recognition would distort Chaudhri's concept of the subsp. parviflora (which was represented, as inferred from his description and specimen-citations, by relatively few atypical collections from northeastern Texas). Considering this fact, and the large number of intermediates to be found between such forms in northeastern Texas, it seems meaningless to recognize the extremes.

4. PARONYCHIA SETACEA T. & G. (1938)

The type material of this relatively delicate annual was collected by Drummond in sandy soils of east-central Texas. It is most easily distinguished from P. lindheimeri (with which it has been confused, at least in part, by nearly all previous workers) by its very pubescent foliage and scarious-margined sepals.

5. PARONYCHIA LINDHEIMERI Engelm. ex Gray (1850)
Paronychia chorizanthoides Small (1897)

This taxon is largely restricted to central Texas on the Edwards Plateau or within the Central Mineral Region where it occurs in either calcareous or sandy soils and mixtures thereof. In my opinion it includes as a synonym P. chorizanthoides, although Core (1943), Chaudhri (1968) and Correll (1970) maintained the species. The type of Small's name is from Burnet County and is said to be distingushed from the sympatric P. lindheimeri by "having longer sepal awns and a somewhat longer style (Chaudhri, 1968; p. 180). These are highly variable characters at best and such plants represent but segregate forms

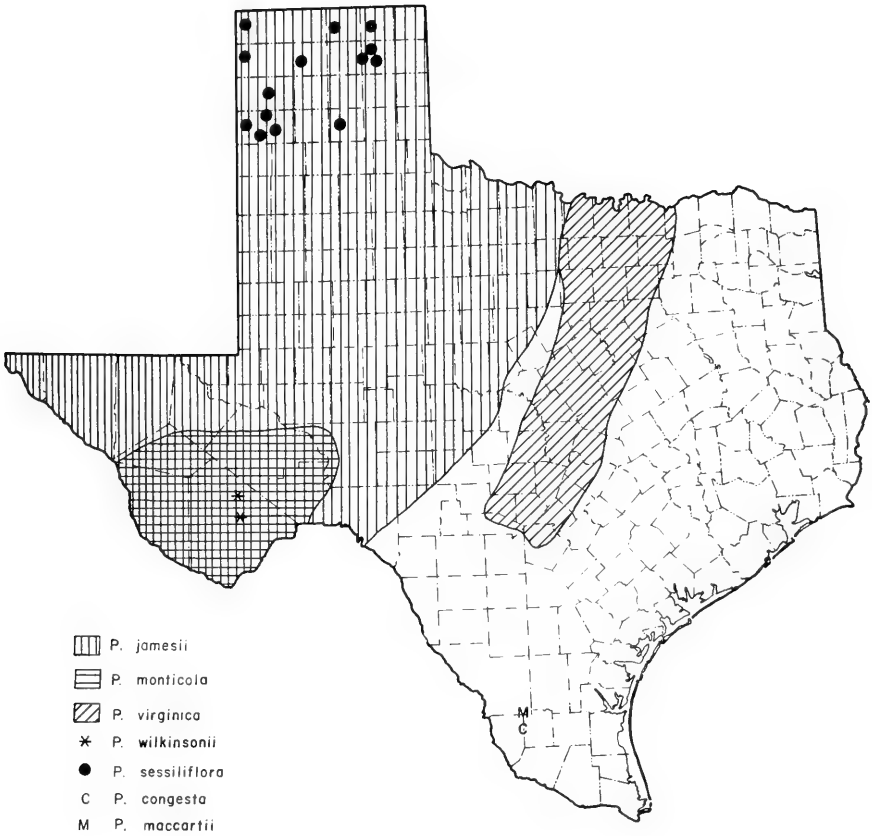

Fig. 1. Distribution of perennial species of Paronychia in Texas.

of P. lindheimeri.

6. PARONYCHIA SESSILIFLORA Nutt. (1818)

This species is readily recognized and is apparently fairly common in the rocky breaks of the Panhandle region of Texas (Fig. 2).

7. PARONYCHIA WILKINSONII S. Wats. (1886)

Core (1943) only knew the species from two sites in northern Mexico. Several additional collections are now known from this region, plus two sites in Texas, both in Brewster County (Glass Mountains and near Pena Colorado, just south of Marathon) where it occurs as a crevice plant on a specific geological outcrop of Devonian age known as Caballos Novaculite.

8. PARONYCHIA MACCARTII Correll (1963) Fig. 3

The species is known only by the type material which was reportedly collected in tight red sandy soil along Farm Road 649, 8.3 miles south of Mirando City in eastern Webb County. The collections were made by Mr. William McCart and students from Laredo Junior College in March of 1962. I have made numerous visits to this area over a several year period in hopes of locating the plant but these have proven unsuccessful. The plant is strikingly different from other species of Paronychia in the region, much resembling P. wilkinsonii of trans-Pecos Texas but clearly different from the latter.

Botanists, and wild flower enthusiasts generally are urged to look for extant populations and report such findings to the present author or else call this to the attention of appropriate authorities so that some efforts might be taken to protect such living individuals.

9. PARONYCHIA VIRGINICA Spreng. (1825)

Paronychia scoparia Small (1897)
Paronychia parksii Cory (1944)
Paronychia virginica var. scoparia (Small) Cory (1944)
Paronychia virginica var. parksii (Cory) Chaudhri (1968)

Chaudhri (1968) did not recognize the var. scoparia, thinking it synonymous with his var. virginica. He did recognize P. parksii, but only as a variety of P. virginica. I tend to agree with Correll (1970) who notes that P. parksii "appears to be little more than a habit variation of P. virginica var. scoparia". This is also implied in Chaudhri's comment (p. 140) that spreading versus erect habits can be environmentally induced when plants are grown from seed. Since P. virginica shows a

continuous distribution on limestone soils from northcentral to central Texas I see no compelling reasons to assign nomenclatural status to the somewhat larger but variable plants from the latter area.

10. PARONYCHIA CONGESTA Correll (1966) Fig. 4

This species is known from only two collections from approximately the same site, one by its original collectors (Correll & Wasshausen, about one mile south of Thompsonville, on rocky slopes of breaks) and one by the present author who, after several hours' search, observed only four plants at a site 0.8 miles south of the old site of Thompsonville. The latter inhabitation is now totally replaced by a single small Exxon pump station.

Paronychia congesta is seemingly most closely related to the more western perennial, P. jamesii, but has a more congested inflorescence with gradually tapered sepals and non-divergent awns. In my opinion it is a "good" taxon deserving of specific rank.

Attempts should be made to locate additional individuals of this rare and endangered taxon so that appropriate action might be made to conserve such populations.

11. PARONYCHIA LUNDELLORUM B. L. Turner, sp. nov.

Paronychia setacea accedens sed plantis robustis perennibus pedicellis florum longioribus.

Perennial low herb 6-24 cm tall. Leaves linear, 1-3 cm. long, 0.5-0.7 mm. wide, rigid, erect-spreading, minutely and evenly pubescent, the apices with a short mucro. Stipules ca. 1/2 as long as the leaves. Calyx urn-shaped, ca. 2.5 mm long, decidedly pedicellate, the pedicels 0.5-1.0 mm long, especially in vernal forms; lobes of the sepals ca. 2 mm long, abrubtly terminated by a pronounced mucro, 0.75-1.00 mm long, that diverges at a nearly right angle to their axis, the fused portion of the calyx body expanded and prominently white strigose, the lobes glabrous or nearly so, each of the sepals possessing a well-defined, hyaline margin.

TYPE: TEXAS. Brooks Co.: in Spartina flats, 3 mi S of Falfurrias, in low pasture, on sandy soil, 21 Apr 1949, C. L. Lundell 14911 (holotype, LL).

Additional specimens examined: TEXAS. KENEDY CO.: King Ranch, Norias Division, San Jose Pasture, open sandy plain, 25 Sep 1958, Lundell & Correll 15216 (LL); Norias, hiway right of way, dune sand, 4 Dec 1948, Tharp et al. 48-19 (TEX). Kleberg

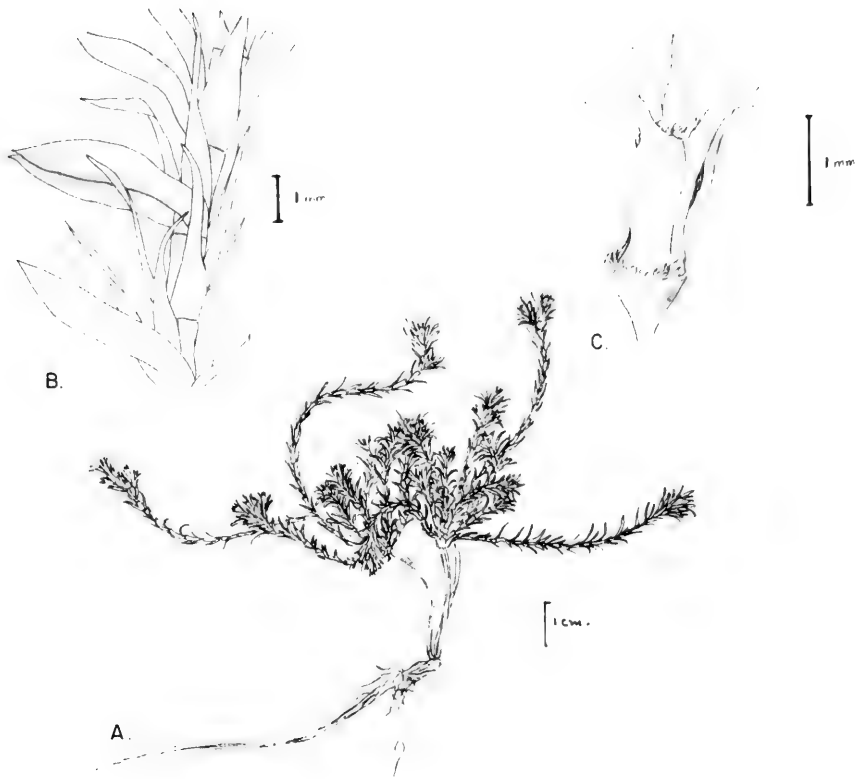

Fig. 3. Paronychia maccartii: A. habit; B. stem, showing leaves and stipules; C. flower. (from isotype, LL).

Co.: 6.5 mi WNW of Riviera, sandy mesquite prairie, King Ranch, Santa Gertrudis Division, 6 Jul 1954, Johnston 541140 (TEX).

Paronychia lundellorum is most closely related to P. setacea but can be distinguished by its larger, more pedicillate flowers and perennial habit. It is largely confined to Southern Texas where it occurs in low, sandy, somewhat saline soils dominated by Spartina grasses. The species is superficially similar to the perennial P. congesta, which is known only from western Jim Hogg County where it occurs in calcareous soils. The latter is readily distinguished by its short, gradually acute, non-reflexed calyx awns and its emarginate (non scarious) sepals.

Previous workers, who looked critically at the type material, and published on the group have annotated these as P. setacea ("unusual form!", Hartman 1976, LL), as P. jamesii var. jamesii (Chaudhri, 1968, TEX) or as P. lindheimeri var. lindheimeri (Chaudhri, 1968; TEX). None of these taxa occurs in the region concerned and most of the confusion seems to stem from the few collections available to these two workers and to the fact that P. lundellorum occurs in a vernal form (relatively open, annual like plants) and an autumnal form (congested, perennials with shorter nodes). This is readily seen in Lundell & Correll 15216 (LL) where both forms are mounted upon the same sheet.

The species is named for Amelia A. and Cyris L. Lundell who together have collected extensively in southern Texas, adding considerably to our knowledge of the flora of this region.

12. PARONYCHIA MONTICOLA Cory (1944)

Paronychia nudata Correll (1966)

In my opinion Paronychia nudata belongs to a group of individuals heretofore designated as P. monticola. The holotype collected by Correll and Wasshausen in Crockett County is essentially like P. monticola; indeed, a paratype and the only other collection of P. nudata cited by Correll (Muller 3097 from Coahuila, Mexico) is cited by Chaudhri (1968) as belonging to P. monticola.

Correll (1970) in his key to species, distinguished P. monticola from P. nudata by the supposedly annual habit of the former and perennial habit of the latter. But, as noted by Chaudhri (1968), P. monticola appears to be a "biennial or, mostly, perennial herb", an observation with which I concur. Correll, in his original description, noted P. nudata to be superficially similar to the perennial P. jamesii but, strangely, did not reckon P. monticola as particularly close, presumably because he thought the latter to be annual, and that the Crockett

Fig. 4. Paronychia congesta: A habit; B. node, showing stipules, base of leaves, and pedicel; C. flower; D. sepal with attached stamen. (from holotype, LL).

Santa Gertrudis Division, 6 Jul 1954, Johnston 541140 (TEX).

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county locality was too removed from the Davis Mountains (type area of P. monticola) to warrant such consideration.

The biological status of Paronychia monticola is moot. It is apparently sympatric with P. jamesii in trans-Pecos Texas and, except for its glabrousity and relatively simple caudex, strongly resembles the highly variable P. jamesii. It is possible that glabrous forms with relatively simple caudices have been singled out for recognition in this instance. But again two distinct species may be involved, with evidence of occasional hybridization, to judge from the variation found in these putative taxa in trans-Pecos Texas. Future field workers should attempt to resolve this problem.

13. PARONYCHIA JAMESII T. & G. (1838)

P. jamesii var. praelongifolia (1966)
P. jamesii var. parviflora Chaudhri (1968)
P. jamesii var. hirsuta Chaudhri (1968)

Paronychia jamesii is by far the most common, widespread, variable species in Texas being represented in the major herbaria by several hundred collections from most counties west of a line from south central Oklahoma to Del Rio (Val Verde Co.) Texas. Core (1943) did not recognize intraspecific taxa in the group but Chaudhri (1968) recognized four varieties:

1) var. jamesii (represented by an overwhelming list of citations); 2) var. hirsuta, exceptionally pubescent forms from Pecos County, Texas; 3) var. parviflora, a small flowered form from the Glass Mountains in Brewster County and; 4) var. praelongifolia, occasional forms with elongated floral bracts, the type being from Guadalupe Mountains, Culberson County, but such forms occur sporadically from Kansas, Colorado, Oklahoma to central Texas. In my opinion these several taxa are but names applied to segregating forms and have no meaningful application in the biological sense. That is, they do not apply to differentiated regional populations.

Literature Cited

Chaudhri, M. N. 1968. A revision of the Paronychiinae. Revis. Paronychiinae. 440 p.

Core, E. L. 1943. The North American species of Paronychia. Amer. Midl. Natur. 26:369-397.

Correll, D. S. 1970. Paronychia. In Manual of the Vascular Plants of Texas. Contr. Tex. Res. Found. 6:625-629.

A NEW SPECIES OF RUSSELLIA (SCROPHULARIACEAE)

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It has been some 25 years since the appearance of Margery Carlson's 1957 monographic treatment of Russellia. This was based upon collections up to about 1955. Since that time numerous new collections from Mexico have inevitably led to the detection of novel taxa, the species described below, from Sinaloa, being one of the more obvious; no doubt study of the Russellia collections assembled at yet other institutions will yield further undescribed taxa. I am grateful to M. C. Johnston for the Latin diagnosis and to Prof. Worthington for freely making available his fine collections from the area of Durango, Mexico.

Russellia worthingtonii B. L. Turner, sp. nov.

Russellia elongata accedens sed corollis parvioribus, inflorescentiis plurifloris foliis amplioribus.

Plants suffruticose up to 1.5 m tall; stems terete, Equisetum-like, 4 to numerous ribs, glabrous. Leaves glabrous, not resinous-lepidote, verticillate on primary shoots, opposite or ternate on the secondary shoots; verticillate leaves lanceolate, much reduced and soon caducous; secondary leaves obliquely ovate to somewhat falcate, 3-6 cm long, 1.5-2.0 cm wide; petioles 0.5-2.0 mm long. Inflorescence an elongate, interrupted "spike" the flowers 15-30 at each node, borne in secund glomerules which arise from a 3-branched system. Peduncles 6-7 mm long, glabrous. Pedicels mostly 2-3 mm long, glabrous. Calyx lobes ca 3 mm long, long-acuminate, glabrous. Corolla glabrous without, "cherry" when fresh; crimson when dried, 9-10 mm long, narrowly tubular, emarginate, the lobes 1.0-1.5 mm long. Capsule ovoid, glabrous, ca. 3 mm across.

TYPE. MEXICO. Sinaloa: 4.9 road mi SW of Santa Lucia (ca. 23 24'N x 105 55'W), ca 3500 ft., open oak forest, 7 Jan 1983, Worthington et al. 9367 (holotype TEX; isotype UMEX).

Russellia worthingtonii, what with its numerous, cherry-colored, flowers borne in secund glomerules, is a strikingly beautiful species, even upon a herbarium sheet. The lower, hollow, stems have the texture and appearance of an Equisetum, being somewhat glaucous and constricted at the nodes. It is clearly related to Russellia elongata Carlson, a species known

only from the type (Sonora: Sapopa Canyon, Rio Maya, Gentry 1287, F), but that species has larger corollas (13-15 mm long) and fewer-flowered inflorescences (3-12 flowers to a glomerule).

It is a pleasure to name the species for one of its only known collectors, Prof. W. D. Worthington of the Biology Dept., University of Texas, El Paso, whose carefully documented, superb collections from the region concerned are a delight to work with.

Literature Cited

Carlson, M. C. 1957. Monograph of the genus Russellia. Fieldiana Bot. 29: 231-292.

REDUCTION OF THE GENUS GONIOGYNA TO CROTALARIA (LEGUMINOSAE)

Velva E. Rudd

California State University, Northridge, Ca. 91330

A species of legume occurring in Sri Lanka, India, and West Pakistan, formerly known as Heylandia latebrosa (L.) DC. and, more recently, as Goniogyna hirta (Willd.) Ali, is now accepted as referable to Crotalaria. Polhill (Kew Bull. 22: 171, 301, 302. 1968) noted that there is no good reason for separating the genus Goniogyna DC. (= Heylandia DC.) from Crotalaria, and placed it in section Calycinae Wight & Arn. As a Crotalaria, a new specific name is required, here proposed as Crotalaria hebecarpa (DC.) Rudd, comb. nov.

The original publication of Goniogyna DC. (Ann. Sci. Nat. Paris 4: 91. Jan 1825) included three species: G. hebecarpa, G. leiocarpa, and G. latebrosa. Later (Prodr. 2: 123. Nov 1825; Mém. Leg. 198. Feb 1826), to honor his illustrator, J. C. Heyland, de Candolle published the genus Heylandia, based on the same three species, with no mention of the earlier generic name. Plate 34 in the Mémoires, reproduced in this paper, is an illustration by Heyland, to whom the genus was dedicated.

In his discussion of Heylandia in the Mémoires (pp. 198-201) de Candolle mentioned its similarity to Crotalaria except that its pods are compressed rather than inflated as in Crotalaria. Bentham concurred, stating "It is closely allied to Crotalaria in which Roxburgh had included it, but is easily known by its constantly axillary inflorescence, and small lenticular pod" (Hook. London Journ. Bot. 2: 471. 1843). In floral and vegetative characters there is apparent close relationship with such species as Crotalaria angulata Mill. (= C. biflora (L.) L.), C. evolvuloides Wight ex Wight & Arn., and C. prostrata Roxb.

As mentioned by Bentham, Roxburgh (Fl. Ind. 3: 271. 1832) recognized this taxon as a Crotalaria, C. uniflora Koenig ex Roxburgh, but cited in synonymy Hallia hirta Willd., the basis of Goniogyna leiocarpa DC., Heylandia leiocarpa DC. and Goniogyna hirta (Willd.) Ali. No other specimen was cited.

Wight and Arnott (Prodr. 180. 1834) maintained Heylandia as a separate genus but combined de Candolle's three species, as H. latebrosa DC., believing them to be states of the same plant, with the pods varying "from glabrous to very hairy on the same specimen". They included in the synonymy, Crotalaria uniflora Koenig ex Roxburgh.

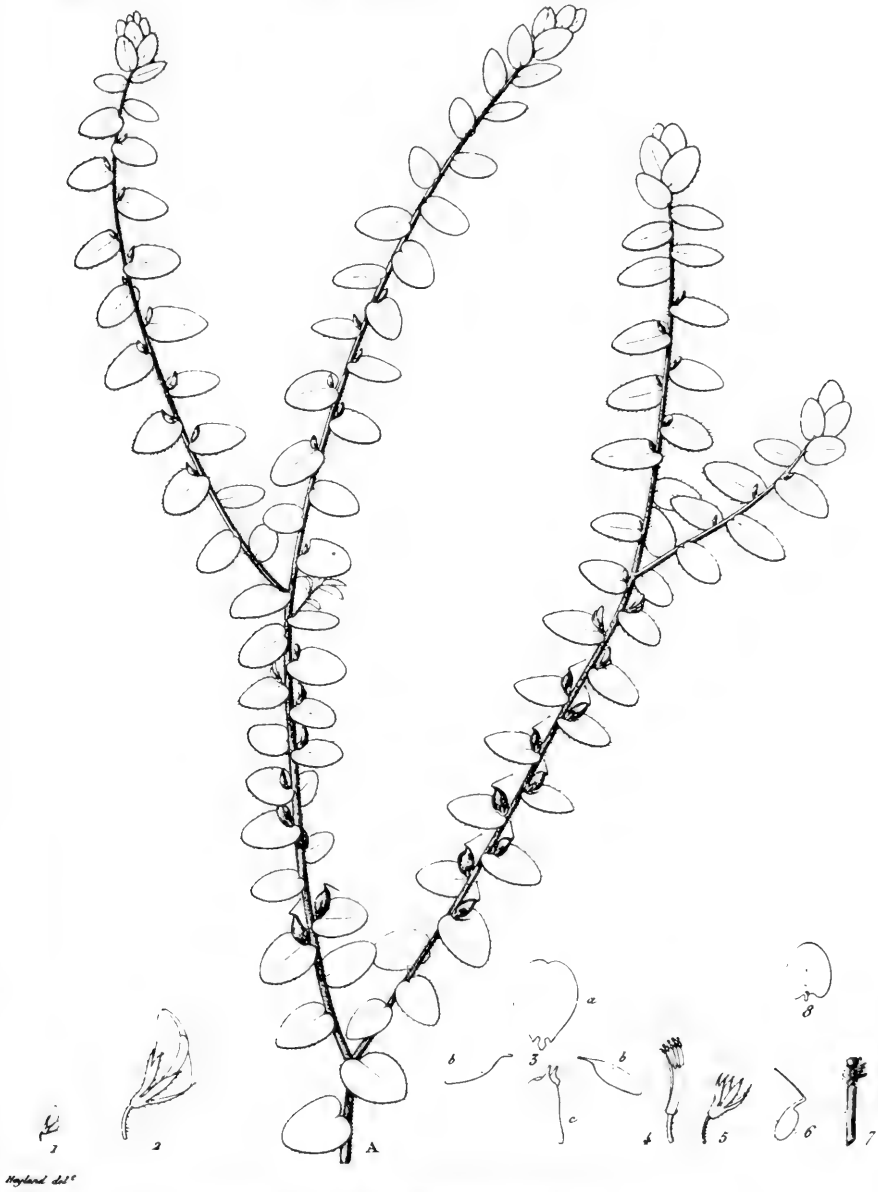

Fig. 1. Copy of plate 34, Heylandia hebecarpa.
A. P. de Candolle, Mémoires sur la Famille de Légumineuses.

Following is the rather lengthy synonymy of this one little species, which will be included, in greater detail, in the treatment of Crotalaria for the Smithsonian Project, A Revised Handbook of the Flora of Ceylon.

CROTALARIA HEBECARPA (DC.) Rudd, comb. nov.

Hallia hirta Willd., Sp. Pl. 3: 1169. 1802. Type: /Koenig ?/, India, Tranquebar. Holotype B-Willd. (microfiche 13750), non Crotalaria hirta Willd. 1803, nec Lag. 1816, nec Roth 1821.

Goniogyna hebecarpa DC., Ann. Sci. Nat. Paris 4: 92. Jan 1825. Type: Leschenault, Ceylon, in 1823. Holotype G-DC; isotype P.

Goniogyna leiocarpa DC., Ann. Sci. Nat. Paris 4: 92. Jan 1825, based on Hallia hirta Willd., non Crotalaria leiocarpa Vog. 1843.

Heylandia hebecarpa DC., Prodr. 2: 123. Nov 1825; Mém. Leg. 200. Feb 1826; tab. 34. Jan 1827, based on the same collection as Goniogyna hebecarpa DC., without reference to the earlier name.

Heylandia leiocarpa DC. Prodr. 2: 123. Nov 1825; Mém. Leg. 200. Feb 1826, based on Hallia hirta Willd., non Crotalaria leiocarpa Vog. 1843.

Crotalaria uniflora Koenig ex Roxb, Fl. Ind. 3: 271. 1832, based on Hallia hirta Willd. given as synonym but, possibly, intended as a new name for the same Koenig collection, non Baker in Oliver, 1871.

Goniogyna hirta (Willd.) Ali, Taxon 16: 463. 1967, based on Hallia hirta Willd.

The third species of Goniogyna, G. latebrosa (L.) DC., Ann. Sci. Nat. Paris 4: 92. Jan 1825 (= Heylandia latebrosa (L.) DC., Prodr. 2: Nov 1825; Mém. Leg. 201. Feb 1826), based on Hedysarum latebrosum L., Mant 2: 270. 1771, was actually described from a galled shoot of a rhamnaceous shrub, Sageretia theezans (L.) Brongn. (Polhill l. c. p. 301; in litt. 1969), therefore is not included in the above list of synonymy. The specimen in the Linnaean herbarium, LINN 921.15, presumably is the holotype. It bears the name of Hedysarum latebrosum in Linnaeus' handwriting but no collector's name or locality is given.

I wish to thank Dr. Roger Polhill who kindly advised me as to the status of various epithets related to this taxon.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCXVII.

THREE NEW SPECIES OF *ADENOSTEMMA*.

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Most problems in the delimitation of the American species of *Adenostemma* were resolved in the study by King and Robinson (1974), and no additions to the genus have been noted from the area during the nearly ten years since that study. It is rather unexpected, therefore, that a limited attempt to identify a single new specimen from Brasil would result in the recognition of the following three new American species.

ADENOSTEMMA FLINTII R. M. King & H. Robinson, sp. nov.

Plantae herbaceae ca. 0.5 m altae? vegetative non vel pauce ramosae. Caules sordido-virides subteretes in sicco sulcati glabri vel subglabri. Folia opposita, petiolis 2-3 cm longis angustis indistincte vel distaliter vix alatis; laminae late ovatae plerumque 4-5 cm longae et 3.5-4.5 cm latae base subtruncatae in medio breviter acuminatae margine lateraliter argute multo serratae apice breviter argute acutae fere ad basem valde trinervatae supra et subtus plerumque glabrae vel subglabrae subtus in nervis sparse vel subdense puberulae. Inflorescentiae in axibus primariis opposito-ramosae in ramis cymoso-ramosae, bracteis primariis minute foliiformibus serrulatis caeteris minutis, ramis ultimis 0.7-1.6 cm longis sensim dense minute puberulis. Capitula late campanulata ca. 5 mm alta et 6 mm lata; squamae involucri ca. 23 subequales biseriatae herbaceae oblongae ad 3.5 mm longae in partibus libris ca. 1.5-2.0 mm longae et 0.7-1.0 mm latae sparse minute puberulae; corollae albae? ca. 2 mm longae, tubis angustis ca. 0.5 mm longis extus sparse minute stipitato-glanduliferis; faucibus ca. 0.8 mm longis inferne subcylindricis superne late infundibularibus extus dense pilosulis, lobis late triangularibus ca. 0.2 mm longis et 0.3 mm latis extus inferne dense puberulis; filamenta in partibus superioribus subcylindrica ca. 0.2 mm longa; thecae ca. 0.5 mm longae; appendices antherarum ca. 0.1 mm longae et 0.2 mm latae; scapi stylorum glabri; appendices stylorum angustae ad 0.2 mm latae. Achaenia 2.5 mm longa leniter curvata subtrigona multo tuberculato-glandulifera; clavulae pappi 3 ca. 0.8 mm longe angustae glanduliferae. Grana pollinis in diametro ca. 20-23 μm.

TYPE: NICARAGUA: 1868. *C. Flint 6* (Holotype: US).

The only species previously known from Central America is the distinctive *A. hirtiflorum* Benth. with its five rather than three knobs on the pappus. The new species differs from the

latter and from all other American species of the genus by the lack of hairs on the shaft of the style. The numerous sharp serrations of the leaf margin are also distinctive.

The species is named for the collector Charles W. Flint.

ADENOSTEMMA GOYAZENSE R. M. King & H. Robinson, sp. nov.

Plantae suffruticosae ad 1.2 m altae inferne pauce ramosae. Caules sordido-virides subteretes in sicco sulcati puberuli. Folia opposita, petiolis 1-3 cm longis distaliter sensim alatis; laminae ovatae plerumque 5-9 cm longae et 1.5-5.0 cm latae base late acutae vel rotundatae in medio valde acuminatae et in petiolis decurrentes margine crenato-serratae apice acutae fere ad basem valde trinervatae supra et subtus sparse puberulae et breviter pilosae subtus in nervis dense puberulae et breviter pilosae. Inflorescentiae in internodis inferioribus elongatis, in bracteis foliiformibus decreascentes inferne non ramosae distaliter pauce capitatae, ramulis ultimis plerumque 1.0-1.7 cm longis dense minute stipitato-glanduliferis. Capitula late campanulata 7-10 mm lata et ca. 7 mm alta; squamae involucri ca. 25-30 subaequales biseriatae herbaceae oblongae 3.5-4.5 mm longae et ca. 1.3 mm latae apice rotundatae extus inferne minute stipitato-glanduliferae superne pilosulae vel scabridulae. Corollae albae? ca. 3.5 mm longae subcylindricae, tubis ca. 0.7 mm longis extus minute stipitato-glanduliferis, faucibus ca. 2.3 mm longis extus glanduliferis et pilosulis, lobis triangularibus ca. 0.5 mm longis et latis extus inferne dense pilosulis; filamenta in partibus superioribus base dilatata ca. 0.2 mm longa; thecae antherarum ca. 1.3 mm longae; appendices antherarum breves ca. 0.1 mm longae et 0.3 mm latae; scapi stylorum distincte hirsuti; appendices stylorum albae grosse inflatae clavatae ad. 0.8 mm latae. Achaenia 2.5-3.0 mm longa leniter curvata subtrigona dense minute stipitato-glandulifera; clavulae pappi 3 ca. 1 mm longae glanduliferae. Grana pollinis in diametro ca. 20 µm.

TYPE: BRASIL: Goias: Município de S. João D'aliança, fazenda Corrente GO. Herbacea de mata inudada alterada com 1,2 m a altura, caule avermelhado, folhas membranaceas, bracteas verdes, flores brancas. 30-XII-1979. *F. C. e Silva & R. C. Mendonça 160* (Holotype, IBGE; isotype, US).

The new species is most distinctive among the members of the genus with erect habits and larger heads by the sparingly branched inflorescence having elongate basal internodes. The species differs further from the more common members of the genus in Brasil by the ovate non-triangular blades of the leaves. The veins of the leaves appear to be more densely pubescent below than in some other members of the genus, and stipitate glands on the inflorescence are rare or lacking in such species as *Adenostemma platyphyllum* Cass. which have similar shaped leaves and similarly broadened style branches.

ADENOSTEMMA VARGASII R. M. King & H. Robinson, sp. nov.

Plantae suffruticosae ad 0.5 m altae pauce ramosae. Caules flavo-virides subteretes in sicco sulcati minute appresse puberuli. Folia opposita, petiolis 2-6 cm longis distaliter sensim alatis; laminae ovatae plerumque 4-12 cm longae et 3-9 cm latae base late acutae vel subtruncatae in medio late acuminatae in petiolis decurrentes margine crenato-serratae vel dentatae apice late acutae fere ad basem valde trinervatae supra et subtus sparse minute appresse puberulae subtus in nervis densius minute puberulae. Inflorescentiae late cymosae multo ramosae, ramis ultimis 3-15 mm longis dense puberulis. Capitula late campanulata ca. 9 mm lata et 6-7 mm alta; squamae involucri ca. 25-30 subaequales biseriatae herbaceae oblongae 3-4 mm longae et ca. 1 mm latae apice rotundatae extus inferne dense puberulae superne glabrae vel sparse pilosae. Corollae virides 3.0-3.5 mm longae in tubis et faucibus inferioribus cylindraceae superne leniter infundibulares, tubis ca. 0.8 mm longis glabris, faucibus inferioribus ca. 0.6 mm longis sparse pilosis superioribus ca. 1.2 mm longis glabris vel subglabris, lobis triangularibus ca. 0.4 mm longis et latis inferne extus dense minute puberulis; filamenta in partibus superioribus base dilatata ca. 0.1 mm longa et lata; thecae antherarum ca. 1 mm longae; appendices antherarum breves ca. 0.07 mm longae et 0.2 mm latae; scapi stylorum distincte puberuli; appendices stylorum albae mediocriter inflatae ad 0.3 mm latae. Achaenia ca. 2 mm longa leniter curvata subtrigona dense tuberculata; clavulae pappi 1-2 vestigiales 0.3-0-4 mm longae plerumque ad 0.25 mm latae non glanduliferae. Grana pollinis in diametro ca. 23 µm.

TYPE: PERU: Cuzco: Prov. Paucartambo. Kosñipata: Pilcopata-Atalaya. Terrenos roasados. Alt. 450-550 m. 5 de agosto 1956. *C. Vargas 11283* (Holotype, US). PARATYPES: PERU: Cuzco: Paucartambo. Atalaya-Pilcopata. borde monte. Alt. 720 m. 16 Nov. 1964. *C. Vargas 15750* (US); Atalaya, hillside & riverbank near jct. Rio Carbon with Rio Alto Madre de Dios. Shrub ½ m. Aug. 6-7, 1974. *Robin B. Foster 3019 with W. A. Foster, H. Brokaw & M. Brokaw* (US).

The three specimens, from a restricted area in the Dept. of Cuzco in Peru, were first noted because of a greenish color of the corollas in well-preserved material. The related *Adenostemma platyphyllum* Cass., to which the species is related and with which it has been confused, always seems to have a reddish color in the corolla throat. The distinct nature of the new species is proven by the comparatively vestigial nature of the pappus, a feature that seems to explain the restricted distribution of the species. The species also has style branches less enlarged than those of *A. platyphyllum* but not as small as those of the other species found in Peru, *A. fosbergii* K.& R.

Adenostemma flintii R. M. King & H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

Adenostemma goyazense R. M. King & H. Robinson, Isotype, United States National Herbarium.

Adenostemma vargasii R. M. King & H. Robinson, Holotype, United States National Herbarium.

Enlargements of heads of *Adenostemma*. Top. *A. flintii*. Middle. *A. goyazense*. Bottom. *A. vargasii*.

King, R. M. and H. Robinson 1974. Studies in the Eupatorieae (Asteraceae). CXXVII. Additions to the American and Pacific Adenostemmatinae. *Adenostemma, Gymnocoronis* and *Sciadocephala*. Phytologia 29 (1): 1-20.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCXVI.

VARIOUS NEW SPECIES FROM THE ANDES AND PANAMA.

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New species of Eupatorieae are described here in the genera *Aristeguietia, Ageratina, Cronquistianthus, Hebeclinium* and *Koanophyllon* from Panama, Colombia and northern Peru. The specimens are from various sources and include both older and recent collections.

ARISTEGUIETIA URIBEI R. M. King & H. Robinson, sp. nov.

Plantae fruticosae ca. 1 m altae mediocriter vel multo ramosae. Caules teretes dense brunneo-hirsuti. Folia opposita subsessilia; laminae ovatae 1.2-2.5 cm longae et 0.8-1.7 cm latae base cordatae margine multo crenato-dentatae mediocriter reflexae apice breviter acutae base vel fere ad basem leniter trinervatae supra leniter bullatae glabrae vel submargine sparse scabridae subtus dense hirsutae in nervis et nervulis prominentes. Inflorescentiae in ramis terminales subdense corymbosae, ramis ascendentibus, ramis ultimis plerumque 7-16 mm longis dense hirsutis. Capitula ca. 10 mm alta et 6-7 mm lata; squamae involucri ca. 30 distincte subimbricatae ca. 4-seriatae persistentes lineares 3-8 mm longae ca. 0.8 mm latae apice breviter acutae margine puberulae extus anguste leniter bicostatae glabrae. Flores ca. 20 in capitulo; corollae violascentes 5.5-6.0 mm longae anguste infundibulares extus glabrae, tubis ca. 1.5 mm longis, faucibus ca. 3 mm longis, lobis longe triangularibus ca. 0.8 mm longis et 0.5 mm latis; filamenta in parte superiore ca. 0.5 mm longa; thecae antherarum ca. 1.5 mm longae; appendices antherarum ca. 0.3 mm longae et 0.25 mm latae; appendices stylorum ad 0.3 mm latae. Achaenia 3.0-3.5 mm longa plerumque in costis dense scabridulae; carpopodia perbreviter obturaculiformia, cellulis parvis subquadratis; setae pappi ca. 45-48 robustiores ad 6 mm longae distaliter angustiores apice acutae. Grana pollinis in diametro ca. 25 µm.

TYPE: COLOMBIA: Boyaca: Ventaquemada, bosques al occidente de la Carretera Central en el km 106. Alt. 2900 m. Arbustillo de cerca de 1 metro. Inflorescencias de bello color violeta. dic. 1972. *Lorenzo Uribe Uribe 765l* (Holotype, US).

The new species is distinctive in its subsessile leaves with cordate bases. It resembles *A. glutinosa* of Ecuador in the cordate bases and bullate upper surfaces of the leaves, but

s evidently not very closely related, having a basically trinervate rather than pinnate venation. Although there is no doubt of the generic placement, the carpopodium of the new species differs from those of other *Aristeguietia* species by its short subquadrate rather than oblong cells.

AGERATINA (Typical) BISHOPII R. M. King & H. Robinson, sp. nov.

Plantae suffruticosae in parte ca. 15 cm altae multo ramosae. Caules flavo-brunnescentes subteretes dense puberuli, internodis plerumque 5-10 mm longis. Folia opposita, petiolis 2-4 mm longis; laminae ovatae 7-15 mm longae 4-9 mm latae base rotundatae vel subtruncatae margine 3-5-crenato-serrulatae apice breviter acutae fere ad basem trinervatae supra et subtus sparse puberulae subtus in nervis densiores. Inflorescentiae laxe ramosae, ramis ultimis 14-30 mm longis dense minute puberulis. Capitula 5 mm alta et 3-5 mm lata; squamae involucri ca. 20 eximbricatae biseriatae anguste ellipticae 2.5-3.5 mm longae 0.5-0.8 mm latae apice obtusae extus bicostatae sparse puberulae. Flores 25-32 in capitulo; corollae albae ca. 3 mm longae, tubis 1.2 mm longis perangustatis glabris, faucibus abrupte breviter campanulatis ca. 1.3 mm longis ad 1 mm latis extus base et apice sparse pilosulis superne longiores intus inferne pauce breviter pilosulis, lobis triangularibus 0.7 mm longis et latis extus longe pilosulis intus distincte laxe papillosis; filamenta in parte superiore 0.2 mm longa; thecae antherarum ca. 0.6 mm longae; appendices antherarum ca. 0.2 mm longae et 0.15 mm latae; basi stylorum leniter nodulifieri; rami stylorum dense papillosi. Achaenia subfusiformia ca. 2 mm longa in costis inferne scabridula superne setulifera; carpopodia cylindrica, cellulis elongatis; setae pappi ca. 20 facile deciduae ca. 2.5 mm longae distaliter vix latiores, scabris inferioribus contortis apice rotundatae; seriebus exteriores subnullis. Grana pollinis in diametro ca. 20-23 μm.

TYPE: PERU: Amazonas: 40 kms along road from Leimebamba SW towards Celendin. Elevation ca. 8400 ft. Herb in pasture, flowers white. 19 January 1983. *R.M.King & L.E.Bishop 9246* (Holotype, US).

The new species is similar in habit to *A. scopulorum* (Wedd.) K.& R., but it has smaller heads and has shorter broader throats in the corolla. Actual closest relationship seems to be to *A. choricephaloides* (B.L.Robins.) K.& R. which is generally a more robust plant, often subscandent, with larger slightly cordate-based leaf blades. The latter typical also bears stipitate glands on the pedicels, a feature not seen in the available material of the new species. The corolla of *A. bishopii* has a corolla throat generally broader and shorter than those of relatives with comparatively larger lobes, and the type shows hairs on the inner of the corolla throat near the base unlike any related species. The species is named for the collector, Luther Earl Bishop.

AGERATINA (Andinia) BARCLAYAE R. M. King & H. Robinson, sp. nov.

Plantae fruticosae ca. 0.5 m latae mediocriter ramosae. Caules brunnescentes teretes dense articulate hirsuti. Folia opposita, petiolis 5-10 mm longis dense hirsutis; laminae late ellipticae 6-9 cm longae et 2.2-4.0 cm latae base acutae margine obscure serrulatae interdum anguste reflexae apice obtusae vel breviter acutae supra et subtus sparse hirsutae in nervulis prominulae, nervis primariis utrinque dense hirsutis subtus prominentibus, nervis secundariis pinnatis utrinque ca. 6. Inflorescentiae in ramis terminales late corymbosae ascendentiter ramosae, ramis ultimis plerumque 10-15 mm longis dense hirsutis. Capitula ca. 10 mm alta et 8-10 mm lata; squamae involucri ca. 15 eximbricatae 1-2-seriatae 6-7 mm longae et 1.0-1.5 mm latae apice acutae extus leniter bicostatae distincte hirtellae. Flores ca. 35-40 in capitulo; corollae distaliter rubro-violaceae ca. 7 mm longae leniter infundibulares extus glabrae, tubis ca. 3 mm longis, faucibus ca. 3 mm longis, lobis triangularibus ca. 1 mm longis et 0.7 mm latis intus dense breviter papillosis; filamenta in parte superiore ca. 0.5 mm longa, cellulis plerumque subquadratis; thecae antherarum ca. 2 mm longae, cellulis quadratis; appendices antherarum ca. 0.25 mm longae et 0.3 mm latae; basi stylorum non noduliferi; appendices stylorum dense breviter papillosae apice subtruncatae. Achaenia submatura ca. 3.5 mm longa dense breviter glandulifera et sparse scabridula; carpopodia breviter obturaculiformia, cellulis quadratis; setae pappi ca. 28 subpersistentes ca. 7.5 mm longae distaliter pallide lavandulae leniter latiores apice acutae; seriebus exteriores brevibus plerumque 0.3-0.4 mm longae. Grana pollinis in diametro ca. 40 µm.

TYPE: COLOMBIA: Magdalena: Sierra Nevada de Santa Marta, alrededores de cabeceras de Rio Sevilla. Under trees of bosque (low forest) on north facing slope below and west of campsite, Sta. 10. Alt. cerca 3330 m. Stem covered with jointed brown hairs. Leaf blades to 9 X 4 cm, lighter with darker veins and more hairs below. Involucre green hairy; no rays; disc flowers light red-violet, deeper at tips; pappus pink to light red-violet. Jan. 27, 1959. *Harriet G. Barclay & Pedro Juajibioy 6724* (Holotype, US).

The species has the general appearance of the subgenus Andinia and in spite of the slight immaturity of the heads, the species shows details that justify such a placement. Still, the species, like many from Santa Marta, is unusual in the genus, both in the lack of a basal node on the style and in the dense hirsute pubescence on stems, leaves, and inflorescence. The other Colombian species lacking a basal stylar node, *A. crassiceps* (B.L.Robins.) K.& R., is an essentially glabrous glutinous plant with fewer noding heads and subimbricate graduated involucral bracts. The densely glanduliferous and sparsely scabridulous achenes with somewhat thickened walls in part of the carpopodium mark the new species, but also occur in some other members of the subgenus. The retrorse position of the leaves in

the type may be an artifact of pressing.

The species is named in honor of the collector, Harriet G. Barclay.

AGERATINA (Andinia) BOEKEI R. M. King & H. Robinson, sp. nov.

Plantae fruticosae ad 3 m altae mediocriter ramosae. Caules atro-brunnescentes valde costati dense grosse pilosi vel hirsuti. Folia opposita, petiolis 5-10 mm longis; laminae anguste ellipticae subsessiles plerumque 9-17 cm longae et 1.5-3.5 cm latae in ramis ca. 5 cm longae et ca. 1.5 cm latae base anguste acutae leniter acuminatae margine integrae vel subintegrae saepe anguste revolutae apice subacutae vel leniter acuminatae supra planae sparse pilosae subtus pallidiores sparse pilosae in nervis et nervulis prominentes et prominulae, nervis secundariis pinnatis utrinque plerumque 5-10. Inflorescentiae late dense corymbosae, ramis late divaricatis, ramis ultimis 1-3 mm longis dense hirtellis. Capitula ca. 8 mm lata et 5 mm lata; squamae involucri ca. 17 leniter subimbricatae 2-3-seriatae anguste oblongae 2.5-4.5 mm longae et 0.7-1.5 mm latae apice obtusae interdum denticulatae extus leniter 4-costatae glabrae vel sparse puberulae. Flores 12-15 in capitulo; corollae albae ca. 5.5 mm longae leniter infundibulares extus sparse glanduliferae in tubis densiores, tubis ca. 1.8 mm longis, faucibus ca. 3 mm longis, lobis triangularibus ca. 0.7 mm longis et 0.5 mm latis intus dense breviter papillosis; filamenta in parte superiore ca. 0.4 mm longa; thecae antherarum ca. 1.5 mm longae; appendices antherarum ca. 0.3 mm longae et ca. 0.2 mm latae; basi stylorum leniter nodulosi; appendices stylorum dense breviter papillosae. Achaenia ca. 3 mm longa dense glandulifera, scabris brevibus plerumque in cellulis uniseriatis in costis dispositis; carpopodia perbreviter obturaculiformia leniter rotundata, cellulis quadratis; setae pappi ca. 25 plerumque 3.0-4.5 mm longae persistentes subscabridae distaliter non vel vix latiores apice breviter acutae; seriebus exteriores sparsae ad 0.4 mm longis. Grana pollinis in diametro ca. 28 μm.

TYPE: PERU: Amazonas: Prov. Chachapoyas. Leimebamba-Lajasbamba trail. Lajasbamba. Elfin forest. Shrub ca. 3 m. Heads white. 27 June 1977. *Jef D. Boeke 2024* (Holotype, US).

The new species is a coarser more pubescent plant with larger leaves and more ribbed stems than other members of the subgenus in Peru. The species has none of the glutinous stem and leaf surface found in *A. wurdackii* which occurs in the same general area. The new species has some resemblance to the Colombian and Venezuelan member of the subgenus, *A. neriifolia* (B.L.Robins.) K.& R., but the latter plant seems less coarse in all parts, lacks the ribs on the stems, and has slender petioles and leaf tips. The uniseriate scabri of the achene are rather distinctive. Both this and the previous species have pollen grains larger than found in most Eupatorieae, but the present species is less exceptional than the preceding.

The new species is named in honor of the collector, Jef Boeke.

CRONQUISTIANTHUS BISHOPII R. M. King & H. Robinson, sp. nov.

Plantae fruticosae ca. 1 m altae mediocriter ramosae. Caules sordido-flavi subteretes et striati dense lanati. Folia opposita, petiolis distinctis 1-2 cm longis; laminae ovatae 6-10 cm longae et 3.0-4.5 cm latae base rotundatae margine multo crenato-serratae apice breviter acutae supra bullatae dense pilosulae subtus albo-lanatae, nervis secundariis pinnatis utrinque ca. 8-11. Inflorescentiae in ramis terminales late corymbosae ca. 16 cm altae et 12 cm latae, ramulis ultimis plerumque 1-2 mm longis dense lanatis. Capitula ca. 7 mm alta et 3 mm lata; squamae involucri flavo-brunnescentes ca. 18 distincte subimbricatae 3-seriatae 1.5-5.0 mm longae et 1.0-1.7 mm latae apice rotundatae vel vix obtusae extus 4-costatae exteriores sparse minute glandulo-punctatae et sparse puberulae caetera glabrae. Flores ca. 14 in capitulo; corollae albae ca. 4 mm longae leniter infundibulares, tubis ca. 2 mm longis glabris, faucibus e tubis indistincte demarcatis ca. 1.5 mm longis extus persparse glanduliferis intus fere ad basem antherarum valde plicatis, lobis triangularibus 0.45 mm longis et 0.4 mm latis extus dense glanduliferis; filamenta in parte superiore ca. 0.4 mm longa, cellulis in parietibus valde annulate ornatis; thecae antherarum ca. 0.8 mm longae; appendices antherarum ca. 0.2 mm longae et 0.17 mm latae; appendices stylorum dense breviter papillosae. Achaenia 1.8-2.0 mm longa 5-costata plerumque in costis longe setulifera; carpopodia obturaculiformia ca. 0.35 µm lata et 0.2-0.35 µm longa distincte asymmetrica; setae pappi ca. 40 plerumque 2.5-3.5 mm longae apice tenuiores argute acutae. Grana pollinis in diametro ca. 20 µm.

TYPE: PERU: Amazonas: Mountains behind Tingo. Elev. ca. 7000 ft. Shrub one meter tall, flowers whitish. 21 January 1983. *R.M.King & L.E.Bishop 9281* (Holotype, US).

The new species is thoroughly distinctive in the genus by the densely lanate stems and leaf undersurfaces. The plant is also larger with larger leaf blades than seen in most members of the genus. The well-developed flanges on the inside of the corolla around the bases of the anther filaments are reminescent of those in *C. kalenbornianus* which may indicate some relationship.

The species is named in honor of Luthur Earl Bishop who collected the specimen.

CRONQUISTIANTHUS LOPEZ-MIRANDAE (Cabrera) R.M.King & H.Robinson, comb. nov. *Eupatorium lopezmirandae* Cabrera, Bol. Soc. Argent. Bot. 10: 21. 1962. The species was originally described by Cabrera from the interior of the Dept. of La Libertad in Peru, close to the border of Cajamarca. A second specimen has now been seen, from southeastern Cajamarca along the Quebrada de San

Vicente, southwest of Cajamarca, at 2700 m alt. June 11-12, 1948. collected by *F. W. Pennell 15486* (PH). On the basis of the closeness of the localities and close match with the description, there is no reason to doubt that a single species is involved. Still, on the basis of the new specimen, it would seem that Cabrera illustrated the tips of the involucral bracts too narrowly. The bracts in the Pennell specimen do not obviously taper and they have rounded tips as in other species of the genus. The most obvious distinction of the species is the short pappus, less than 1 mm long. A somewhat shortened pappus, about half as long as the corolla, also occurs in another Peruvian species, however, *C. infantesii* K.& R., also of La Libertad. A greater reason for excluding the Cabrera species from the genus would be the comparatively weak asymmetry of the carpopodium, but the asymmetry is most obvious where it is most helpful, on the surface. The cells of the corolla have a slight development of oxalate crystals, a feature almost unknown in the tribe even to the slight extent involved. The only other example that has been observed is in the same genus in *C. kalenbornianus* (B.L.Robins.) K.& R.

HEBECLINIUM KNAPPII R. M. King & H. Robinson, sp. nov.

Plantae suffruticosae ca. 1 m altae mediocriter ramosae. Caules rubescentes tenues subteretes striati sparse appresse pilosuli. Folia opposita, petiolis 4-7 mm longis; laminae oblongo-ovatae membranaceae 7-13 cm longae et 3-4 cm latae base late rotundatae margine remote serratae apice anguste acuminatae supra et subtus subglabrae laeves in nervis et nervulis sparse appresse puberulae, nervis secundariis pinnatis utrinque 3-4 arcuatis sensim valde ascendentibus. Inflorescentiae in ramis terminales laxe ramosae dense ramulosae corymbosae, ramis ultimis tenuibus 1-6 mm longis minute puberulis. Capitula 5-6 mm alta et ca. 4 mm lata; squamae involucri ca. 30 distincte subimbricatae ca. 4-seriatae anguste oblongae vel lanceolatae 1.5-4.0 mm longae et 0.4-0.6 mm latae apice obtusae extus anguste 4-costatae sparse minute puberulae. Flores ca. 34 in capitulo; corollae albae ca. 3 mm longae leniter infundibulares, tubis cylindraceis ca. 1.5 mm longis extus glabris, faucibus ca. 1.5 mm longis base et distaliter sparse puberulis, lobis triangularibus ca. 0.3 mm longis et latis extus dense puberulis, setis uniseriatis apice rotundatis; filamenta in parte superiore ca. 0.2 mm longa; thecae antherarum ca. 1 mm longae; appendices antherarum ca. 0.2 mm longae et 0.15 mm latae; appendices stylorum filiformes subflexuosae subteretes leniter mamillosae apice vix latiores. Achaenia ca. 1.7 mm longa leniter curvata in costis superne uniseriate setulifera; carpopodia indistincta, cellulis tenuis; setae pappi ca. 35-40 contigues ca. 3 mm longae distaliter vix latiores apice acutae. Grana pollinis in diametro ca. 20 µm.

TYPE: PANAMA: Darien: Top of ridges separating Río Jaqué

Valley from Pacific Ocean; 7°26'N, 78°05'W. Tropical wet forest; elev. 300-500 m. Herb 1.0 m; flowers white; leaves purple beneath. 24 January 1982. *S.Knapp & J.Mallet 3090* (Holotype, US; isotype, MO).

The new species is one of a group of slender-stemmed acuminate-leaved species from Colombia and Panama including *H. lellingeri* K.& R. and *H. gentryi* K.& R. The former from the Chocó in Colombia differs most by the acute leaf bases, the more glabrous stems leaves and involucral bracts, the fewer hairs on the corolla lobes, the minute glands on the achenes, and the distinct enlargements on the tips of the pappus bristles. The latter species, *H. gentryi*, also from the Chocó, is much closer to *H. knappii*, but differs by the lanate stems and leaf veins, the shorter more ovate leaves with obtuse bases, the somewhat longer petioles, the densely puberulous rounded tips on the involucral bracts, the more numerous usually ca. 5-seriate involucral bracts, and the seemingly more flexuous style branches.

The species is named in honor of the collector, Sandra Knapp.

KOANOPHYLLON SAGASTEGUII R. M. King & H. Robinson, sp. nov.

Plantae suffruticosae ad 1 m altae mediocriter ramosae. Caules brunnescentes subteretes leniter striati dense breviter puberuli. Folia opposita, petiolis tenuibus 5-15 mm longis; laminae ovatae 2-6 cm longae et 1.2-3.2 cm latae base late rotundatae supra basem trinervatae margine utrinque 8-15-serrulatae apice breviter argute acuminatae supra dense hirtello-pilosulae et minute glandulo-punctatae subtus pallidiores breviter dense tomentellae obscure glandulo-punctatae. Inflorescentiae in ramis terminales pyramidaliter thyrsoideo-paniculatae in ramis subdense corymbosae, ramis ultimis 3-12 mm longis dense puberulis. Capitula ca. 1 cm alta; squamae involucri ca. 15 minime subimbricatae 2-3-seriatae lanceolatae 3-5 mm longae et 0.5-0.8 mm latae apice anguste acutae extus leniter bicostatae breviter puberulae et sparse minute glandulo-punctatae. Flores ca. 25 in capitulo; corollas albae ca. 4.5 mm longae, tubis ca. 2 mm longis cylindraceis glabris, faucibus ca. 2 mm longis leniter infundibularibus glabris, lobis triangularibus ca. 0.6 mm longis et 0.5 mm latis extus multo glandulo-punctatis obsitis; filamenta in parte superiore ca. 0.35 mm longa; thecae antherarum ca. 1.3 mm longae; appendices antherarum oblongo-ovatae ca. 0.27 mm longae et 0.2 mm latae ad medio exaratae; rami stylorum distaliter vix vel non latiores. Achaenia 3.5-3.8 mm longa dense glandulifera sparse breviter scabro-setulifera inferne leniter angustiores; carpopodia perbreviter obturaculiformia; setae pappi ca. 30 plerumque ca. 4.5 mm longae distaliter distincte leniter latiores et scabriores. Grana pollinis in diametro ca. 20 µm breviter papillate spinulifera.

TYPE: PERU: Cajamarca: Dept. Cajamarca. El Molino (San

Pablo). Alt. 2320 m. Sufrútice con capítulos blanquecinos. 22 Mayo 1975. *A.Sagastegui A. & J.Cabanillas S. 8011* (Holotype, IJ; isotype, US)

The pyramidal inflorescence and weakly subimbricate involucre might suggest relationship to the typical element of the genus, but the anther appendages are distinctly longer than wide, a feature seen in the genus thus far only in various atypical members. The lack of broadened tips on the style branches is also unusual though not unique in the genus. The corolla lobes of the species are only slightly longer than wide, but most other species of the genus have the lobes consistently slightly shorter than wide. The species can be most easily identified by the short sharp acuminations of the leaves and the soft pubescence on the leaf undersurface.

The new species is named in honor of the collector, Abundio Sagastegui Alva of the Universidad Nacional de Trujillo in Peru.

Aristeguietia uribei R. M. King & H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

Ageratina bishopii R. M. King & H. Robinson, Holotype, United States National Herbarium.

Ageratina barclayae R. M. King & H. Robinson, Holotype, United States National Herbarium

PLANTS OF PERU

Depto. Amazonas Prov. Chachapoyas
Leimebamba-Lajasbamba trail.

JEF D. BOEKE. June 1977

UNITED STATES

2852732

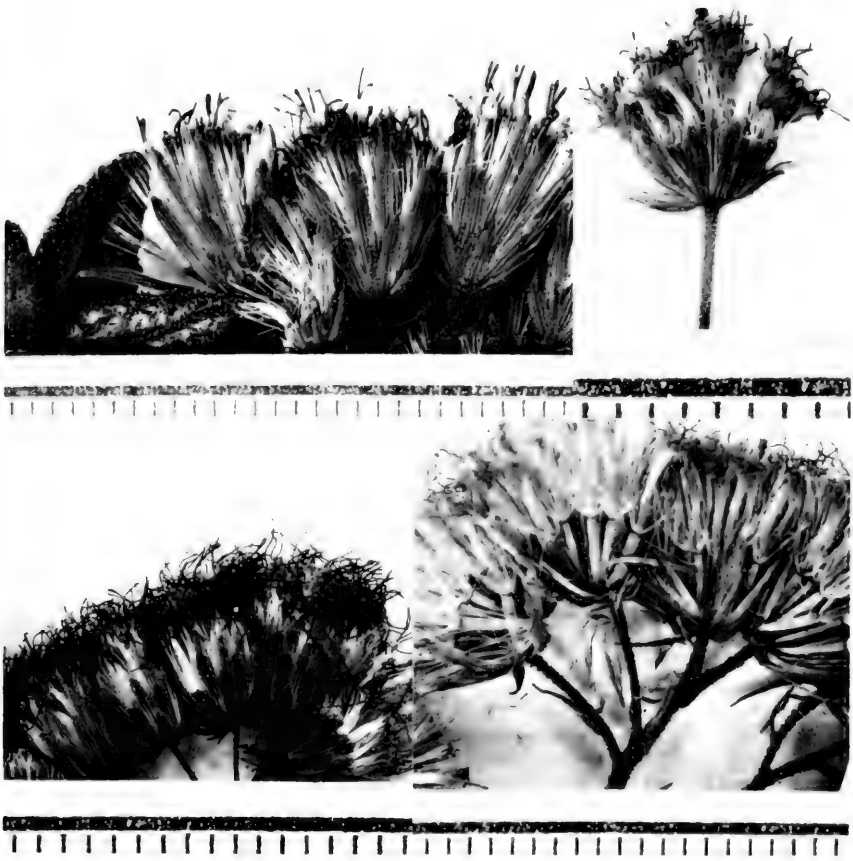
NATIONAL HERBARIUM

Ageratina boekei R. M. King & H. Robinson, Holotype, United States National Herbarium.

Cronquistianthus bishopii R. M. King & H. Robinson, Holotype, United States National Herbarium.

Hebeclinium knappii R. M. King & H. Robinson, Holotype, United States National Herbarium.

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



Enlargements of heads. Top left. *Aristeguietia uribei*. Top right. *Ageratina bishopii*. Bottom left. *Hebeclinium knappii*. Bottom right. *Koanophyllon sagasteguii*.

STUDIES IN THE HELIANTHEAE (ASTERACEAE). XXX.

FOUR NEW SPECIES FROM PERU.

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Recent specimens from Peru collected by R. M. King and L. E. Bishop include representatives of four undescribed species of the tribe Heliantheae. The species are described here to allow duplicates to be distributed under the names.

HELIANTHOPSIS BISHOPII H. Robinson, sp. nov.

Plantae subarborescentes ad 3 m altae mediocriter vel multo ramosae. Caules subhexagonales dense flavo-lanati; pilis base vermiformibus apice perelongatis nematiformibus. Folia alterna, petiolis 5-13 mm longis dense lanatis; laminae ovatae vel anguste ovatae plerumque 3-6 cm longae et 0.8-2.0 cm latae base breviter acutae margine integrae anguste reflexae apice anguste acutae vel acuminatae fere ad basem leniter trinervatae supra atro-virides minute subbullatae dense scabridae subtus dense flavo-tomentosae vel lanatae. Inflorescentiae in ramis foliosis terminales sessiles unicapitatae. Capitula ca. 2 cm alta, involucra ca. 3 cm lata dense sordido-lanata; squamae involucri 45-50 ca. 4-seriatae reflexae lanceolatae 12-17 mm longae et 3-4 mm latae apice anguste acutae vel leniter acuminatae supra serisceae interiores glabrae subtus lanatae; paleae atrescentes oblongo-ellipticae ad 9 mm longae ca. 3 mm latae apice erectae breviter acutae extus glabrae in medio anguste carinatae. Flores radii ca. 30 in capitulo; corollae flavae ca. 30 mm longae in tubis 2.5 mm longis in laminis ad 3.2 mm latae apice anguste bidentatae extus pilosulae et minute glanduliferae in tubis densiores. Achaenia radii sterilia. Flores disci ca. 250 in capitulo; corollae inferne flavae distaliter nigrescentes 7 mm longae, tubis ca. 2 mm longis extus scabridis superne densiores, faucibus longe campanulatis 3.5 mm longis extus base dense scabridulae, lobis triangularibus ca. 1.5 mm longis et 0.8 mm latis vix scabridis; filamenta antherarum in parte superiore ca. 0.2 mm longa; thecae antherarum nigrae ca. 2.7 mm longae; appendices antherarum nigrescentes ovatae ca. 0.6 mm longae et 0.4 mm latae extus pauce glanduliferae. Achaenia disci sub-matura ca. 4 mm longa et 1 mm lata glabra; subulae pappi pallidae deciduae lineari-lanceolatae ca. 3 mm longae inferne ad 0.3 mm latae. Grana pollinis in diametro ca. 38 µm longe anguste spinulosa.

TYPE: PERU: Cajamarca: 62 kms NE of Cajamarca along the road to Celendin. Elevation 11,000 ft. Small tree to 3 meters

tall, ray flowers yellow, disc yellow-brown. 9 January 1983. *R. M. King & L. E. Bishop 9141* (Holotype, US).

Helianthopsis bishopii would key roughly in Robinson (1979) to *H. stuebelii* (Hieron.) H. Robins. also of northern Peru, but the latter has non-lanate stems and has more branching inflorescences with longer pedunculate heads. The new species actually seems closest to the more recently described *H. smithii* Ferreyra (1980) from the neighboring region of La Libertad, but the latter seems to be a smaller plant in all its parts with somewhat fewer flowers in the heads and yellow disc corollas and anther appendages. The latter also has more numerous and more prominent hairs on the lower half of the disc corolla throat.

HELIANTHOPSIS UTCUBAMBENSIS H. Robinson, sp. nov.

Plantae suffruticosae ad 1.5 m altae mediocriter ramosae. Caules brunnescentes teretes hispidi. Folia alterna; petiolis plerumque 1-2 cm longis; laminae ovatae vel anguste ovatae 4-10 cm longae et 1.5-4.5 cm latae base acutae vel leniter acuminatae base vel fere ad basem ascendentiter trinervatae margine subintegrae vel serrulatae planae apice anguste acutae vel distincte acuminatae supra minute velutinae subtus cinereo-tomentellae. Inflorescentiae terminales divaricate ramosae foliosae pauce capitatae, ramis ultimis maturitatis plerumque 2-4 cm longis dense hispidulis. Capitula 8-9 mm alta et ca. 12 mm lata; squamae involucri ca. 18-20 bi-tri-seriatae oblongo-lanceolatae 6-7 mm longae et ca. 2 mm latae apice acutae reflexae extus et distaliter intus dense hirtellae vel subtomentellae; paleae oblongo-ovatae ca. 5.5 mm longae et 1.5 mm latae apice acutae et in squamis interioribus reflexae extus sparse vel dense puberulae in medio prominule costatae. Flores radii ca. 12 in capitulo; corollae flavae ca. 10 mm longae in tubis ca. 1.5 mm longae et in laminis ad 4.2 mm latae apice late bi-tri-lobatae extus scabridulae et puberulae superne in costis densiores, glandulis minutis plerumque inter costam dispositis. Achaenia radii sterilia. Flores disci ca. 50-60; corolla flavae 4.5-5.0 mm longae extus scabridulae in faucibus in nervis densiores, tubis 1.0-1.5 mm longis, faucibus longe anguste campanulatis 2.0-2.5 mm longis, lobis ca. 1.0 mm longis et 0.7 mm latis submargine densius puberulentibus; filamenta antherarum in parte superiore ca. 0.25 mm longa; thecae antherarum pallidae ca. 1.7 mm longae; appendices antherarum ovatae ca. 0.4 mm longae et 0.3 mm latae extus saepe glanduliferae. Achaenia disci ca. 3 mm longa et 1.3 mm lata sericeo-setulifera; subulae pappi pallidae deciduae lineari-lanceolatae ca. 2.3 mm longae inferne eroso-alatae ad 0.3 mm latae. Grana pollinis in diametro ca. 27 μm longe spinulosa.

TYPE: PERU: Amazonas: Rio Utcubamba Valley, 3 kms along road S of Tingo. Elevation ca. 5500 ft. Shrub to 1½ meters tall, flowers yellow. 21 January 1983. *R. M. King & L. E. Bishop 9271* (Holotype, US). PARATYPES: PERU: Amazonas: 3 kms E

of Chachapoyas along road to Mendoza. Elevation ca. 7000 ft. Rays yellow, disc greenish yellow. 12 January 1983. *R. M. King & L. E. Bishop 9155* (US); 6 kms along road W of Chachapoyas. Elevation ca. 6600 ft. Shrub 1½ meters tall, flowers yellow. 13 January 1983. *R. M. King & L. E. Bishop 9193* (US).

Helianthopsis utcubambensis is clearly a member of the species group in northern Peru having pale anther thecae (Robinson, 1979), and is geographically close to or sympatric with the other members of the group. The heads are of the size range nearest *H. matthewsii* (Hochr.) H.Robinson and *H. verbesinoides* (H.B.K.) H.Robinson but have reflexed involucral bracts and palea tips as in the more recently described *H. hutchisonii* H. Robinson and *H. sagasteguii* H. Robinson. Of the latter two, the inflorescence is more branched and foliose as in *H. sagasteguii*, but the pubescence is much smaller, nearer that of *H. hutchisonii*. The two related species seem to be separated somewhat geographically from the new species by being from Cajamarca in the Rio Maranõn Valley at the eastern edge of Amazonas. The related species may be separated seasonally also, both having been collected in May while the present specimens are mature in January.

PERYMENIUM BISHOPII H. Robinson, sp. nov.

Plantae suffruticosae ad 0.5 m altae inferne mediocriter vel multo ramosae. Caules atro-brunnescentes subteretes vel subhaxagonales dense longe albide antrorse scabridi. Folia opposita; petiolis 1-2 mm longis; laminae ellipticae vel oblongo-lanceolatae plerumque 1-3 cm longae et 0.3-0.9 cm latae base acutae margine obscure subserrulatae leniter anguste reflexae apice anguste acutae fere ad basem valde trinervatae supra atro-virides microbullatae dense albo-scabridae subtus dense appresse canescentiter strigosae, pilis in parietibus rugulosis. Inflorescentiae in ramis terminales laxe ramosae foliosae pauce et plerumque triplici ter capitatae, ramis ultimis plerumque 3-7 cm longis dense canescentiter antrorse strigosae. Capitula 7-9 mm alta late campanulata; squamae involucri ca. 10 herbaceae suborbiculares ca. 5-6 mm longae et 4-5 mm latae margine integrae distincte anguste reflexae apice breviter obtusae vel rotundatae extus dense canescentiter strigosae longitudinaliter 6-8-nervatae; squamae basilares interdum ovatae breviter acutae base minute dentatae; paleae late lanceolatae ca. 5 mm longe argute acutae scarisoae superne ad medio costatae et pauce strigosae margine uni- vel bi-dentatae. Flores radii 12-14 feminei; corollae flavae in tubis ca. 2 mm longi minute hispidulae in laminis oblongae ca. 10 mm longae et 4 mm latae apice late tridentatae extus in costis strigulosae. Flores disci hermaphroditi 50-75; corollae flavae ca. 5 mm longae, tubis ca. 1.3-1.5 mm longis extus glabris, faucibus anguste campanulatis ca. 3 mm longis extus plerumque glabris base pauce scabridulis, lobis ca. 0.7 mm longis et 0.5 mm latis extus dense scabridulis; filamenta in

parte superiore ca. 0.35 mm longa; thecae antherarum nigrae 1.8-2.2 mm longae; appendices antherarum flavae ovatae ca. 0.6 mm longae et 0.4 mm latae; rami stylorum apice breviter acuti minute apiculati. Achaenia ca. 3.5 mm longa et 2 mm lata apice constricta pappifera in humeris anguste alata et breviter setulifera in superficiis superioribus dense hispidula; setae pappi breves 1-2 mm longae mediocriter deciduae flavae. Grana pollinis in diametro ca. 26 µm.

TYPE: PERU: Cajamarca: 8 kms E of Cajamarca along road to Celenin. Elevation 8500 ft. Subligneous herb to 3 dm tall, flowers yellow. 9 January 1983. *R. M. King & L. E. Bishop 9122* (Holotype, US). PARATYPES: PERU: Cajamarca: 5 km N along road from Cajamarca to Bambamarca. Elevation ca. 8600 ft. Uncommon subligneous herb in pasture, flowers yellow. 8 January 1983. *R. M. King & L. E. Bishop 9110* (US); Ancash: just below Chancos at old sawmill (road to Vicos). Common, lax very scraggly shrublet hanging over banks on steep slopes. Alt. ca. 2850 m. 11 March 1964. *P. C. Hutchison & J. K. Wright 4338* (US).

The species is distinct from others in Peru and Ecuador by the broad canescently strigose involucral bracts having slight but distinct raised costae in at least the middle. The rounded apical margin is also often narrowly reflexed and appearing thickened. The species seems closest in leaf form and geography to the common peruvian *P. featherstonei* Blake but that has flat less pubescent apically darkened involucral bracts. Both the other peruvian species, *P. matthewsii* Blake and *P. serratum* have broad dark flat tips on the involucral bracts, broader leaves, and the latter has more densely serrate leaves with less pubescent lower leaf surfaces.

WEDELIA EPISCOPALIS H. Robinson, sp. nov.

Plantae suffruticosae ad 1/2 m altae mediocriter ramosae. Caules brunnescentes subteretes dense patentiter vel leniter retrorse hispiduli. Folia opposita, petiolis 5-12 mm longis; laminae ovatae plerumque 3.0-6.5 cm longae et 1.5-3.3 cm latae base obtusae fere ad basem ascendentiter trinervatae margine remote minime mucrono-denticulatae apice acutae supra et subtus antrorse delicate sericeae subtus densiores canescentes. Inflorescentiae in ramis terminales uni- vel tri-capitatae, ramis ultimis 2-7 cm longis dense patentiter vel leniter retrorse hispidulis et perminute puberulis. Capitula ca. 1 cm alta late campanulata; squamae involucri ca. 12 suborbiculatae vel late oblongo-ovatae 6-8 mm longae et ca. 4 mm latae margine integrae apice obtusae vel breviter acutae inferne leniter chartaceae superne sensim submembranaceae extus vix striatae et dense puberulae; paleae oblongae apice abrupte breviter acutae extus subapice et ad medio dense puberulae caetera subglabrae. Flores radii ca. 12; corollae flavae, tubis ca. 2 mm longis glabris, laminis oblongis 10 mm longis et 4.5 mm latis subtus in costis dense hispidulis. Flores disci ca. 35; corollae sordido-flavae

ca. 5 mm longae, tubis ca. 1.5 mm longis glabris, faucibus anguste cylindraceo-campanulatis ca. 3 mm longis extus plerumque glabris, lobis ca. 0.8 mm longis et 0.6 mm latis extus dense scabridulis intus submargine dense longe papillate fimbriatis; filamenta in parte superiore ca. 0.3 mm longa; thecae antherarum nigrae ca. 2 mm longae; appendices antherarum ovatae ca. 0.45 mm longae et 0.3 mm latae; appendices stylorum apice anguste attenuatae. Achaenia ca. 6 mm longa dense sericeo-setulifera superne valde constricta in humeris truncate alata in collis minute scabridula; corona pappi brevis minute denticulato-fimbriata. Grana pollinis in diametro ca. 25 um.

TYPE: PERU: Cajamarca: Rio Jequetepeque Valley, 2 km along road W of Magdalena. Elevation ca. 3800 ft. Subshrub 1/2 meter tall, flowers yellow. 7 January 1983. *R. M. King & L. E. Bishop 9095* (Holotype, US).

The species does not have the long acute involucral bracts seen in many members of the genus including *W. grandiflora* Benth. which occurs in Peru. Still, there are no short outer bracts such as those of the distinctly graduated involucres in *W. jelskii* Hieron. of northern Peru. The bracts are more chartaceous basally than those in most related species, and the bracts bear a finer pubescence. The leaf pubescence is more sericeous than strigose and there are no evident glandular punctations.

As in two of the other species in this paper, the name honors the collector Luther Earl Bishop.

Literature Cited

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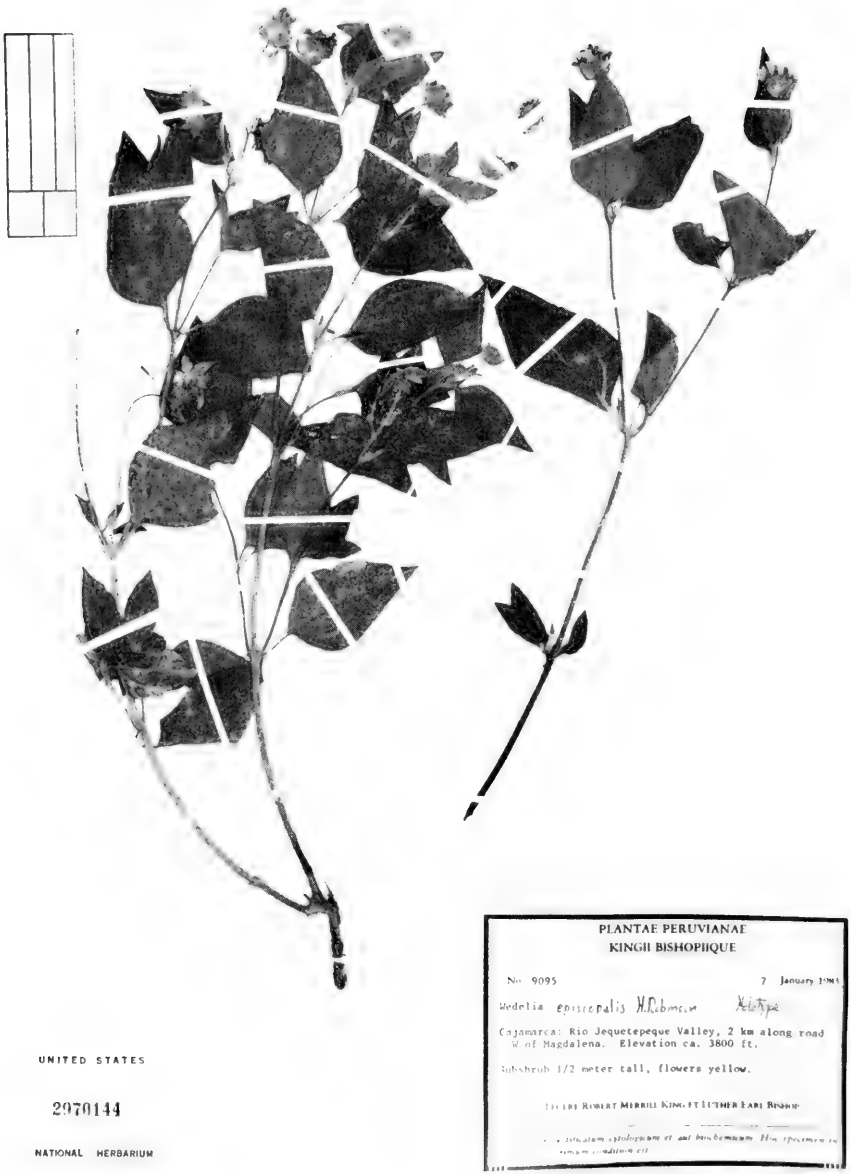
Robinson, H. 1979. Studies in the Heliantheae (Asteraceae). XVIII. A new genus *Helianthopsis*. Phytologia 44 (4): 257-269.

Helianthopsis bishopii H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

Helianthopsis utcubambensis H. Robinson, Holotype, United States National Herbarium.

Perymenium bishopii H. Robinson, Holotype, United States National Herbarium



Wedelia episcopalis H. Robinson, Holotype, United States National Herbarium.

Enlargements of heads. Top. *Helianthopsis utcubambensis*. Middle. *Perymenium bishopii*. Bottom. *Wedelia episcopalis*.

STUDIES IN THE LIABEAE (ASTERACEAE). XVI.

NEW TAXA FROM PERU.

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Two taxa of Liabeae are described below which were not included in the recent revision of the tribe (Robinson, 1983). One of the taxa, that was collected just before the revision was published, proves to represent an entirely undescribed genus.

LIABUM SAUNDERSII H. Robinson, sp. nov.

Plantae suffruticosae ca. 1.7 m altae sparse vel mediocriter ramosae. Caules teretes dense persistentiter albo-tomentosi, nodis disciferis, discis in diametro ad 2 cm. Folia opposita, petiolis 1-2 cm longis late alatis in discis nodarum confluentis; laminae ovatae plerumque 5-10 cm longae et 1.5-4.5 cm latae base breviter acutae in petiolis alatis confluentae margine utrinque 10-20-serrulatae apice breviter argute acuminatae fere ad basem ascendentiter ad 3/5 longitudinem laminarum attingentes trinervatae supra distincte pilosulae subtus dense persistentiter albo-tomentosae. Inflorescentiae in ramis terminales in nodis primariis superioribus subumbellatae, ramis ultimis 5-15 mm longis dense lanate albo-tomentosis. Capitula ca. 13-14 mm alta; involucra late campanulata 14-16 mm lata brunnescentes subpersistentiter arachnoideo-albo-tomentosa; squamae involucri ca. 150 anguste lanceolatae vel lineares 2-10 mm longae et 0.7-1.0 mm latae apice anguste acutae margine superne minute setulo-fimbriatae extus plerumque glabrescentes. Flores radii ca. 30? feminei; corollae flavae, tubis ca. 8 mm longis tenuis extus plerumque glabris apice sparse minute puberulis, laminis anguste linearibus ca. 7 mm longis et 1 mm latis plerumque glabris apice extus minute scabridulis. Flores disci hermaphroditi ca. 125; corollae flavae ca. 11 mm longae, tubis 5-6 mm longis tenuibus superne sensim leniter latioribus glabris, faucibus ca. 3 mm longis extus glabris linearibus ca. 2.5 mm longis et 0.35 mm latis distaliter spiculiferis apice valde dense spiculiferis; filamenta in parte superiore ca. 0.4 mm longa; thecae antherarum ca. 3 mm longae; appendices antherarum oblongae ca. 0.45 mm longae et 0.18 mm latae; scapi stylorum in partibus superioribus hispidulis ca. 1 mm longi; rami stylorum filiformes ca. 5 mm longi. Achaenia ca. 2 mm longa 10-costata dense breviter setulifera; carpopodia late truncata brevia; setae pappi albae longiores ca. 30 ad 7 mm longae distaliter leniter latiores, scabris in apicibus minute mucronatis; setae breviores tenuiores plerumque 0.5-2.0 mm longae. Grana pollinis in diametro ca. 27 μm irregulariter spinulifera.

TYPE: PERU: Junin: Prov. Tarma, Dist. San Ramon. About 200 ft. above road, left side, about 15 kms from San Ramon towards Tarma. c. 3,400 ft. In deep humus, on steep hillside. Orange flowers. About 5 ft. tall. 15.8.1960. *S. G. E. Saunders 559* (Holotype, IJ).

The new species is closely related to *Liabum wurdackii* Ferreyra of northern Peru, having similar terete stems and narrow involucral bracts. The related species, however, is less robust with greener less persistently arachnoid-tomentose involucral bracts, has petiolar wings always narrowed to the base, and lacks hairs on the upper leaf surface in all but one specimen. In the case where the leaf surface has hairs, those hairs are not always present or as large as those in the new species. The location of the new species in central Peru seems isolated from the known range of *Liabum wurdackii* in Amazonas and immediately adjacent Cajamarca.

The new species is named for the collector, S. G. E. Saunders.

BISHOPANTHUS SOLICEPS H. Robinson, gen. et sp. nov.

Plantae fruticosae ad 1/2 m altae mediocriter vel multo ramosae. Caules lacticiferi pallide rufescentes in internodis brevibus articulati dense albo-lanati in basis foliorum arcte investientes. Folia opposita base valde vaginata, vaginis plerumque ca. 5 mm longis quam internodis longioribus et in partibus imbricatis extus lanato-tomentosis, petiolis brevibus ca. 0.5 mm longis; laminae oblongo-ovatae plerumque 2-4 cm longae et 8-16 cm latae base rotundatae margine multo distincte serrulatae apice breviter acutae fere ad basem valde sublongitudinaliter trinervatae supra bullatae in nervis majoribus distincte insculptae et diffuse arachnoideo-tomentosae subtus dense cinereo-lanato-tomentosae in nervis majoribus exsculptae. Inflorescentiae in ramis foliosis abrupte terminales unicapitatae. Capitula ca. 1 cm alta et ex radiis ca. 12 mm latis; squamae involucri ca. 25 subaequales ca. 2-seriatae oblongo-lanceolatae 7-8 mm longae et ca. 1.5 mm latae exteriores apice reflexae supra virides subglabrae subtus dense albe lanato-tomentosae interiores non reflexae acutae subglabrae. Flores radii ca. 20 feminei; corollae flavae, tubis 2.5-3.5 mm longis anguste infundibularibus sparse patentiter piliferis, laminis linearibus 11-12 mm longis et ca. 2 mm latis apice tridentatis extus base breviter minute biseriate piliferis superne subdense arachnoidea-tomentosis et multo glandulo-punctatis. Flores disci ca. 25 hermaphroditi; corollae flavae 7.0-7.5 mm longae, tubis ca. 2.5 mm longis leniter infundbularibus extus sparse patentiter recte piliferis, pilis uniseriatis, faucibus ca. 2.5 mm longis subcylindraceis inferne breviter pauce biseriate piliferis et persparse longe patentiter uniseriate piliferis superne vix piliferis et sparse glandulo-punctatis, lobis linearibus ca. 2.8 mm longis et 0.5 mm latis submargine superne pauce stomatiferis extus multo glandulo-

punctatis et subdense arachnoideo-tomentosis; filamenta in parte inferiore laevia in parte superiore ca. 0.25 mm longa, cellulis breviter oblongis in parietibus firmis inornatis; thecae antherarum ca. 2.5 mm longae, cellulis obscuris aliquantum oblongis in scutis tenuiter irregulariter areolatis; appendices antherarum oblongo-ovatae ca. 0.4-0.5 mm longae et 0.22 mm latae in superficiis laevibus; basi stylorum distincte noduliferi; scapi stylorum in partibus superioribus hispidulis ca. 3 mm longi; rami stylorum ca. 1 mm longi. Achaenia ca. 2.7 mm longa 8-10-costata breviter setulifera pilifera et glandulifera, setulis numerosis contortis superioribus longioribus, pilis persparsis uniseriatis, glandulis breviter stiptitatis minute capitatis sparsis; carpopodia breviter obturaculiformia subannuliformia ca. 0.35 mm lata et 0.15 mm longa, cellulis 12-15-seriatis in diametro ca. 12-15 μm in parietibus incrassatis; setae pappi dense congestae majores ca. 35 interdum irregulariter elongatae plerumque 4.5-6.0 mm longae apice tenues; setae exteriores breviores tenuiores plerumque 0.7-1.0 mm longae, scabris simplicibus. Grana pollinis in diametro ca. 37 μm irregulariter spinulosa.

TYPE: PERU: Amazonas: Mountains behind Tingo. Elevation ca. 6500 ft. Spreading shrub 1/2 meter tall, flowers yellow, copious milky sap. 21 January 1983. *R. M. King & L. E. Bishop 9280* (Holotype, US).

Unfortunately, the new genus became available at the time when the hopefully complete generic review of the tribe was within a month of publication (Robinson, 1983), an example of remarkably poor timing. The new genus is clearly a member of the subtribe Liabinae, but is not a member of the specialized group containing *Liabum, Oligactis* and *Ferreyranthus* which seems to characteristically lack latex. The new genus superficially resembles *Cacosmia*, but is not necessarily closely related, differing by the solitary heads, subequal involucral bracts, and well-developed capillary pappus. As preserved, the raphids in the achene walls are short, but they are in elongate cells and may be under-developed. The raphid form is definitely unlike the quadrate type characteristic of the Munnoziinae and the generic pair *Liabum-Oligactis*. The strongly trinervate leaves furnish an additional distinction from the genus *Ferreyranthus*. The genus furnishes further evidence that the center of diversity of the tribe is in northern Peru and southern Ecuador. The genus is named for the collector L. E. Bishop.

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Robinson, H. 1983. A Generic Review of the Tribe Liabeae (Asteraceae). Smiths. Contrib. Botany 54: 1-69.

Liabum saundersii H. Robinson, Holotype, Institute of Jamaica, Kingston. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXIX

Harold N. Moldenke

LEIOTHRIX FLAVESCENS var. *CHIMANTENSIS* Mold., var. nov.

Haec varietas a forma typica speciei foliis erecto-adscentibus gracilibus utrinque glabris nitidisque apicaliter obtusis recedit.

This variety differs from the typical form of the species in its smaller, erect or ascending, slender leaves, which are thin-textured, glabrous and shiny on both surfaces, and apically obtuse, only 5--7 cm. long and 2.5--3 mm. wide.

The type of the variety was collected by Julian A. Steyermark, Otto Huber, and Victor Carreño E. (*no. 128382*) in a swampy savanna, at about 2200 m. altitude, on the "Altoplanicie en la base meridional de los farallones superiores del Apacará-tepui, sector Norte del Macizo, 5°20' N., 62°12' W., Distrito Piar, Macizo del Chimantá," Bolívar, Venezuela, between January 30 and February 1, 1983, and is deposited in the Lundell Herbarium at the University of Texas.

PAEPALANTHUS APACARENSIS var. *HUMILIS* Mold., var. nov.

Haec varietas a forma typica speciei statura perparvioracapitulis parvioribus pedunculis brevioribus differt.

This variety differs from the typical form of the species in its much smaller stature, the leaves only about 5 mm. long, the peduncles only to 1 cm. long, and the flowering heads only to 3 mm. wide.

The type of the variety was collected by Julian A. Steyermark, Otto Huber, and Victor Carreño E. (*no. 128164*) on open sandy banks along a river, on the "cabeceras orientales del Caño Chimantá, Sector centro-noreste del Chimantá-tepui, Macizo del Chimantá, Distrito Piar," 5°18' N., 62°09' W., Bolívar, Venezuela, at about 2000 m. altitude, between January 26 and 29, 1983, and is deposited in the Lundell Herbarium at the University of Texas.

PAEPALANTHUS FRATERNUS var. *CHIMANTENSIS* Mold., var. nov.

Haec varietas a forma typica speciei statura humilior foliis dense congestis parvioribus 1--1.5 cm. longis 1.5--2 mm. latis utrinque glabris nitidisque supra iridescenti-caeruleis apicaliter acutis pedunculis 4--5 cm. longis tortis striatis glabris recedit.

This variety differs from the typical form of the species, among other characters, in its low stature, shortly elongate stems, very densely congested foliage, the leaves 1--1.5 cm. long and 1.5--2 mm. wide, apically acute, firm but rather thin in texture, glabrous and shiny on both surfaces, iridescent torquoise-blue above when fresh, and the peduncles only 4--5 cm. long, glabrous, twisted, and striate.

The variety is based on *Steyermark, Huber, & Carreño E. 128944a* from under ledges around grottos of a large rock formation, at about 2450 m. altitude, in the "Sección oriental del Chimantá-tepui, cabeceras del afluente derecho superior del rio Tirica (Caño del Orillo),

Macizo del Chimantá, Distrito Piar," 5°18' N., 62°03' W., Bolívar, Venezuela, between February 7 and 9, 1983, and is deposited in the Lundell Herbarium at the University of Texas.

PETREA ALGENTRYI Mold., sp. nov.

Frutex volubilis caulibus 5 cm. diametro, ramis ramulisque subacute tetragonis griseis forsan pilosis in statu senectute glabrescentibus; internodiis elongatis; nodis irregulariter tumidis suberosis; foliis subcoriaceis ellipticis 12--20 cm longis 5--9 cm. latis apicaliter acutis vel subacuminatis aliquando minute apiculatis vel incurvo-bidenticulatis basaliter abrupte rotundatis vel anguste subtruncatis utrinque glabris; petiolis obsoletis vel usque ad 3 mm. longis crassis suberosis; racemis axillaribus 17--26 cm. longis remote multifloris pilosulis; pedicellis tenuissimis 10--20 mm. longis; calicis tubo obconico 5 mm. longo apicaliter 7 mm. lato dense glanduloso-pilosis, dentibus triangularibus 2--2.5 mm. longis apicaliter acutis, lobis anguste ellipticis usque ad 2.5 cm. longis 9 mm. latis glabratis apicaliter acutis; corollis permagnis 5 cm. latis in statu vivo purpureis.

A large liana; main stems to 5 cm. in diameter, high-climbing; branches and branchlets subacutely tetragonal, gray, possibly at first pilosulous but glabrescent in age; principal internodes elongate, sometimes to 10 cm. long; nodes conspicuously and irregularly swollen and corky; leaves apparently opposite and decussate, sessile or subsessile; petioles obsolete or to 3 mm. long, thick, corky; leaf-blades thinly subcoriaceous or thickly chartaceous, apparently uniformly green and shiny on both surfaces, elliptic, 10--20 cm. long, 5--9 cm. wide, marginally entire, apically acute or subacuminate or sometimes minutely apiculate or even minutely reflexed-bidenticulate, basally abruptly rounded or abruptly subtruncate; racemes axillary, 17--26 cm. long, remotely many-flowered, the flowers opposite, approximate, or in whorls, distant; peduncles slender, about 7 cm. long, more or less pilosulous; rachis densely pilosulous, especially apically, very slender; pedicels very slender, 1--2 cm. long, densely pilosulous; calyx obconic, about 5 mm. long, apically 7 mm. wide, densely glandular-pilose, the teeth triangular, erect, stiff, 2--2.5 mm. long, apically acute; calicinal lobes lavender when fresh, narrowly elliptic, to 2.5 cm. long and 9 mm. wide during anthesis, glabrate, venose, apically acute; corolla very large for the genus, to 5 cm. wide during anthesis when fresh, purple, the lobes to 2 cm. long and wide, rounded.

The type of this distinctive and beautiful species was collected by Al Gentry (in whose honor it is named), L. Escobar, and J. Brand M. (*no. 37075*) in an alluvial floodplain forest, at an altitude of about 100 m., Río Tagachi, about 12 km. west of Río Atrato, Choco, Colombia, 6°15' N., 76°50' W., on June 19, 1982, and is deposited in the Lundell Herbarium at the University of Texas.

STACHYTARPHETA SANGUINEA var. *HATSCHBACHII* Mold., var. nov.

Haec varietas a forma typica speciei ramis foliisque inflorescentiisque dense albido-villosis recedit.

This variety differs from the typical form of the species in having its branches, petioles, both leaf-surfaces, peduncles, rachis, bracts, and calyxes densely white-villous; the leaves also are more uniformly small, oblong-lanceolate, 2--2.5 cm. long, 6--8 mm. wide, and subsessile.

The type of the variety was collected by Gert Hatschbach (*no. 44170*) -- in whose honor it is named -- at Corrego Serra Negro, municipality of Oliveira dos Berjinhos, Bahia, Brazil, on October 12, 1981, and is deposited in the Lundell Herbarium at the University of Texas.

SYNGONANTHUS DROUETII var. *PARVICEPS* Mold., var. nov.

Haec varietas a forma typica speciei capitulis parvioribus ca. 2 mm. latis recedit.

This variety differs from the typical form of the species in its smaller flowering heads, which are only about 2 mm. wide, mostly without conspicuous widely spreading white bracts.

The type of the variety was collected by William Wayt Thomas (*no. 2638*) in a small disturbed savanna with pH 3.5, north of the first creek at the northern edge of Maroa, Amazonas, Venezuela, on November 15, 1979, and is deposited in the Lundell Herbarium at the University of Texas.

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ADDITIONAL NOTES ON THE *ERIOCAULACEAE*. LXXXIX

Harold N. Moldenke

ERIOCAULON SUBULATUM N. E. Br.

Additional bibliography: Mold., Phytologia 53: 479. 1983.

Greenway found this plant both in flower and in fruit in September in Zimbabwe.

Additional citations: ZIMBABWE: *Greenway 8809* (E--1748592); *H. Wild 6740* (E--1781921). SOUTH AFRICA: Transvaal: *Fabes 828* (E--2792508). MOUNTED ILLUSTRATIONS: Mold. in Humbert, Fl. Madag. 36: [7], fig. 24--27. 1955 (Ld).

ERIOCAULON SUISHAENSE Hayata

This taxon is now known as *E. merrillii* var. *suishaense* (Hayata) Chang, which see.

ERIOCAULON SUMATRANUM Ruhl.

Additional bibliography: Mold., Phytologia 25: 81. 1972; Mold., Phytol. Mem. 2: 315 & 605. 1980.

ERIOCAULON TAKAE Koidz.

Additional bibliography: Mold., Phytologia 41: 458. 1979; Mold., Phytol. Mem. 2: 301 & 605. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Satake, Bull. Tokyo Sci. Mus. 4: pl. 6, fig. 11. 1940 (Ld--photo of type); Koidz. in Matsum., Icon. Pl. Koisikav. 1: 157, pl. 79. 1913 (W).

ERIOCAULON TANAKAE Ruhl.

Additional bibliography: Mold., Phytologia 25: 81. 1972; Mold., Phytol. Mem. 2: 301 & 605. 1980.

ERIOCAULON TAQUETII H. Lecomte, Notul. Syst. 1: 192. 1909.

Additional & emended bibliography: H. Lecomte, Notul. Syst. 1: 191 & 192. 1909; Mold., Phytologia 25: 81. 1972; Mold., Phytol. Mem. 2: 299 & 605. 1980.

The original publication of this binomial is often cited as "1910", but appears actually to have been published in 1909.

Additional citations: MOUNTED CLIPPINGS: H. Lecomte, Notul. Syst. 1: 192. 1910 (W).

ERIOCAULON TENUIFOLIUM Klotzsch

Additional bibliography:Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 179. 1927; Mold., Phytologia 41: 458. 1979; Mold., Phytol. Mem. 2: 115, 122, 142, & 605. 1980; Mold., Phytologia 53: 271 & 314. 1983.

Recent collectors have described this plant as 30--40 cm. tall, the heads gray or grayish-white and "white-tomentose", the bracts green at the apex, and the anthers black. They have found it growing in moist sand among rocks, even referring to it as "frequent or very common on wet savannas", at 100 m. altitude, in both flower and fruit in February and October. Huber refers to it as "casi dominante en sabana arenosa".

The species is certainly very closely related to *E. atabapense* Mold. of the same region, and the *Huber 1529,* cited below, was previously regarded by me as representing that taxon.

Material of *E. tenuifolium* has been misidentified and distributed in some herbaria as *Syngonanthus* sp. as well as the very similar *E. atabapense* Mold. On the other hand, the *Goodland 515, Herb. Forest Dept. Br. Guian. G.641* [record 7656], *Maas & Westra 4029, Maguire, Wurdack, & Keith 41890, Prance, Steward, Ramos, & Farias 9177,* and *A. C. Smith 2280,* distributed as and previously cited by me as *E. tenuifolium,* seem better regarded as representing the very similar and closely related *E. klotzschii* Mold.

Additional & emended citations: VENEZUELA: Amazonas: *O. Huber 1529* (Ld), *1545* (Ld), *1597* (Ve), *1598* (Ld), *3086* (Ld); *B. Maguire 29256* (N, Ve, W--2046473). State undetermined: *Herb. Nac. Venez. s.n.* (N).

ERIOCAULON TENUIFOLIUM f. *VIVIPARUM* Mold.

Additional bibliography: Mold., Phytologia 41: 458. 1979; Mold., Phytol. Mem. 2: 142 & 605. 1980.

ERIOCAULON TENUISSIMUM Nakai

Additional bibliography: Mold., Phytologia 36: 491. 1977; Mold., Phytol. Mem. 2: 299 & 605. 1980.

Citations: MOUNTED CLIPPINGS: Nakai, Bot. Mag. Tokyo 31: 97. 1917 (W); Satake, Bull. Tokyo Sci. Mus. 4: pl. 7, fig. 14. 1940 (Ld--photo of type).

ERIOCAULON TEPICANUM Mold.

Additional bibliography: Mold., Phytologia 33: 17. 1976; Mold., Phytol. Mem. 2: 62 & 605. 1980.

ERIOCAULON TEUSCZII Engl. & Ruhl.

Additional bibliography: Mold., Phytologia 41: 458--459. 1979; Mold., Phytol. Mem. 2: 212, 224, 226, 233, 235, 237, 240, 242, 404, & 605. 1980; Mold., Phytologia 53: 267 & 271. 1983.

Giess describes this plant as having its peduncles (scapes) 5.8--8 cm. tall, the basal leaves 2--3.5 cm. long and 4 mm. wide, the heads gray or black, 4 mm. in diameter, and the anthers black. He encountered it both in flower and fruit in April. Phillips describes the plant as 8 inches tall, with white "flowers", and found it growing in grass on wet grasslands, at 4000--4300 feet altitude, in both flower and fruit in June and July.

Material of *E. teusczii* has been misidentified and distributed in some herbaria as *E. amboense* Schinz and *E. aristatum* H. Hess.

Additional citations: MALAWI: *E. Phillips 2531* (Ba--379219), *3492* (Ba--378962). NAMIBIA: *Giess 15099* (Mu), *15193* (Mu), *15217* (Ld, Mu). MOUNTED ILLUSTRATIONS: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 128, fig. 1--3. 1955 (La).

ERIOCAULON TEXENSE Körn.

Additional bibliography: Raf., Autikon Bot., imp. 1, 189 (1840) and imp. 2, 189. 1943; Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 505, 507, 508, 513, & 515, fig. 294. 1979; Mold., Phytologia 41: 459. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Pl. 2: 197. 1980; Mold., Phytol. Mem. 2: 25, 41, 48, 404, & 605. 1980; Duncan & Kortesz, Vasc. Fl. Ga. 36. 1981; Mold., Phytologia 50: 236 (1982) and 53: 282 & 342. 1983.

Additional illustrations: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 507, fig. 294. 1979.

Recent collectors have found this plant growing in clumps in boggy areas near lakes, in boggy places of creek-bottoms, and on seepage slopes in longleaf pine areas, in both flower and fruit in May. Kral (1979) describes the species as "A clump former, perennating by means of short lateral offshoots".

It seems very probable that Rafinesque (1840) included this species in the Texas portion of his description of *E. brevifolium* Raf., although the New Jersey portion evidently applied to a form of *E. pellucidum* Michx. (cfr. under *E. pellucidum*).

Material of *E. texense* has been misidentified and distributed in some herbaria as *E. compressum* Lam., *Lachnocaulon anceps* (Walt.) Morong, and *Lachnocaulon* sp.

Additional citations: ALABAMA: Washington Co.: *R. Kral 26602* (Mi). LOUISIANA: Beauregard Par.: *R. Kral 20158* (W--2470408); *Kral & Ricks 16992* (W--2470345). Sabine Par.: *Carroll 1736* (Ne--

181486). Vernon Par.: *R. Kral 20078* (W—2470342); *Kral & Ricks 16772* (W--2470343). TEXAS: Angelina Co.: *Correll & Ogden 25168* (N). Henderson Co.: *Correll, Correll, & Crutchfield 30952* (N). Houston Co.: *E. J. Palmer 13185* (W--1602635). MOUNTED ILLUSTRATIONS: Kral, Sida 2: 304. 1966 (Ld); Kral in Godfrey & wooten, Aquat. Wetl. Pl. Southeast. U. S. 507, fig. 294. 1979 (Ld).

ERIOCAULON THAILANDICUM Mold.

Additional bibliography: Mold., Phytologia 34: 493. 1976; Mold., Phytol. Mem. 2: 285 & 605. 1980.

ERIOCAULON THOUARSII H. Lecomte

Additional bibliography: Mold., Phytologia 29: 233. 1974; Mold., Phytol. Mem. 2: 250 & 605. 1980.

ERIOCAULON THUNBERGII Wikstr.

This taxon is now reduced to synonymy under *E. latifolium* J. E. Sm.

ERIOCAULON THWAITESII Körn.

Additional bibliography: Fyson, Indian Sp. Erioc. 29. 1923; C. E. C. Fischer, Kew Bull. Misc. Inf. 1930: 160. 1930; Worsdell, Ind. Lond. Suppl. 1: 376. 1941; Anon., Kew Bull. Gen. Ind. 111. 1959; Amaratunga, Ceyl. Journ. Sci. Biol. 12: 189. 1977; Mold., Phytologia 41: 459. 1979; Mold., Phytol. Mem. 2: 262, 268, 404, & 605. 1980.

Additional illustrations: Fyson, Journ. Indian Bot. 2: 202. 1921; Fyson, Indian Sp. Erioc. 29. 1923.

Recent collectors have found this plant growing as a "weed" in unplowed paddy fields, at 40--1700 m. altitude, in both flower and fruit in September.

Additional citations: SRI LANKA: *Davidse & Sumithraarachchi 7956* (W—2808538); *Huber 300* (W--2891318); *Nooteboom & Huber 3139* (W—2757465). MOUNTED CLIPPINGS: Fyson, Kew Bull. Misc. Inf. 1914: 331. 1914 (W).

ERIOCAULON TOFIELDIFOLIUM Schinz

Additional bibliography: Mold., Phytologia 29: 234. 1974; Mold., Phytol. Mem. 2: 242, 245, & 605. 1980.

Giess describes this plant as having peduncles (scapes) to 20 cm. tall, the basal leaves fleshy, to 8 cm. long and basally 1.5 cm. wide, and the flower-heads oval (not round), to 5 mm. long and 7 mm. wide.

Additional citations: NAMIBIA: *Giess 15231* (Mu). MOUNTED ILLUSTRATIONS: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 265. 1955 (Ld).

ERIOCAULON TOGOËNSE Mold.

Additional bibliography: H. Lecomte, Notul. Syst. 1: 192. 1909; Mold., Phytologia 41: 459--462. 1979; Mold., Phytol. Mem. 2: 200, 207, 210--212, 404, & 606. 1980.

Additional citations: MALI: Soudan: *Raynal & Raynal 5204* (Ld--

drawings).

ERIOCAULON TONKINENSE Ruhl.
Additional bibliography: Mold., Phytologia 25: 83. 1972; Mold., Phytol. Mem. 2: 292 & 606. 1980.

ERIOCAULON TORTUOSUM F. Muell.
Additional bibliography: T. B. Muir, Muelleria 2: 140. 1972; Mold., Phytologia 33: 17. 1976; Mold., Phytol. Mem. 2: 336 & 606. 1980.

ERIOCAULON TOUMOUENSE Mold.
This taxon is now relegated to the synonymy of *Mesanthemum albidum* H. Lecomte, which see.

ERIOCAULON TRANSVAALICUM N. E. Br.
Additional bibliography: Mold., Phytologia 41: 460. 1979; Mold., Phytol. Mem. 2: 200, 205, 222, 224, 226, 233, 240, 245, 402, 404, 443, & 606. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 148, fig. 3. 1955 (Ld).

ERIOCAULON TRANSVAALICUM var. *HANNINGTONII* (N. E. Br.) Meikle
Additional bibliography: Mold., Phytologia 41: 460. 1979; Mold., Phytol. Mem. 2: 200, 205, 224, 226, 240, 402, 443, & 606. 1980.
Katende encountered this plant in permanent swamps, at 1100 m. altitude, in both flower and fruit in May.
Additional citations: UGANDA: *Katende K.1695* (E--2450519).

ERIOCAULON TRILOBATUM Ruhl.
Additional bibliography: Mold., Phytologia 29: 235. 1974; Mold., Phytol. Mem. 2: 250 & 606. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Mold. in Humbert, Fl. Madag. 36: [23], fig. 3 (10--16). 1955 (Ld).

ERIOCAULON TRILOBATUM var. *GLABRESCENS* Mold.
Additional bibliography: Mold., Phytologia 25: 84. 1972; Mold., Phytol. Mem. 2: 250 & 606. 1980.

ERIOCAULON TRISECTOIDES Satake
Additional bibliography: Mold., Phytologia 25: 84--85. 1972; Mold., Phytol. Mem. 2: 257 & 606. 1980.
Citations: MOUNTED ILLUSTRATIONS: Satake in Hara, Bull. Univ. Mus. Univ. Tokyo 2: fig. 12. 1971 (Ld--photo of type).

ERIOCAULON TRISECTUM Satake
Synonymy: *Eriocaulon nantoense* var. *trisectum* (Satake) Chang, Fl. Taiwan 5: 187. 1978.
Additional bibliography: Huang, Taiwania 15: 152, pl. 45, fig. 3. 1970; Mold., Phytologia 26: 465. 1973; Chang, Fl. Taiwan 5: [179] & 187 (1978) and 6: 654 & 663. 1980; Mold., Phytol. Mem. 2: 304 & 606. 1980.

Additional illustrations: Huang, Taiwania 15: 152, pl. 45, fig. 3. 1970.

Chang (1978) avers that this species is endemic to wet lowlands on Taiwan. He cites *Yamamoto 27309* and *Yamamoto & Mori s.n.* (the type collection). He states that "According to the original description of *Eriocaulon trisectum*, the author claimed that it was close to *E. nantoense*, differing from it by the glabrous receptacle and deeply trifid apices of the staminate calyx. However, after examining the specimens of the two species, it was found that there is no difference between the two except for the glabrous receptacles of the former." Huang (1970) illustrates the pollen grains of *E. trisectum* and describes them as 23--24 mu wide, based on *Hashioka s.n.* and *Hibino & al. s.n.* from Taiwan.

ERIOCAULON TRUNCATUM Hamilt.

Additional bibliography: Craib, Kew Bull. Misc. Inf. 1912: 421. 1912; Fyson, Indian Sp. Erioc. 26. 1923; Worsdell, Ind. Lond. Suppl. 1: 376. 1941; Hundley & Ko in Lace, List Trees Shrubs Burma, ed. 3, 293. 1961; Huang, Taiwania 15: 153. 1970; Soerjani in Vanshney & Rzóska, Aquat. Weeds S. E. Asia 64. 1973; Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 148. 1979; Mold., Phytologia 41: 460. 1979; Mold., Phytol. Mem. 2: 262, 268, 270, 272, 278, 281, 283, 285, 288, 289, 292, 293, 296, 298, 301, 304, 307, 315, 353, 401, & 606. 1980; Mold., Phytologia 53: 280, 293, & 462. 1983.

Additional illustrations: Fyson, Indian Sp. Erioc. 26. 1923.

Recent collectors refer to this plant as a common annual herb under 6 inches tall with "black" heads and narrow basal leaves, growing in full exposure to the sun or in partial shade on dry ground and in sandy areas in semi-evergreen forests. They have also encountered it in shallow pools on mountain tops, on moist savannas over sandstone, and "common in moist grassy places", at 800--1300 m. altitude, flowering in July and September, in fruit in December, and in both flower and fruit in January and September. Congdon refers to it as an herb, 16 cm. tall, common in damp ground in Thailand, with "white bracts", in both flower and fruit in August.

Huang (1970) describes the pollen grains of *E. truncatum* as 34 mu wide, on the basis of *Yamamoto s.n.* from Taiwan. Lecomte (1912) cites only *Lecomte & Finet s.n.* from Cambodia, unnumbered collections of Godefroy, of Pierre, and of Thorel from Cochinchina, and unnumbered collections of Balansa and of Bon from Tonkin, Vietnam.

The *Bernardi 15816*, distributed as *E. truncatum*, seems, rather, to be *E. cinereum* R. Br., while *Faden & Faden 77/194* is *E. quinquangulare* L.

Additional citations: INDIA: Karnataka: *Jarrett & Saldanha HFP. 744* (Ld); *Jarrett, Saldanha, & Ramamoorthy HFP.675* (W--2797026); *Saldanha 15328* (W--2797025). SRI LANKA: *Nooteboom 3385* (E--2686502); *Sohmer & Sumithraarachchi 9914* (E--2581977). CHINA: Kiangsu: *Chiao 22344* (It). THAILAND: *Beusekom, Phengkglai, Geesink, & Wongwan 4590* in part (E--2359030). MALAYA: Singapore: *J. Sinclair*

6366 (W--2937277). TAIWAN: *Boufford, Wood, & Lei 19444* (N); *Congdon 869* (Ac). GREATER SUNDA ISLANDS: Brunei: *Van Niel 3474* (E--2403463). Sumatra: *Toroes 4441* (Mi), *4572* (Mi), *5024* (Mi). NEW GUINEA: Territory of New Guinea: *Pullen 6648*(E--2365381). MOUNTED CLIPPINGS & ILLUSTRATIONS: Backer, Onkruidfl. 1: Handb. Suiker.-Cult. 7: pl. 187. 1928 (Ld); Ridl., Journ. Fed. Mayal States Mus. 10: 155. 1920 (W).

ERIOCAULON TRUNCATUM var. *DISEPALUM* Fyson
Additional bibliography: Mold., Phytologia 25: 85. 1972; Mold., Phytol. Mem. 2: 262, 268, 272, 296, & 606. 1980.

ERIOCAULON TRUNCATUM var. *MALACCENSE* Hook. f.
Additional bibliography: Mold., Phytologia 34: 495. 1976; Mold., Phytol. Mem. 2: 296 & 606. 1980.

ERIOCAULON TRUNCATUM var. *QUADRICOSTATUM* H. Lecomte
Additional bibliography: Mold., Phytologia 25: 86. 1972; Mold., Phytol. Mem. 2: 293 & 606. 1980.

ERIOCAULON TUBERIFERUM Kalkarni & Desai
Additional bibliography: Mold., Phytologia 33: 18--19. 1976; Mold., Phytol. Mem. 2: 262 & 606. 1980.
Citations: MOUNTED ILLUSTRATIONS: Kulkarni & Desai, Journ. Bomb. Nat. Hist. Soc. 67: 134/135, fig. 1--8. 1970 (Ld) and 71: 81, fig. 1--19. 1974 (Ld).

ERIOCAULON TUBIFLORUM Van Royen
Additional bibliography: Mold., Phytologia 33: 19. 1976; Van Royen, Alpine Fl. N. Guin. 2: 824--826, fig. 281 A--F. 1979; Mold., Phytol. Mem. 2: 326 & 606. 1980.
Van Royen (1979) lists this species only from the Lake Habbema area of western New Guinea, where it inhabits boggy alpine grasslands and the edges of pools and bogs, at 3225 m. altitude, flowering and fruiting in August. He cites as the holotype *Brass 9288* in the New York Botanical Garden herbarium and nothing else.
Additional citations: MOUNTED ILLUSTRATIONS: Van Royen, Alpine Fl. N. Guin. 2: 824, fig. 281 A--F. 1979 (Ld).

ERIOCAULON TUTIDAE Satake
Additional bibliography: Mold., Phytologia 36: 492. 1977; Mold., Phytol. Mem. 2: 301 & 606. 1980.
Citations: MOUNTED ILLUSTRATIONS: Satake, Journ. Jap. Bot. 49: 181. 1974 (Ld--photo of type).

ERIOCAULON TUYAMAE Satake
Additional bibliography: Mold., Phytologia 36: 492. 1977; Mold., Phytol. Mem. 2: 290 & 606. 1980.
Citations: MOUNTED ILLUSTRATIONS: Satake, Journ. Jap. Bot. 49: 239, fig. 3 & 4. 1974 (Ld--photo of type).

ERIOCAULON UBONENSE H. Lecomte

Additional bibliography: Mold., Phytologia 26: 41. 1973; Mold., Phytol. Mem. 2: 286, 289, 293, & 606. 1980.

Lecomte (1912) cites for this species only an unnumbered Pierre collection from Cambodia and a Thorel collection from Laos.

Citations: MOUNTED ILLUSTRATIONS: H. Lecomte, Journ. de Bot. 21: 109, fig. 1. 1908 (W); Koyama, Philip. Journ. Sci. 84: pl. 5 C. 1956 (W).

ERIOCAULON ULAEI Ruhl.

Additional bibliography: Mold., Phytologia 36: 492--493. 1977; Mold., Phytol. Mem. 2: 142, 404, & 606. 1980.

ERIOCAULON ULAEI var. *RADIOSUM* Ruhl.

Additional bibliography: Mold., Phytologia 36: 493. 1977; Mold., Phytol. Mem. 2: 142 & 606. 1980.

ERIOCAULON USSURIENSE Körn.

Additional & emended bibliography: Komarov & Klobukova-Alisova, Key Pl. Far East. USSR [Opred. Rast. Dal'nevosk. Kr.] 1: 340, pl. 105. 1931; Vasinger-Alektorova, Bull. Appl. Bot. Leningrad 25 (4): 121. 1931; Worsdell, Ind. Lond. Suppl. 1: 376. 1941; Mold., Phytologia 25: 86. 1972; Mold., Phytol. Mem. 2: 198 & 606. 1980.

Additional illustrations: Komarov & Klobukova-Alisova, Key Pl. Far East. USSR [Opred. Rast. Dal'Nevosk. Kr.] 1: pl. 105. 1931; Vasinger-Alektorova, Bull. Appl. Bot. Leningrad 25 (4): 121. 1931.

ERIOCAULON VANHEURCKII Muell.-Arg.

Additional & emended bibliography: Fyson, Journ. Indian Bot. 2: 139, 318, & 320, fig. 7 (1921) and 2: pl. 41. 1922; Fyson, Indian Sp. Erioc. pl. 41. 1923; Worsdell, Ind. Lond. Suppl. 1: 376. 1941; Anon., Kew Bull. Gen. Ind. 111. 1959; Mold., Phytologia 29: 236. 1974; Bole & Almeida, Journ. Bomb. Nat. Hist. Soc. 74: 226. 1977; Mold., Phytol. Mem. 2: 262, 267, & 606. 1980.

Additional & emended illustrations: Fyson, Journ. Indian Bot. 2: 139, fig. 7 (1921) and 2: pl. 41. 1922; Fyson, Indian Sp. Erioc. pl. 41. 1923.

Santapau & Shah (1969) record this species from Salsette Island, India.

Additional citations: INDIA: Maharashtra: *Vartak RD.27* (Ld). MOUNTED CLIPPINGS: Fyson, Journ. Indian Bot. 2: 318. 1921 (W).

ERIOCAULON VANHEURCKII f. *MINIMUM* Mold.

Additional bibliography: Mold., Phytologia 25: 87. 1972; Bole & Almeida, Journ. Bomb. Nat. Hist. Soc. 74: 227. 1977; Mold., Phytol. Mem. 2: 262. 1980.

ERIOCAULON VAUPESENSE Mold.

Additional bibliography: Mold., Phytologia 25: 87. 1972; Mold., Phytol. Mem. 2: 108 & 606. 1980.

Additional citations: COLOMBIA: Vaupés: *Schultes, Baker, & Cabrera 18274* (W--2198898--isotype).

ERIOCAULON VITTIFOLIUM H. Lecomte

This taxon is now regarded as a synonym of *E. latifolium* J. E. Sm., which see.

ERIOCAULON VOLKENSII Engl.

Additional bibliography: Ruhl., Wiss. Ergebn. Deutsch. Zentral-afr. Exped. 2 (1): 57--58. 1910; Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247. 1911; Fedde & Schust., Justs Bot. Jahresber. 39 (2): 10. 1913; Wangerin, Justs Bot. Jahresber. 39 (1): 550. 1913; Fedde, Justs Bot. Jahresber. 39 (2): 1387. 1916; Mold., Phytologia 29: 237. 1974; Mold., Phytol. Mem. 2: 224, 226, 230, & 606. 1980.

Wilde has encountered this plant growing in small, open, peaty places, at 4000 m. altitude. He describes it as forming mats and dense clumps and as having hard, coriaceous, bright-green leaves and grayish inflorescences.

Additional citations: ETHIOPIA: *Wilde 9068* (E--2261724).

ERIOCAULON WALKERI Hook. f.

Additional bibliography: Mold., Phytologia 41: 461. 1979; Mold., Phytol. Mem. 2: 268 & 606. 1980.

Townsend has found this plant in both flower and fruit in March.

Additional citations: SRI LANKA: *Townsend 73/261* (Ac).

ERIOCAULON WELWITSCHII Rendle

Additional bibliography: Mold., Phytologia 34: 495. 1976; Mold., Phytol. Mem. 2: 200, 227, 233, 235, 237, 242, 245, 404, & 606. 1980.

ERIOCAULON WHANGII Ruhl.

Additional bibliography: Mold., Phytologia 26: 42. 1973; Mold., Phytol. Mem. 2: 278 & 606. 1980.

ERIOCAULON WIGHTIANUM Mart.

Additional bibliography: Fyson, Indian Sp. Erioc. pl. 21 & 22. 1923; Worsdell, Ind. Lond. Suppl. 1: 376. 1941; Hundley & Ko in Lace, List Trees Shrubs Burma, ed. 3, 293. 1961; Mold., Phytologia 41: 461. 1979; Mold., Phytol. Mem. 2: 262, 268. 270, 272, 274, 275, 286, 404, & 606. 1980.

Additional illustrations: Fyson, Indian Sp. Erioc. pl. 21 & 22. 1923.

Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 568. 1841 (W); Mart. in Wall., Pl. As. Rar. 3: 29. 1832 (W).

ERIOCAULON WIGHTIANUM var. *HELFERI* Hook. f.

Additional bibliography: Hundley & Ko in Lace, List Trees Shrubs Burma, ed. 3, 293. 1961; Mold., Phytologia 29: 238. 1974; Mold., Phytol. Mem. 2: 274 & 606. 1980.

ERIOCAULON WIGHTIANUM f. *VIVIPARUM* Mold.

Additional bibliography: Mold., Phytologia 25: 88. 1972; Mold., Phytol. Mem. 2: 262 & 606. 1980.

ERIOCAULON WILLDENOVIANUM Mold.

Additional bibliography: Miq., Fl. Ind. Bat. Suppl. 1: 268. 1860; Mold., Phytologia 41: 461. 1979; Mold., Phytol. Mem. 2: 250, 252, 268, 273, 274, 278, 283, 286, 289, 293, 296, 307, 311, 315, 320, 326, 336, 402--404, & 606. 1980; Mold., Phytologia 50: 253 (1982) and 53: 473 & 474. 1983.

Recent collectors have encountered this plant among grasses in ricefields in hilly country and in marshes at 15--1800 m. altitude, in flower in August and both in flower and fruit in February, June, and October. They refer to it as an herb to 35 cm. tall, the flower-heads semi-globose, the bracts "powdery-white", and the seeds elliptic, with hairy ribs.

Fosberg, in Madagascar, reports the species "common in open wet places in dense forests of small trees on rolling white sand, the stems erect" and "occasional in marshy seeps on gentle slopes with *Sphagnum* [this collection exhibits remarkably short leaves and may actually represent *E. sexangulare* L.]". In Papua Pullen refers to it as a "locally common erect tussocky herb with scapes rising to 27 inches tall, the leaf base rather fleshy, and the flower-heads white" and found it growing in thin sand of open seasonally wet grass-sedge plain over clay. In Sumatra it is described as forming tussocks, the inflorescence emergent and whitish, in half-shaded damp places by pools with water to 25 cm. deep over a peaty bottom.

Miquel (1860) records the vernacular name, "rompot-krah", for this plant.

Lecomte (1912) cites for this species only unnumbered collections of Lefevre, of Pierre, and of Thorel from Cochinchina and of Alleizette from Tonkin, Vietnam.

Material of *E. willdenovianum* has been misidentified and distributed in many herbaria as the very similar *E. sexangulare* L. On the other hand, the *Ahmad SA.1407* and *Sinclair 4977*, distributed as *E. willdenovianum*, actually are *E. sexangulare* L., while *Cushing & Cushing 356* and *Volkens 406* are *E. sexangulare* var. *micronesicum* Mold.

Additional citations: MADAGASCAR: *Fosberg 52535* (W--2922838), *52555* (W--2922822). SRI LANKA: *Bremer & Bremer 816* (W--2877268). THAILAND: *Congdon 989* (Ac); *Koyama, Phengklai, O'Connor, & Niyondham 15229* (Ac, N). MALAYA: Singapore: *J. Sinclair 8732* (W--2937281). GREATER SUNDA ISLANDS: Sumatra: *Wilde & Wilde-Duyfjes 19126* (E--2940228). NEW GUINEA: Papua: *Pullen 7154* (E--2365374). MOUNTED ILLUSTRATIONS: Mold. in Humbert, Fl. Madag. 36: 14 & 15, fig. 21--27. 1955 (Ld).

ERIOCAULON WILLDENOVIANUM var. *FERGUSONII* Mold.

Additional bibliography: Mold., Phytologia 41: 461. 1979; Mold., Phytol. Mem. 2: 268, 404, & 606. 1980.

ERIOCAULON WILLDENOVIANUM f. *VIVIPARUM* Mold.

Additional bibliography: Mold., Phytologia 34: 491, 495, & 496. 1976; Mold., Phytol. Mem. 2: 296, 315, & 606. 1980.

ERIOCAULON WILLIAMSII Mold.

Additional bibliography: Mold., Phytologia 25: 89. 1972; Mold., Phytol. Mem. 2: 74, 83, & 606. 1980.

Whitefoord encountered this plant in damp sand along paths through secondary vegetation in Belize, describing the leaves as green and the inflorescences as gray.

Additional citations: BELIZE: *Whitefoord 2376* (N).

ERIOCAULON WOODII N. E. Br.

Additional bibliography: Mold., Phytologia 34: 496. 1976; Mold., Phytol. Mem. 2: 224, 237, 245, & 606. 1980.

ERIOCAULON WOODII var. *MINOR* Ruhl.

Additional bibliography: Mold., Phytologia 25: 89. 1972; Mold., Phytol. Mem. 2: 245 & 606. 1980.

ERIOCAULON WOODSONIANUM Mold.

Additional bibliography: Mold., Phytologia 25: 89. 1972; Mold., Phytol. Mem. 2: 83 & 606. 1980.

Recent collectors refer to this plant as an herb with white flower-heads and have found it growing in "wet areas with standing water and mud", in both flower and fruit in February. The *Stern & al. 1701* collection bears a label reading "voucher specimen for wood USw", obviously in error.

Additional citations: PANAMA: Herrera: *Stern, Eyde, & Ayensu 1701* (E--2773097). MOUNTED CLIPPINGS: Mold. in Woodson & Schery, Ann. Mo. Bot. Gard. 27: 268--269. 1940 (W).

ERIOCAULON XENOPODION T. Koyama

Additional bibliography: Mold., Phytologia 41: 461. 1979; Mold., Phytol. Mem. 2: 286 & 606. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: T. Koyama, Philip. Journ. Sci. 84: pl. 4. 1956 (Ld, W).

ERIOCAULON XERANTHEMUM Heyne ex Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832.

Additional synonymy: *Eriocaulon xeranthemum* Mart. apud Kunth, Enum. Pl. 3: 555. 1841.

Additional bibliography: H. Lecomte, Notul. Syst. 1: 192. 1909; Fyson, Indian Sp. Erioc. 28. 1923; Worsdell, Ind. Lond. Suppl. 1: 376. 1941; Hundley & Ko in Lace, List Trees Shrubs Burma, ed. 3, 293. 1961; Mold., Phytologia 41: 453 & 461--462. 1979; Mold., Phytol. Mem. 2: 257, 262, 270, 273, 286, 296, 315, 404, & 606. 1980; Mold., Phytologia 53: 348 & 469. 1983.

Additional illustrations: Fyson, Indian Sp. Erioc. 28. 1923.

Padhye reports that this is a plant of high altitudes. Material of it has been misidentified and distributed in some herbaria as *E. sedgwickii* Fyson.

Additional citations: INDIA: Maharashtra: *Padhye 9* (Ld). MOUNTED CLIPPINGS: Dalz., Journ. Bot. Kew Misc. 3: 281. 1851 (W); Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832 (W).

ERIOCAULON YAOSHANENSE Ruhl.

Additional bibliography: Mold., Phytologia 26: 42. 1973; Mold., Phytol. Mem. 2: 279 & 606. 1980.

ERIOCAULON YOSHINOI Nakai

Additional bibliography: Mold., Phytologia 25: 89. 1972; Mold., Phytol. Mem. 2: 301 & 606. 1980.

ERIOCAULON YUNNANENSE Mold.

Additional bibliography: Mold., Phytologia 25: 89. 1972; Mold., Phytol. Mem. 2: 279 & 606. 1980.

Forrest found this plant growing in moist pastures, in both flower and fruit in May, describing it as 10—20 inches tall, with grayish-white flowers.

Additional citations: CHINA: Yünnan: *Forrest 7878* (Ba), *8454* (Ba).

ERIOCAULON ZAMBESIENSE Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 41: 462. 1979; Mold., Phytol. Mem. 2: 212, 222, 227, 235, 239, & 606. 1980.

Wilde encountered this plant, in Ethiopia, along small creeks and in open places in marshy land with muddy soil or in shallow, slowly streaming water, at 1800 m. altitude, both in flower and fruit in February, describing it as having white roots and grayish-white inflorescences.

Additional citations: ETHIOPIA: *Wilde 9260* (E--2265833), *10148* (E--2256273).

ERIOCAULON ZOLLINGERIANUM Körn.

Additional bibliography: Stapf, Ind. Lond. 3: 90. 1930; Mold., Phytologia 41: 462. 1979; Mold., Phytol. Mem. 2: 286, 293, 307, 315, 326, & 606. 1980.

Lecomte (1912) cites for this species only an unnumbered Pierre collection from Cochinchina, Vietnam, and one of Thorel from Laos.

Additional citations: MOUNTED ILLUSTRATIONS: H. Lecomte, Fl. Gén. Indo-chine 7: 17, fig. 2. 1912 (Ld).

ERIOCAULON ZYOTANII Satake

Additional bibliography: Mold., Phytologia 34: 497. 1976; Mold., Biol. Abstr. 63: 2461. 1977; Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytol. Mem. 2: 301, 310, & 606. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Satake, Bull. Tokyo Sci. Mus. 4: pl. 11, fig. 3. 1940 (Ld--photo of type).

LACHNOCAULON Kunth

Additional & emended bibliography: Endl., Spl. 2: 12. 1842; Meisn., Pl. Vasc. Gen. 1: 407 (1842) and 2: 312. 1843; Spach, Vég. Phan. 13: 140. 1846; Pfeiffer, Nom. Bot. 2 (1): 5, 6, & 15. 1874; Durand, Ind. Gen. Phan. 454. 1888; Post & Kuntze, Lexicon 312 & 623. 1904; Lotsy, Vortr. Bot. Stammesges. 3 (1): 707. 1911; J. C. Willis, Dict. Flow. Pl., ed. 5, 359 (1925), ed. 6, imp. 1, 359

(1931) and ed. 6, imp. 2, 359. 1948; Lawrence, Taxon. Vasc. Pl., imp. 1, 405 & 800. 1951; J. C. Willis, Dict. Flow. Pl., ed. 6, imp. 3, 359 (1951) and ed. 7, 418 & 611. 1966; Rouleau, Guide Ind. Kew. 103 & 270. 1970; Lawrence, Taxon. Vasc. Pl. , imp. 2, 405 & 800. 1971; Hocking, Excerpt. Bot. A.23: 292 & 389. 1974; Thanikaimoni, Inst. Franc. Pond. Trav. Sect. Scient. Techn. 13: 129 & 285. 1976; Giulietti, Bol. Bot. Univ. S. Paulo 6: 63. 1978; Hocking, Excerpt. Bot. A.31: 17 & 18. 1978; Monteiro-Scanavacca & Mazzoni, Revist. Bras. Bot. 1: [59]. 1978; Benson, Pl. Classif., ed. 2, 373. 1979; Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 503, 518, & 520--529, fig. 302--307. 1979; Mold., Phytologia 41: 411, 419, 459, 462--467, & 508 (1979), 42: 41 & 507 (1979), and 45: 40 & 507. 1980; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 14, 16--19, 22, 25, 26, 32, 41, 48, 89, 91, 213, 413, & 606--607. 1980; Duncan & Kortesz, Vasc. Fl. Ga. 36. 1981; Geesink, Leeuwenb., Ridsdale, & Veldkamp, Thonn. Analyt. Key 11. 1981; Mold., Phytologia 50: 234, 236, 261, & 508 (1982) and 52: 111 & 112. 1982; Wunderlin, Guide Vasc. Pl. Cent. Fla. 125--126. 1982; Mold., Phytologia 52: 506 (1983) and 53: 280, 286, 344, 463, & 504. 1983.

The *Correll, Correll, & Crutchfield 30952,* distributed as *Lachnocaulon* sp., actually is *Eriocaulon texense* Körn., while *Poole 1616* is *Paepalanthus subtilis* Miq.

Wunderlin (1982) provides a very useful key to the Florida species:

1. Trichomes of apex of receptacular bracts opaque white; head appearing gray to white.
   2. Leaves narrowly linear; mature heads 3.5--4 mm. wide; seeds smooth, lustrous.....*L. beyrichianum.*
   2a. Leaves linear; mature heads 4--7 mm. wide; seeds with distinct longitudinal lines, dull.....*L. anceps.*
1a. Trichomes of apex of receptacular bracts translucent; head showing brown color of bractlets.
   3. Scapes with ascending hairs; heads dull gray-brown..... ..... *L. minus*
   3a. Scapes glabrous; heads red-brown or chocolate-brown..... .....*L. engleri.*

LACHNOCAULON ANCEPS (Walt.) Morong

Additional & emended bibliography: Pfeiffer, Nom. Bot. 2 (1): 5. 1874; Hocking, Excerpt. Bot. A.23: 292 & 389 (1974) A.31: 17. 1978; Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 520, 521, 523, 524, & 529, fig. 303. 1979; Mold., Phytologia 41: 459, 462--464, & 466. 1979; Pursh, Fl. Amer. Sept., imp. 2, [ed. Ewan], 92. 1979; J. T. & R. Kortesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 14, 16--19, 22, 25, 26, 32, 41, 48, 91, 413, & 606. 1980; Duncan & Kortesz, Vasc. Fl. Ga. 36. 1981; Mold., Phytologia 50: 234 & 236 (1982) and 52: 111--113. 1982; Wunderlin, Guide Vasc. Pl. Cent. Fla. 125 & 126. 1982; Mold., Phytologia 53: 280. 1983.

Additional illustrations: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 523, fig. 303. 1979.

Recent collectors describe this plant as growing "in large clumps in sand", "in clumps on savannas", in "broad shallow roadside ditches with *Carex longii, C. vexans,* and *Juncus elliottii*", in "savanna-evergreen shrub bog areas", in flatwoods ditches, in sandy peat in pineland bogs and recently burned bogs, in sandy-peaty bogs on pine-palmetto flats, in seepage bogs on sandy peat, in exposed wet sand of seepage bogs, in sandy peat of cypress-gum flatwoods, in hillside bogs on longleaf pine-covered hills, and around small lakes, describing the heads as grayish, in both flower and fruit from April to June and August.

Wunderlin (1982) refers to the species as common on the margins of ponds and in wet pinelands throughout central Florida. He follows Kral in reducing *L. floridanum* Small and *L. glabrum* Körn. to synonymy under *L. anceps.* Haynes refers to it as "abundant in wet soil of road embankments" in Alabama. One plant of the *Thomas & Grelen 71890* collection, cited below, exhibits viviparous fruiting-heads!

Material of *Lachnocaulon anceps* has been misidentified and distributed in some herbaria as *Eriocaulon cinereum* R. Br. On the other hand, the *Gregory & Eiten 23* and *Kral 20204* & *28694,* distributed as typical *L. anceps,* actually represent its f. *glabrescens* Mold., while *Kral 17855, 17969,* & *18418* are *L. glabrum* Körn. *Thomas, Allen, & Bot. 403 Class 47817* is *Eriocaulon cinereum* R. Br,, and *Carroll 1736* is *E. texense* Körn.

Additional citations: VIRGINIA: Greensville Co.: *Smith & Hodgdon Pl. Exsicc. Gray. 1028* (It, Mi). James City Co.: *Baldwin 17221* (Ne--125572). Prince George Co.: *Fernald, Long, & Smart 5698* (It). NORTH CAROLINA: Beaufort Co.: *Wiegand & Manning 682* (It). Bladen Co.: *R. Kral 14672* (Mi), *27185* (Mi). Brunswick Co.: *Thomas & Bio. 451 Class 53100* (Ne--134247). Carteret Co.: *Marx 2983* (Ne--124147). Columbus Co.: *Rodgers, Compton, Green, & Hudson 73501* (Ne--83566). Lenoir Co.: *Randolph & Randolph 785* (It). Moore Co.: *Wiegand & Manning 683* (It). New Hanover Co.: *Sieren 288* (Ne--105944), *1323* (Ne--134946). Onslow Co.: *Biernacki 400* (N); *Randolph & Randolph 947* (It); *Thomas & Bio. 451 Class 53061* (Ne--139201). Richmond Co.: *Wiegand & Manning 684* (It). Scotland Co.: *Wiegand & Manning 685* (It). SOUTH CAROLINA: Albemarle Co.: *K. Hunt 33b* (It). Chesterfield Co.: *Radford 12435* (Mi). Georgetown Co.: *Godfrey & Tryon 51* (It). Hampton Co.: *Wiegand & Manning 686* (It). GEORGIA: Baker Co.: *Thorne 4851* (It). Berrier Co.: *R. Kral 24253* (Mi). Calhoun Co.: *Thorne 4571* (It), *4684* (It). Charlton Co.: *Wright, Wright, Harper, & Pirnie 129* (It). Clay Co.: *Thorne 3669* (It). Colquitt Co.: *R. Kral 24231* (Mi). Cook Co.: *R. Kral 24237* (Mi). Decatur Co.: *Thorne & Muenscher 7857* (It); *Thorne, Muenscher, & Smith 3021* (It). Dodge Co.: *R. Kral 28744* (Mi). Early Co.: *Thorne 4070* (It). Lanier Co.: *R. Kral 24266* (Mi). Liberty Co.: *R. Kral 24211* (Mi). Lowndes Co.: *Breland s.n.* [13 May 1970] (Ne--120653); *Rowley 7* (Ne--120632). Macon Co.: *Pyron & McVaugh 498* (It). Miller Co.: *Thorne 4426* (It). Ware Co.: *R. Kral 19236* (Mi). FLORIDA: Baker Co.: *MacDaniels s.n.* [April 13, 1936] (It). Bay Co.: *R. Kral 15657* (Mi), *15668* (Mi). Bradford Co.: *Wiegand & Manning 687* (It). Duval Co.: *Curtiss 3021* (It), *4861* (It); *R. Kral 18568* (Mi). [to be continued]

BOOK REVIEWS

Alma L. Moldenke

"PLANTS OF THE BIBLE - A Complete Handbook to All the Plants with 200 Full-Color Plates Taken in the Natural Habitat" by Michael Zohary, 223 pp., 6 color maps & 200 plant photos. Cambridge University Press, Cambridge, London, & New York, N. Y. 10022. [1982] 1983. $16.95.

Publishing this short review on this excellent publication gives my husband and myself the opportunity to thank Professor Zohary* publically for the Hebrew language and Biblical and local flora information which he shared with us over three decades ago when we were preparing our own book on Bible plants. He has continued to work in this and other fields as head of the Botany Department of the Hebrew University in Jerusalem and in his studies of the Negev of the past and the present with the hope of reactivating some of the ancient water sources. There is agreement with us on the identity of most of the plants involved. Some plants can never be named definitely. English Bible translations did not appear until after the invention of the printing press but before the naming phase in the development of botany with Linnaeus' work of 1753. The unnamed forbidden fruit of the Garden of Eden is mentioned in the chapter on apples and there is no chapter on apricots. We are not sure that we can follow the author on this identification for the reasons stated in our book. His book has excellent color photographs of the Biblical plants as they grow today, ecological colored maps and descriptions of vegetal landscapes of Biblical times.

* We regret to announce that Dr. Zohary died recently. His many botanical studies alone are lasting monuments to his devoted service to mankind.

"AGRICULTURAL DEVELOPMENT IN CHINA, JAPAN AND KOREA" edited by Chi-ming Hu & Tzong-shian Yu, xiv & 877 pp., 221 b/w tab. & 65 fig., distributed for the Institute of Economica, Academia Sinica (Taipei, Taiwan, Republic of China) by the University of Washington Press, Seattle, Washington 98105. 1983. $40.00.

The title of this book was the topic of a conference held in Taipei at the Academia Sinica in 1980. The important lead article is by T. W. Schultz on "The Economics of Agricultural Productivity in Low Income Countries" and stresses many of the points made in his Nobel Laureate speech in 1979. "Differences in the agricultural achievements among Asian countries is instructive. Japan has over-achieved in rice production: South Korea fairly well in rice: Philippines modernizing parts: Taiwan one of the best: West Malaysia in palm fruit remarkable but Nigeria a failure: India far ahead

with many more skilled agricultural scientists than mainland China. The major unsolved problem is the tendency to over-organize and over-control agricultural research from the top." There are 3 technical papers on Japan, 3 on Korea, 6 on mainland China from the traditional tenure systems to that in the Four Modernizations, 9 on Taiwan which is insularly land-limited, has been stable politically, has been having rapid industrial and economic expansion while its small-sized farms have increased yields but at a slower pace, and finally 2 on agricultural comparisons among Japan, Taiwan and South Korea and also between mainland China and Taiwan. These papers have been carefully researched, well documented and effectively presented, making this book a valuable addition to the libraries of agricultural schools, universities, working agricultural and political institutes, etc.

"*IMPATIENS* OF AFRICA - Morphology, Pollination and Pollinators, Ecology, Phytogeography, Hybridisation, Keys and a Systematic Treatment of All the African Species, with a Note on Collecting and Cultivation" by A. Grey-Wilson, ix & 235 pp., 52 color photos on 8 unnumb. pl., 170 b/w fig., 128 geog. distrib. maps & 7 tab. A. A. Balkema Publishers, P. O. Box 1675, Rotterdam, Netherlands and Merrimac Book Service, Salem, New Hampshire 03079. 1980. Hfl. 125 or £27.80 or $58.00.

The author, on the staff at Kew, covers effectively and interestingly all of the topics mentioned in the subtitle in a highly informative and beautifully illustrated format for the 109 species recognized by him. Even the keys to the species have the distinguishing characteristics illustrated. A world distribution map (on p. 42) shows "suggested evolutionary migration routes of *Impatiens* distribution of linear-fruited species and distribution of fusiform-fruited species." An appendix explains how to prepare herbarium specimens because the flowers so often have ended up as dried blobs. Another appendix enumerates the horticultural possibilities of these attractive flowers and easily cutting-proliferating plants. What a successful metamorphosis of a limitedly available Ph.D. dissertation to an easily available, reasonably priced book is now available to folks and institutions with any or many kinds of botanical and/or horticultural interest!

"BOTANICAL DERMATOLOGY. Plants and Plant Products Injurious to the Skin" by John Mitchell & Arthur Rook, xiii & 787 pp., 5 b/w fig. & 14 tab. Greengrass, Vancouver, Canada or Lea & Febiger, Philadelphia, Pennsylvania 19106. 1979. $39.50.

Very effective subject matter organization makes readily available tons of medical, biochemical, pharmaceutical and botanical information through cause-effect relationships. Irritant, allergic and cross-sensitivity contact dermatitic situations can be caused by many kinds of plants due to mechanical injuries and to trauma

from cuts, occupational marks, thorns, plant hairs, exposure as in phytophotodermatitis, etc. After each of these and other pathological descriptions are described possible causal organisms with explanations. The conditions are arranged (in left-hand columns) so that they can match the plant organisms involved with substantiating literature. The plant species are listed alphabetically under their also alphabetically listed genera and families. Airy Shaw's 8th edition of Willis' "Dictionary of the Flowering Plants and Ferns" serves as the taxonomic guide. This book is valuable not only to the medical profession and its trainees but also to related biological sciences and their trainees.

"LOOKING FAR NORTH - The Harriman Expedition to Alaska 1899" by William H. Goetzmann & Kay Sloan, xxv & 244 pp., 62 b/w photos, 2 maps & 2 fig. Princeton University Press, Princeton, New Jersey 08540. [1982] 1983. $8.95 paperbound.

This is a wonderful report about an even more wonderful scientific expedition hosted by the railroad magnate-financier-philanthropist Edward H. Harriman (in response to his physician's serious admonition to "rest") with 10 family members and servants, 26 scientists (including George Grinnell, William Trelease, L. Agassiz Fuertes, John Muir, John Burroughs, B. Fernow) and many assistants, 3 artists, 3 physicians and a nurse, 2 photographers, 1 chaplain, 2 stenographers, and 65 ship's officers and crew. First there was the cross-country Pullman train trip to Seattle with stops for interesting sights and sites and then the embarking in the luxurious Elder for Skagway and even a touch in Siberia. This expedition produced such valuable scientific contributions in the 13 volumes of its "Reports" as descriptions and illustrations of hundreds of new plant and animal species, charted waters and islands, and detailed glacier studies. Since Edward Harriman's personal papers were fire-destroyed, this book's authors' very diligent research of other sources resulted in a very interesting text of the personal inter-living and scientific sights and collections on the trip. The photographs are also very interesting, even if a little less clear than in the hard cover edition.

"LUCRĂRILE GRĂDINII BOTANICE DIN BUCURESTI" Acta Botanica Horti Bucurestiensis 1981-1982, 288 pp., 69 b/w photos, 5 maps, 25 fig., 23 line draw., 26 tab. Universitatea din Bucuresti, Grădina Botanică, Soseana Cotrocenl nr. 32 Cod: 76258, Bucuresti 15, Republica Socialista Romania. 1982.

This volume is composed of 27 papers in Romanian, French, German or English on a wide range of topics such as: the rare trees, certain varieties of roses and tropical aquatics cultivated in this garden, chromosome numbers, chromatin ultra-structure, the hundred-year-old herbarium, pollen morphology in the *Empetraceae*

and cartography of medicinal flora.

"A COLOUR ATLAS OF FLOWERING TREES AND SHRUBS" by V. Csapody & I. Tóth, 311 pp. & 141 multispecimen color pl. Académiai Kiadó, H-1363 Budapest, P. O. Box 24, Republica Socialista Hungarica. 1982. $44.00.

This selection of 608 species and varieties of arborescent plants cultivated in central Europe "acquaints the reader with those trees and shrubs that are hardy in the open" and "gives information on their behaviour in Hungary or in the neighbouring countries." The printing is not up to the quality now expected from western presses, but the accuracy of the paintings very definitely is. The left-hand page has the names and descriptive text for the various colored paintings on the right-hand page. These horticultural species and cultivars are known over much of the temperate world, giving this attractive book a wide interest range.

"ANTARCTIC WILDLIFE" photographs by Eric Hosking & text by Bryan Sage, 160 pp., 130 color photos, 12 b/w photos, 1 map & 2 tab. Facts on File, Inc., New York, N. Y. 10016. 1982. $22.95.

Awe-inspiringly beautiful - must be the verdict for this book, for this nearly pristine area, for the amazing creatures that live at least part of their annual life cycles, with birthing or hatching of their young, under these frigid conditions, for the superb photography and for the informative descriptive text. One appendix lists in tabular form the distribution of breeding birds of the Continental and the Maritime Antarctic and another does so for the Subabtarctic Islands. There is a "how to" chapter on wildlife photography in this Antarctic wonderland. For the bird-lover, for the armchair traveler, for those who have been there and appreciate recall, for those planning such a visit and appreciate informed appreciation, and for both the young and the old, this book will prove most gratifying.

"NEMATODES IN SOIL ECOSYSTEMS" edited by Diana W. Freckman, xiv & 206 pp., 58 b/w fig., 15 tab. & 1 photo. University of Texas Press, P. O. Box 7819, Austin, Texas 78712. 1982. $20.00.

This book has been printed by photo-offset from very neat copy. Besides a foreword, a preface and a question-answer discussion, it consists of ten papers under the headings of (1) Primary Consumption, (2) Decomposition and (3) Synthesis and Validation by modelling. It stresses the taking of wet-soil samples no less than once a month since these tiny different creatures may have from one to eight generations a year. There is a very helpful figure of eight different "head" structures associated with feeding

material. "Nematodes feed on living protoplasm and so none are known to be saprophagic." There are (1) facultative migratory and obligate sedentary endo- and ectoparasites of roots, (2) microbivores on bacteria, etc., (3) fungivores on mycelia, (4) omnivores consuming various fungi, bacteria, algae, protozoans and rotifers, and (5) predators feeding on other nematodes, enchytraeids, tardigrades and protozoa. There is much important material contained within this book.

"BIOLOGICALLY ACTIVE SUBSTANCES: EXPLORATION AND EXPLOITATION" edited by D. A. Hems, xxviii & 309 pp., 72 b/w fig., 22 photos & 46 tab. John Wiley & Sons, New York, N. Y. 10158. 1977.

These well prepared, printed and illustrated papers pay tribute to the authors' mentor and admired friend, Sir Ernst Chain, of bacterial and mold protein and RNA fame, upon the occasion of his 70th birthday. "Throughout his long scientific career Sir Ernst has shown a genius for selecting topics which have not only been of scientific interest but also of great practical value for the welfare of mankind." Among the 14 papers are: Biosynthesis of B-Lactan Antibiotics, Biochemical Engineering in the Production of Fungal Metabolites, Fusicoccin Phytotoxins, Liver Metabolism in Diametes, and Metabolic Approaches to Myocardial Infarction.

"BIRDS OF THE WORLD: A CHECKLIST" by James Clements, xxxviii & 562 pp. & end-page colored major faunal regions maps of the world. Facts on File, Inc., New York, N. Y. 10016. 1981. $24.95.

This is a third edition, not so mentioned in the title, but so indicated in the Acknowledgments. Taxonomically it basically follows the Morony, Bock & Farrand list from the American Museum of Natural History but it adds most used common names and ranges, thus making it usable by many more ornithologists and bird watchers. "Of the 9,198 birds included in this edition, Morony and I concur on 9,022.....Since birds pay no attention to political boundaries, I have tried to use the geographic range. There are brief, straight-forward instructions for using this guide and interpreting its taxonomic computer coding as "01 01 001" for Order *Struthioformes,* Family *Struthionidae* (Ostrich), and *Struthio camelus* (Ostrich) through "28 79 110" for Order *Passeriformes,* Family *Corvidae* (Crows and Jays), *Corvus crassirostris* (Thick-billed Raven) for which (as for each other) locality is given as "Mountains and high plateaus of Eritrea, Ethiopia". There is lined space above for individual date and location records. This work should prove to be a great asset to all with a serious interest in birds.

"ALPINE FLORA OF KASHMIR HAMALAYA" by Uppeandra Dhar & P. Kachroo, xv & 280 pp., 1 color & 23 b/w photo., 6 tab., 21 fig. & 115 geog. distrib. maps. Scientific Publishers, Man Bhawan, Jodhpur 342001, India. 1983. Rs.200 or $45.00.

The contents of this book are particularly well prepared and well presented. Introductory chapters deal with the alpine habit and habitat generally and specifically, the area's geology, climate and general vegetation, its extinct and extant flora with floristic analyses, and distribution patterns of plant families and their genera. Then follow keys to the genera and species with publication data for the names, simple descriptive notes and herbarium specimen collection data. The very useful and clear geographical distribution maps for well over 200 species cover either the whole Himalayan area or the Eurasian area where pertinent. The earlier and more recent phytogeographical literature is given important consideration. The printing of the text and of the photographs could have been improved by more careful proofreading for clarity, but the authors' contributions are of high caliber.

"FLORA OF CONNEMARA AND THE BURREN" by D. A. Webb & Mary J. P. Scannell, xlv & 332 pp., 4 color pl., 25 b/w photo. & 4 maps. Royal Dublin Society & Cambridge University Press, Cambridge, London & New York, N. Y. 10022. 1983. $69.50.

In the fine tradition of the previously published county floras of the British Isles but abiding by approximate borders, this excellent book has introductory chapters on the 8 districts involved, geology and soil, climate and notes on habitats, vegetation since tne last glaciation, pollen records and history of the knowledge of the flora collected by professional botanists and by amateurs. The body of the work is arranged taxonomically by families with the scientific names and authorities, only common synonyms, common English and Irish names not used also for other plants, numbered location spots on the geographical maps as well as the place names, details of the first recorded collection and ecological notes. There are short chapters on marine and freshwater algae, lichens, hepatics and pteridophytes. The format makes this very fine book easily usable either with or without an accompanying systematic flora.

"LANDSCAPE ARCHITECTURE - A Manual of Site Planning and Design" - Second Edition by John Ormsbee Simonds, ix & 331 pp., 214 b/w photo., 303 fig., 1 map & 8 tab. McGraw Hill Book Company, New York, N. Y. 10020. 1983. $37.50.

The reader, careful student, or architectural building and area planner and contractor should "gain through this [outstanding] book a more keen and telling awareness of our physical surroundings,... useful knowledge to be applied in the design of homes, schools,

recreation areas, shopping malls, trafficways.....or any other project to be fitted into, and planned in harmony with, the all-embracing landscape." The author knows whereof he writes because of his long and highly successful professional life as teacher, author and landscape architect. The first edition of 1961 was a highly successful trailblazer in its emphasis on adjusting architectural needs to the environment and to human requirements for efficiency and peaceful working and living conditions.

"ADVENTURES WITH INSECTS" by Richard Headstrom, 221 pp. & 306 b/w fig. Dover Publications, New York, N. Y. 10014. 1982. $4.50 paperbound.

This "is an unabridged replication of the work originally published in 1963 by J. B. Lippincott Company, Philadelphia. The listing of biological supply houses has been brought up to date." This is a charming, easily read, absorbingly interesting book to put into the hands of a youngster, a recent retiree interested in his back yard, any person who wants to learn about the other living forms around him (or her) in an easy fashion, a teacher who wants to share wonder with little ones or even with biology students who have missed really seeing the "out-of-doors". The many clear drawings in the 39 chapters illustrate how some pumping stations operate, how some masons work, also tent-makers, engravers, case-makers, subterranean dwellers, etc.

"IN THE SHADOW OF MAN" with text by Jane Goodall and photographs by Hugo van Lawick, xx & 297 pp. & 64 b/w unnumbered pl. with 84 photos, 1 map & 22 line draw. Houghton Mifflin Company, Boston, Massachusetts 02108. 1983. $9.95 paperbound.

Much of these wonderful photographs and descriptive text we had marvelled at over a score of years ago in National Geographic articles with the added embellishment of full color and/or we remember the hardcover original edition by the same printers in 1971 and the more recent educational nature films prepared for television Now we are fortunate to have available this reprint with its thrilling, scientifically accurate, pioneering, intimate observations of groups of chimpanzees in their normal living in their native habitat in an area now set aside as the Gombe Stream Research Centre on Lake Tanganyika in Tanzania. Dr. Goodall pleads for proper care for these wonderful animals when they are captives in zoos or in laboratories where confinement alone within small areas is as stultifying to them as jailing in solitary confinement is to humans.

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A NEW ALLOPATRIC SEGREGATE FROM AND A NEW COMBINATION IN PINUS CEMBROIDES ZUCC. AT ITS SOUTHERN LIMITS

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Boulder, Colorado 80309

INTRODUCTION

Pinus cembroides Zucc. has, during the past decade, been the object of considerable attention. A geographical distribution map for P. cembroides Zucc. sensu lato was published earlier by Critchfield and Little (1966). Working northward from the southern region of the distribution in central Mexico, Robert has segregated Pinus johannis (Robert, 1978) and later Pinus catarinae and Pinus cembroides var. lagunae (Robert-Passini, 1981). P. catarinae Robert-Passini was based on a collection from a site studied earlier by Bailey (v. Bailey and Wendt, 1979) and is clearly identical with the earlier-published Pinus remota Bailey & Hawksworth (1979). It must therefore be considered a synonym (v. Bailey and Hawksworth, 1983). During the same period Bailey, with principal collaborators Hawksworth and Zavarin, has been working southward from the northern region of the distribution in southwestern U. S. A. and northern Mexico. As a result of these collaborative studies, the earlier segregates, Pinus cembroides var. remota Little (1966) and Pinus cembroides var. bicolor Little (1968), were elevated to specific status as P. remota (Little) Bailey & Hawksworth and P. discolor Bailey & Hawksworth (1979).

Recent studies disclose an additional segregate, proposed as subsp. orizabensis, at the extreme southern limits of P. cembroides s. lat., and indicate a need to elevate var. lagunae, found only in a limited area at the southern end of the peninsula of Lower California, to subspecific rank. Justifications additional to those published earlier for the reduction to synonymy of P. catarinae, and those now given for the establishment of the two taxa described below, including full details of chemical studies, further details of needle morphology, and interpretations, are in draft form and are planned for early publication by Zavarin, Snajberk and Bailey. The purpose of this report is to propose names and preferable ranks.

1. PINUS CEMBROIDES subsp. ORIZABENSIS D. K. Bailey subsp. nov.

Pinus cembroides auct. pro parte, non Zucc.
Pinus cembroides Gordon

Arbor ab 8 usque ad 10 m alta, similis Pino cembroidei, foliis tamen praecipue 3, nonnullis 4, rarissime 2 per fasciculum, 4 - 6 cm longis; fasciculi 1.3 usque 2.0 mm lati; paginae dorsales obscuro-virides, ventrales glaucae; stomata in utraque pagina; sulci longitudinales et irreg-

ulares in cortice arborum maturarum qui flavo-aurantiacum subcorticem patefaciunt; fasciculo-bracteae brevi tempore nigrae et tam conspicuae ut ramunculi scaberrimi fiant.

(Translation: A tree from 8 to 10 m tall, similar to Pinus cembroides, but leaves principally 3, sometimes 4, and very rarely 2 per fascicle, 4 - 6 cm long; fascicles 1.3 up to 2.0 mm thick; dorsal surfaces dark green, ventral surfaces glaucous; stomata on each surface; irregular longitudinal furrows in the bark of mature trees which expose the yellowish-orange inner bark; fascicle bracts soon black and sufficiently conspicuous as to make the small twigs rough.)

TYPE: MEXICO, Puebla, Mpio. Soltepec, lat. 19° 04' N, long. 97° 42' W, elev. 2370 m, along highway Mex 140, ca. 10 km southwest of San Salvador el Seco, 23 February 1983, D. K. Bailey 83-01 (HOLOTYPE: MEXU; ISOTYPES: ARIZ, CHAPA, COLO, E, ENCB, INIF, K, MO, NY, RM, TEX, UC, US, UTC).

DISCOVERY AND DISTRIBUTION

The segregate named and described above was first recognized by the author as a specimen tree, No. P.372, in the Royal Botanic Gardens at Kew on 27 June 1977. Now labelled P. cembroides, it was acquired in 1910 from H. Clinton-Baker of Bayfordbury, Herts. as seed labelled P. nelsonii (D. R. Hunt, private communication). Today it is a substantial tree of approximately 9 m height and 25 cm diameter about 1 m above ground level. The original provenance is unknown. Study of two branchlets showed it to have fascicles mainly of 3 needles. Thus of 400 fascicles examined, 374 were of 3 needles, 24 of 4 and only 2 of 2. In this respect it differed markedly from the approximately 400 trees of P. cembroides s. str. already studied from all parts of the known distribution except that to the south and east of Mexico City in the states of Tlaxcala, Puebla and Veracruz. Then in March 1979 a stand of pinyon in the state of Puebla along highway Mex 140 some 10 km southwest of San Salvador el Seco was examined and a standard sample taken consisting of a branchlet from each of 10 trees together with such cone material as could be found. Wood cores were not taken at that time, but twig ends of the 10 samples were subsequently analysed for monoterpene constituents (Zavarin and Snajberk, private communication). These trees, upon detailed needle and chemical study, proved to be identical with the specimen tree at Kew and established the status of the latter as a distinct taxon rather than an aberrant specimen of P. cembroides s. str..

To establish the taxonomic significance of this finding it was necessary to make additional collections to learn as accurately as possible the distribution of pinyons resembling the Kew tree and those near San Salvador el Seco. Herbarium material was useful in suggesting possible collection localities, but could not be

studied in the detail considered necessary, nor could it provide information on tree-to-tree variation. It was also necessary to establish how near to these localities the distribution of P. cembroides s. str. extends. At that time the nearest 10-tree collection was from a site along highway Mex 120 some 7 km southwest of Pinal de Amoles in Querétaro. Thus the populations considered to be P. cembroides occurring between the Querétaro and Puebla collections required sampling to ascertain whether the two taxa meet on common sites with or without intermediate forms, or are geographically separated. Just prior to making the March 1979 collection it was learned from Dr. Jerzy Rzedowski that a collection, taken to be P. cembroides, had been made by M.-F. Robert at a locality on the mountains east of the city of Tehuacán, Puebla. This locality, represented by a herbarium specimen at the Escuela Nacional de Ciencias Biológicas (ENCB), is the southernmost and easternmost for any pinyon known at present. It is represented by collection 14 in Figure 1 which shows the geographical distribution of subsp. orizabensis as collections 8 through 14. Figure 1 also shows the southeastern part of the much more widespread distribution of subsp. cembroides (= P. cembroides s. str.) as collections 1 through 7. Collection 6 was made at the only known locality for subsp. cembroides in the state of Veracruz. This, the southernmost and easternmost locality known, is isolated from the nearest similar stands to the northwest by rather moist heavily vegetated country. To judge from the vegetation surrounding the pinyons at collection site 6, the climate must be locally rather dry and warm, in contrast with that at the collection sites for subsp. orizabensis. The latter sites are not only at higher elevations (some by as much as 400m) but are cooler and somewhat more humid as made evident by the presence of Tillandsia sp. on the pinyons.

Herbarium material exists for subsp. orizabensis from farther west than collection 12 in Tlaxcala, and Martínez (1948) lists a number of such localities, but a limited search for pinyons at some of these has failed, and it seem likely from the general condition of the land in Tlaxcala that pinyons at many of these localities no longer exist. Martínez also reports pinyons in the state of México at Dexcaní near Jilotepec. A recent search in this locality has been unsuccessful.

From the 14 collections shown in Figure 1 and described in detail in Table 1 it is concluded that a genuine gap exists between the southeasternmost representatives of subsp. cembroides and the northwesternmost stands of subsp. orizabensis, and no trees were found in the course of this study which exhibited significant evidence of intermediacy between the two taxa. However, in order to define the gap as precisely as possible, it is to be noted that collection 11 near Frijol Colorado was made near the southern end of a stand of subsp. orizabensis that extends north northeast by possibly as much as 20 km toward Jalacingo (v. Martínez, 1948). It is also likely that subsp. cembroides extends as much as 3 km east southeast of collection 6 near Teximalpa. It is therefore concluded

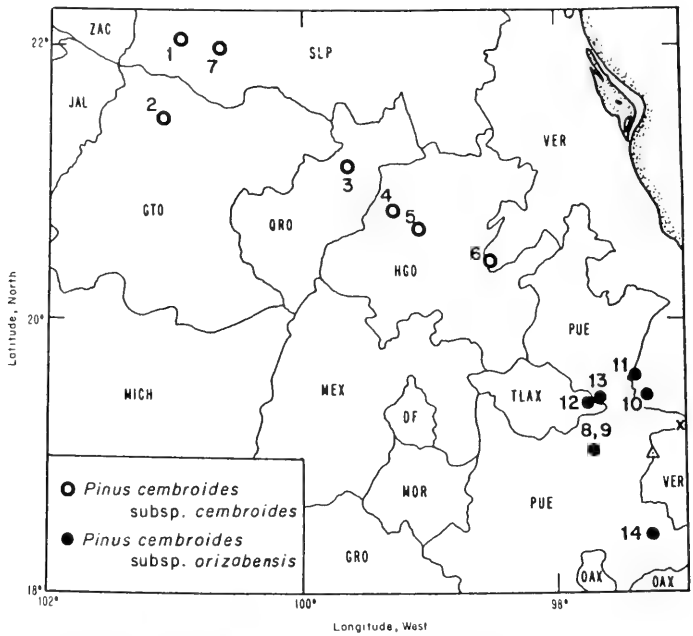

FIGURE 1. Geographic distribution of Pinus cembroides sensu lato at its southern limits. ▲ Mt. Orizaba, X village of Chichiquila.

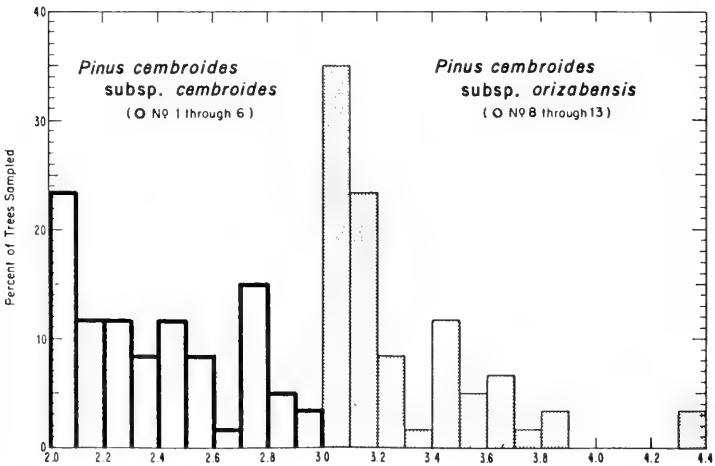

FIGURE 2. Needle-number distributions.

TABLE 1. Details of collections. Each collection consisted of a branchlet from each of 10 different trees. Twig ends and/or wood cores were also collected at each site, except numbers 2 and 7, from each tree for chemical analysis. Twig ends from the Kew tree were also taken.

Collection No.(Fig.1)	Mpio.	State	Lat.(°N)	Long.(°W)	Elev.(m)	Collectors	Date
Pinus cembroides subsp. *cembroides*							
1. Villa de Reyes (5 km WSW of Cerritos)		SLP	22° 02'	100° 58'	2320	D. K. Bailey 79-04 & F. G. Hawksworth	3 Mar. 1979
2. San Felipe (3 km ESE of Puerto Sandoval)		Gto	21 30	101 05	2100	D. K. Bailey 81-17 & B. E. Berger	5 May 1981
3. Pinal de Amoles (Along Mex 140, 7 km SW of Pinal de Amoles)		Qro	21 05	99 41	2400	D. K. Bailey 78-34 & F. G. Hawksworth	16 May 1978
4. Zimapán (3.7 km N of Pto. de la Estancia)		Hgo	20 47	99 18	1960	E. J. Lott & Tom Wendt P-93	14 Dec. 1980
5. Cardonal (near Santuario)		Hgo	20 40	99 06	2380	D. K. Bailey 80-12 & Tom Wendt 2499	10 Mar. 1980
6. Huayacocotla (1 km SE of Teximalpa)		Ver	20 25	98 31	2200	D. K. Bailey 81-18, B. E. Berger & Juan Velasquez H.	8 May 1981
7. Zaragoza (7 km NW of Mina las Cuevas)		SLP	21 59	100 38	2300	D. K. Bailey s.n. & F. G. Hawksworth	13 Nov. 1975
Pinus cembroides subsp. *orizabensis*							
8. Soltepec (10 km SW of San Salvador el Seco)		Pue	19° 04'	97° 42'	2370	D. K. Bailey 79-01, F. G. Hawksworth & D. Wiens	7 Mar. 1979
9. Soltepec (10 km SW of San Salvador el Seco)		Pue	19 04	97 42	2370	D. K. Bailey 80-06 & Tom Wendt s.n.	8 Mar. 1980
10. Perote (In malpais, 8 km S of Totalco)		Ver	19 27	97 17	2500	D. K. Bailey 80-07 & Tom Wendt 2494	9 Mar. 1980
11. Perote (4 km WNW of Frijol Colorado)		Ver	19 35	97 22	2630	D. K. Bailey 80-08 & Tom Wendt 2495	9 Mar. 1980
12. Atlzayanca (Santa Maria las Cuevas)		Tlax	19 24	97 44	2540	E. J. Lott & Tom Wendt P-134	28 Jan. 1982
13. Libres (7 km SSE of Libres)		Pue	19 25	97 41	2410	D. K. Bailey 80-11 & Tom Wendt 2498	10 Mar. 1980
14. Ajalpan (15 km E of Tehuacán)		Pue	18 27	97 14	2450	D. K. Bailey 80-05 & Tom Wendt 2481	7 Mar. 1980

that the gap has a width of about 140 km.

For the record it should be noted that the heavy infestation of the dwarf mistletoe, Arceuthobium pendens Hawksworth & Wiens, on subsp. orizabensis at collection site 11 was sampled, and subsequently reported by Hawksworth and Wiens (1980) under the host name Pinus cembroides Zucc., the only name available at the time. In contrast at the type locality of the parasite, collection site 1, the infestation was very light, affecting only two trees (that could be found) of Pinus discolor. No dwarf mistletoe was found on pinyons at the other twelve sites comprising this study. In particular no dwarf mistletoe was found on subsp. cembroides at site 1.

DISTINGUISHING CHARACTERS

To distinguish subsp. orizabensis from subsp. cembroides a rapid check on needle number or fascicle size is sufficient as is demonstrated by Figure 2 and the detailed numbers of Table 2. Collections 7 and 14 are omitted from the histogram of Figure 2. Material of collection 7 was destroyed inadvertently before complete analyses could be performed. Collection 14 differs from the remaining six collections of subsp. orizabensis in ways leaning very slightly toward subsp. cembroides. Until the general region of collection 14 can be studied further, its relative isolation from the other stands justifies its separate consideration as shown in Table 2, where the needle numbers for the Kew tree are also shown for comparison. It should be noted that collection 4 from

TABLE 2. Distribution of fascicle sizes (numbers).

	Percent of Fascicles with Indicated Number of Needles			
	2	3	4	5
Pinus cembroides subsp. cembroides				
12000 fascicles, 60 trees Collections 1 through 6	62.52	37.46	0.02	-
Pinus cembroides subsp. orizabensis				
12000 fascicles, 60 trees Collections 8 through 13	0.33	74.19	22.35	3.13
Collection 14 2000 fascicles, 10 trees	2.35	94.80	2.85	-
Tree P.372, Royal Botanic Gardens, Kew 400 fascicles	0.50	93.50	6.00	-

Zimapán, the generally accepted type locality for Pinus cembroides Zucc., is atypical as well. It comes from an exceptionally low and presumably dry location and yielded, in the standard sample of 2000 fascicles, 200 fascicles from each of 10 trees, an average fascicle size of 2.07. Of the remaining five localities, the average fascicle size varied from 2.30 to 2.65. Trees from greater elevation in the Zimapán region, including the type specimen Munich (examined while on loan to Kew) exhibit a substantially higher fraction of 3-needle fascicles. The inclusion of the Zimapán data has therefore somewhat distorted the histogram for subsp. cembroides as shown in Figure 2. The collections of subsp. orizabensis, studied in the same way, yielded average fascicle sizes ranging from 3.13 to 3.70. The slightly differing collection 14 yielded 3.00. Collection 13 had the very large average of 3.70 and most of the 5-needle fascicles shown in Table 2. The next largest average fascicle size was 3.32.

Other character differences of varying usefulness are;

Needle dimensions. Needles of subsp. orizabensis, including collection 14, are systematically somewhat longer and thicker than those of subsp. cembroides, though this is not obvious from casual observation. Nevertheless the needles of subsp. orizabensis are soft to the touch relative to the stiffer and sometimes more curved needles of subsp. cembroides.

Number and position of stomatal lines. From standardized samples of five fascicles per tree it was found that subsp. orizabensis has, on average, slightly fewer dorsal stomatal lines, and slightly more on the ventral surfaces than subsp. cembroides. However, histograms of the distributions show considerable overlap.

Number of resin ducts. For all practical purposes the needles of both taxa contain two resin ducts. Thus of more than 900 needles of subsp. cembroides considered in this study, all had 2 resin ducts. However among the 1200 needles of subsp. orizabensis, similarly considered, 10 needles were found with 3 resin ducts, and one needle was found with 4.

Foliage color. The ventral surfaces of the needles of subsp. orizabensis are usually much more glaucous than those of subsp. cembroides, and the dorsal surfaces are a darker more bluish green. In this respect the foliage of subsp. orizabensis more closely resembles that of Pinus discolor than that of subsp. cembroides. The latter has foliage which is usually somewhat yellowish green.

Needle retention and resinousness. Needle retention was found to be slightly greater for subsp. cembroides than for subsp. orizabensis. The average retention in years and its range are 4.2(3 - 6) and 3.6(2 - 5) respectively. Since early loss of needles is considered to be a means of moisture conservation, this could lead to the conclusion that evapo-transpiration is a more severe problem for the stands of subsp. orizabensis, except for collection 14, at an obviously rather wet locality, where the average needle retention was 5.0 years. Lest this result be interpreted solely as a climatic

response, it must be pointed out that the foliage of subsp. cembroides throughout its entire range is resinous and sticky to handle thus permitting better moisture retention, whereas that of subsp. orizabensis is comparatively non-resinous and clean to work with. Thus the difference in resinousness of needles of the two taxa is more useful as a character distinction than needle retention.

Bark of large mature trees. The bark of subsp. orizabensis resembles closely that of Pinus discolor and is in marked contrast with that of subsp. cembroides. Thus it exhibits little or no transverse fissuring with its irregular longitudinal fissuring. The bark is rather thin and shows yellowish-orange inner bark in the often broad fissures. Between fissures the bark tends to form in thin, rather ragged, concave layers. Subsp. cembroides, on the other hand, often exhibits irregular transverse fissuring as well as less conspicuous longitudinal fissuring, which results in the formation of coarse polygonal plates in the comparatively thick bark without the thin concave layers. The underbark, while yellowish, is less conspicuous in the fissures, and often does not show at all.

Small twigs after shedding needles and fascicle sheaths. The fascicle bracts of subsp. orizabensis are conspicuous and become nearly black in a few years. They tend to protrude thus giving the twigs a rough appearance and feel. In the case of subsp. cembroides the fascicle bracts are less conspicuous and somewhat smaller than those of subsp. orizabensis and result in comparatively smooth twigs after the passage of a few years.

Cones. Cones are very similar among all of the segregates of Pinus cembroides s. lat. with the exception of Pinus remota, and extremely variable even on the same tree, and from year to year. They are therefore of little use for distinguishing characters. Nevertheless it is possible to say a little. The cones of subsp. orizabensis are somewhat larger (i.e. longer) and harder than those of subsp. cembroides. The seeds of both have thick, hard shells relative to P. remota, and pink endosperms as revealed by Robert-Passini (1981) whose examples of subsp. cembroides included, unwittingly, some examples of subsp. orizabensis. Despite several similarities, pointed out above, between var. orizabensis and Pinus discolor, the endosperm of the latter, and of Pinus remota, is white.

Chemical differences. The difference between the two taxa in the percentage of 3-carene in wood from cores or twigs provides a limited character distinction. The percentage is small, usually 1 % or less, in subsp. cembroides, whereas it may be an order of magnitude greater in subsp. orizabensis. However, in the latter taxon it is highly variable within a stand, and some trees, or even most trees in some stands, exhibit only a little more than that found in subsp. cembroides, as for example collection 14 and the Kew tree.

CHOICE OF NAME

The name orizabensis has been chosen for two reasons. Firstly it gives recognition to the position of Mt. Orizaba (Pico de Oriza-

ba) with respect to the collection localities reported above. Mt. Orizaba is indicated by a small triangle in Figure 1. Secondly it commemorates the first two reports of what is now, in the light of the geographical distribution, clearly identifiable as subsp. orizabensis on the slopes of the mountain. Though the pinyons await rediscovery on the mountain, the suffix, -ensis, indicating place of growth, origin, or habitat, seems appropriate.

The taxon was first recognized by Gordon who gave it the name Pinus cembroides Gordon in The Pinetum (1858). The name is a later homonym, having been used earlier by Zuccarini (1832). Gordon, for reasons that are not clear, regarded Pinus cembroides Zucc. as a synonym for Pinus llaveana Schiede ex Schlechtendal (1838) rather than the reverse. Thus Pinus cembroides Gordon represented to Gordon a different taxon. It may be supposed that Gordon's persistent emphasis on the distinctness rested mainly on needles in fascicles of 3 rather than of 2 and 3 on the same tree, and on cone size. It also rested on the "shorter, more glaucous . . . leaves" than those of P. llaveana, where "more glaucous" is the relevant character.

Gordon's name was based on material received from Hartweg (Gordon, 1846)

> ". . . who found it in the cold districts of the mountain of Orizaba, near the village of Chichiquila, attaining a height of 30 feet, at an elevation of 10,000 feet above the sea.
>
> Leaves in threes, from an inch to an inch and a half in length (on wild specimens), . . . Cones single and sessile, from $2\frac{1}{2}$ to 3 inches in length . .
>
> Judging from locality and appearance, this Pine is likely to prove hardy in England and is quite new to the collections of this country."

This last remark was prophetic indeed in view of the success of the Kew tree.

Further independent evidence that subsp. orizabensis, as P. cembroides Gordon, occurs or once occurred on the flanks of Mt. Orizaba is provided by Gordon (1858) who states, in reference of Pinus orizabae Gordon (= Pinus pseudostrobus Lindl.) that

> "It was first discovered by Hartweg on the eastern declivity of the Mountain of Orizaba, in Mexico, at the same elevation (10,000 feet) as P. cembroides, growing in company with that species and a bushy Juniper; . . . but not abundant."

Unfortunately the Hartweg material from "the cold districts of the mountain of Orizaba" has not come to light. Specimens of his earlier collection of 1839, No. 440, from the vicinity of Zimapán and Cardonal have been examined at Kew. This material, alluded to by Gordon in the heading of his 1846 paper, is quite certainly P. cembroides Zucc. as stated by Bentham (1840). It has fascicles of both 2 and 3 needles on the same specimen.

An unsuccessful attempt was made to make a collection for this study on the lower slopes of Mt. Orizaba, beginning at the village of Chichiquila, shown by the small "x" on Figure 1. Unfortunately the route found led to the northwest instead of southwest, and did not reach a sufficient elevation (Chichiquila itself is only at about 6000 feet or 1830 m) before leading to the main highway, Mex 140, to the west of collection 10. A route to higher elevations to the southwest of Chichiquila would quite possibly lead to the trees collected by Hartweg, if they still exist.

2. PINUS CEMBROIDES subsp. LAGUNAE (Robert-Passini) D. K. Bailey

comb. nov. Pinus cembroides var. lagunae Robert-Passini. Adansonia ser. 4, 3, sec. B, No. 1: 64, 1981

This pinyon occurs only in a small area of the Sierra de Laguna to the east of Todos Santos, between La Paz and Cabo San Lucas at the southern end of the peninsula of Lower California. Robert-Passini (1981) decided that it differed at varietal rank from P. cembroides s. str. in having thinner seed walls and more cotyledons. To justify raising the rank to subspecies the following additional characters distinguish subsp. lagunae (based on Bailey's collection 79-09 of 15 March 1979, 10 trees sampled each with cores) from subsp. cembroides (based on collections 1 through 6)

longer needles, averages	6.75 vs. 4.51 cm
thinner fascicles, averages	1.19 vs. 1.32 mm
fewer stomatal lines per needle, averages	5.91 vs. 7.58

also longer cone peduncles and perceptible prickles peduncles 2 to 3 mm thick, prickles ca. 0.5 mm long on cone-scale umbos.

But the most important and quantitative difference was the completely different monoterpene chemistry of subsp. lagunae compared with that of subsp. cembroides and subsp. orizabensis. Subsp. lagunae is high in sabinene and terpinolene as compared with subsp. cembroides and subsp. orizabensis, and has many chemical similarities to Pinus discolor. Both subsp. lagunae and Pinus discolor are low in α-pinene as compared with subsp. cembroides and subsp. orizabensis.

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branchlets, and secondly for obtaining on loan from Munich the type specimen of Pinus cembroides Zucc., and making it available for study at Kew. Prof. J. N. Hough must be thanked for assistance with the Latin description of the new taxon. Dr. Rupert Barneby of the New York Botanical Garden gave extremely valuable advice and criticism of an earlier version of this account, much of which is reflected in the present version. Dr. Eugene Zavarin of the Forest Products Laboratory of the University of California gave permission to report in a preliminary and highly abridged form the results of the chemical analyses of the cores and twigs collected during the project. Most of all indebtedness must be acknowledged to Dr. Frank Hawksworth of the U. S. Forest Service for long-continuing assistance, encouragement and advice in carrying forward the pinyon project during the past decade.

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NOVITATES ANTILLANAE. X

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This new series of additions to the Floras of Hispaniola and Puerto Rico is the result of intensive field work in both islands and brings up to date our knowledge of their vegetation. After publishing our last book: LIOGIER, A. H. & L. F. MARTORELL, Flora of Puerto Rico and Adjacent Islands: a Systematic Synopsis (Editorial de la Universidad de Puerto Rico, 1982), several taxa have been added and new species have to be described.

LORANTHACEAE

Dendropemon linearis Alain, sp. nov.

Rami usque 30 cm longi, in parte inferiori usque 2 mm crassi, teretes plicato-striati, brunnei, juvenili compressi, internodiis usque 2 cm longis, e basi ad apicem paullo dilatati; folia linearia vel anguste lineari-lanceolata, basi in petiolum brevissimum vel subnullum angustata, apice paulatim acuminata, apice ipso apiculata, 2-3.5 cm longa, 2-4 mm lata, nervo medio supra nullo, subtus prominente, lateralibus nullis, margine plana integra, in sicco nigrescentia opaca coriacea; inflorescentiae solitarii axillares, 3-4-florae; pedunculo 12-15 mm longo, compresso, apice versus dilatato et usque 2 mm lato; rachis plus minus compressa; pedicelli 2-5 mm longi; bractea et prophylla inter sese in cupulam 1 mm longam coalita, superne libera triangularia; calycodium non visum; baccae nigrae obovato-cylindraceae, 8-9 mm longae.

DOMINICAN REPUBLIC: In pine forest, near Aceitillar, Bahoruco Mts., alt. approx. 1,000 m, uncommon, 26 Feb. 1971, Alain H. Liogier 17912 (Holotypus: NY).

The very narrow leaves, the few-flowered inflorescence, the absence of calycodium distinguish this species. Some forms of Dendropemon purpureus (L.) Krug & Urb., have narrow leaves, but this last species has a conspicuous calycodium, and the leaves have a well-developed petiole.

POLYGONACEAE

Coccoloba jimenezii Alain, sp. nov.

Frutex 4-5 m altus, ramuli tereti glabri; ochreae cylindraceae, coriaceae, puberulae, 5-7 mm longae, apice breviter bilo-

Dendropemon linearis Alain (A. H. Liogier 17912).

batae; foliia ovata vel oblongo-ovata, apice versus attenuata, apice ipso leviter emarginata, basi cordata, 2-4.8 cm longa, 1-2.5 cm lata, subcoriacea vel coriacea, supra glabra vel nervo medio basim sparse pilosa, nervo medio supra vix prominulo, subtus prominente, lateralibus utroque latere 5-6, supra et subtus prominulis, ad marginem arcuatis et anastomosantibus, venis utroque facie dense reticulatis, margine integra, plana vel leviter recurvata; petioli 6-8 mm longi, puberuli, 1-2 mm sub ochreae apicem abeuntes; inflorescentiae terminales in ramuli brevissimi, 1-5 mm longae, rachis glaber, angulatus; bracteae anguste ovato-triangulares, acutae, 1 mm longae, 0.4 mm latae, glabrae; ochreolae membranaceae, tubulari-campanulatae, 1 mm longae, glabrae; pedicelli 2-3 mm longi, glabri; flores feminei solitarii, glabri, hypanthium in fructo 3 mm longum, lobi imbricati, 2 mm longi, apice rotundati; caetera ignota.

DOMINICAN REPUBLIC: In thickets, on serpentine rocks, Sierra Prieta, Villa Mella, Distrito Nacional, alt. 150 m, 24 March 1974, Alain & Perfa Liogier 21450 (Holotypus: NY; Isotypi: SDM, UPR); id., 26 May 1973, Alain & Perfa Liogier 19276 (NY, SDM); id., 24 Oct. 1975, Alain & Perfa Liogier 24125 (NY, SDM).

The ovate, cordate leaves, the short inflorescences distinguish this species. The nearest taxon seems to be C. hotteana Schmidt, with elliptic or ovate to obovate-elliptic leaves, rounded or narrowed at base, the perianth lobes ovate to suborbicular, the fruits up to 6 mm long. This species is named in memory of the late José Jesús Jiménez, a prominent botanist in the Dominican Republic.

LEGUMINOSAE-PAPILIONOIDEAE

Crotalaria intermedia Kotschy

St. CROIX: On roadside, Bonne Esperance, Alain H. Liogier 34234 (UPR). A new record.

Pueraria triloba (L.) Makino

DOMINICAN REPUBLIC: Vicinity of Bonao, Alain & Perfa Liogier 9073-1 (NY, UPR, SDM); new record for Hispaniola. Native of Asia, cultivated and escaped.

Sesbania tomentosa Hook. & Arn.

PUERTO RICO: Gurabo Station, introduced and becoming a weed. A new record (det. Peter E. Gibbs).

EUPHORBIACEAE

Chamaesyce blodgettii (Engelm. ex Hitchc.) Small

PUERTO RICO: Caja de Muertos Isl., R. O. Woodbury & M. Cobin s.n. (UPR 7485); on coastal limestone, Guánica, A. & P. Liogier, L. F. Martorell 29485 (UPR); a new record for Puerto Rico. Bermuda, Bahamas, Florida, Cuba, Jamaica, Virgin Islands, Grand Cayman; oddly enough, this species has not yet been reported from Hispaniola.

Coccoloba jimenezii Alain (A. & P. Liogier 21450).

Adams (Flowering Plants of Jamaica, p. 429. 1972) cites this species for Puerto Rico and the Virgin Islands.

AQUIFOLIACEAE

Ilex cassine L.

PUERTO RICO: Dorado Beach forest, R. O. Woodbury s.n. (UPR 1770); a new record for Puerto Rico. Southern United States, Bahamas, Cuba.

MALVACEAE

Bastardia bivalvis (Cav.) HBK.

St. CROIX: On roadside, Estate Solitude, A. H. Liogier 34213 (UPR). A new record for St. Croix. Greater Antilles, Mexico to Peru and Brazil.

PASSIFLORACEAE

Passiflora berteriana Balb. ex DC.

PUERTO RICO: in dry thickets, Maruca, Guánica, A. & P. Liogier, L. F. Martorell 33732 (UPR); a new record for Puerto Rico. Cuba, Hispaniola.

MYRTACEAE

THE GENUS CALYPTRANTHES IN PUERTO RICO AND ADJACENT ISLANDS.

In their "Botany of Porto Rico and the Virgin Islands", N. L. Britton and P. Wilson list 6 species of Calyptranthes; one of them, C. kiaerskovii Krug & Urban, is considered as an endemic to Tortola and will not be considered in this study, being outside of the area covered. Subsequently, several species have been added to the list, either as species new to science, or as new records for the area. Yet another species has to be added, bringing the total number to 11. The following key will help to identify the different taxa found in the area.

According to R. McVaugh (Taxon 17: 377. 1968), this genus probably consists of about 100 described species in the West Indies; it is well represented in South America, mainly in southern Brazil; it needs a revision, and the number of species known to occur in the West Indies will probably be less than actually listed in each one of the islands.

Key to the species of Calyptranthes in Puerto Rico and Adjacent Islands:

a. Flowers sessile or subsessile.
  b. Plants ferrugineo-tomentose in young parts and inflorescences; flowers solitary. C. krugii.
  b. Plants glabrous; flowers 3-4. C. dumetorum.
a. Flowers in paniculate, or 1-3-flowered, peduncled inflorescences, or glomerate.
  c. Flowers 1-3, sessile on 2.5-3.5 cm long peduncles.

d. Plants glabrous; branchlets 2-lined or slightly 2-winged, not articulate at base.
e. Flowers solitary on peduncles to 3.5 cm long; leaves ovate or oblong-ovate, rounded to obtuse at apex, 1.7-2.6 cm long. C. peduncularis.
e. Flowers 1-3, peduncles to 2.5 cm long; leaves rhomboid or oblong, 2-3.5 cm long, narrowed to cuspidate at apex. C. triflorum.
c. Flowers in panicles, cymes or glomerules.
f. Leaves 8-11 cm long, oblong-elliptic; flowers in glomerules, on peduncles to 9.5 cm long. C. luquillensis.
f. Leaves to 7.5 cm long; flowers paniculate or cymose.
g. Leaves acute or obtuse; inflorescences few-several-flowered.
h. Leaves oblong-obovate; cymes trichotomous. C. thomasiana.
h. Leaves elliptic or ovate-elliptic; panicles several-flowered, the flowers subglomerate, nearly sessile. C. portoricensis.
g. Leaves acuminate; panicles few- to many-flowered.
i. Leaves cuspidate-acuminate at apex; twigs with appressed brown hairs when young.
j. Panicles usually as long as the leaves or longer, pubescent; fruits 4-5 mm in diameter. C. pallens.
j. Panicles usually shorter than the leaves, glabrous or nearly so; fruits 6-7 mm in diameter. C. sintenisii.
i. Leaves obtuse or at most bluntly acuminate at apex; twigs glabrous. C. zuzygium.

C. dumetorum Alain, Bull. Torrey Bot. Club 92: 298. 1965.
In serpentine barrens, Susua, Puerto Rico (Type: Alain Liogier 9870); Camuy river, R. O. Woodbury s.n., sterile (UPR 2290); endemic.
This rare species has been collected only twice. It is little known; the flowers and fruits are still unknown.

C. krugii Kiaersk., Bot. Tids. 17: 248. 1889.
In forests at middle and higher elevations, in the Luquillo and Guavate forests, and the Central mountain range, Puerto Rico; endemic.
A very variable species, the shape and size of the leaves varying from rounded to obtuse at apex, and from 2-5.5 cm long and 1.3-4.3 cm broad, being sessile or short-petioled; the main characteristic is the sessile flowers.

C. luquillensis Alain, Bull. Torrey Bot. Club 90: 189. 1963.
Rare at middle and higher elevations, in the Luquillo forest, Puerto Rico; endemic (Type: Holdridge 61, NY; C. E. Horne, s.n., NY; R. O. Woodbury 5575 (UPR)
This striking species is unique by its large oblong-elliptic leaves and the glomerate flowers on long peduncles.

C. pallens (Poir.) Griseb., in Abh. Gött. Akad. 7: 215. 1857.
Eugenia pallens Poir. in Lam., Encycl. Suppl. 3: 122. 1813.
Local, mainly in moist coastal forests, ascending to 800 meters, Puerto Rico; southern Florida, Bahamas, Greater Antilles, Virgin Islands, Cayman Islands, Guadeloupe; also in Mexico and Guatemala.

C. peduncularis Alain, Bull. Torrey Bot. Club 90: 189. 1963.
In woods, Maricao State Forest, Puerto Rico (Type: Alain Liogier 9220, NY); endemic.
A very rare and little known species, to be collected again.

C. portoricensis Britton, Bull. Torrey Bot. Club 51: 11. 1924.
Rare in forests, at Luquillo and Maricao forests, from 800 to 1,200 m altitude, Puerto Rico; endemic.

C. sintenisii Kiaersk., Bot. Tids. 17: 250. 1889.
In forests, at lower and middle elevations, at Bayamón and in the Luquillo Mountains, and in moist coastal forest at Dorado, Puerto Rico; Hispaniola.

C. thomasiana Berg., Linnaea 27: 26. 1855.
Locally common in mounatins, Vieques and St. Thomas islands; Virgin Islands.

C. triflorum Alain, Bull. Torrey Bot. Club 90: 189. 1963.
In forests on serpentine, Maricao State Forest, Puerto Rico (Type: Alain Liogier 9342, NY; id., May 24, 1964, R. O. Woodbury s.n., UPR 2316; id., June 1970, R. O. Woodbury s.n., UPR 2315; id., July 1970, R. O. Woodbury s.n., UPR 2314); endemic.
This species is notable by its 3-flowered inflorescences, the flowers sessile, its cuspidate flower-bud, its small rhomboid leaves.

Calyptranthes woodburyi Alain, sp. nov.

Arbor parva usque 7 m alta, caulis usque 10 cm diam, ramulis subteretibus vel paullo compressis, glabrescentes, pilis simplicibus sparsissimis muniti et glandulosis, ad basim articulatis; folia elliptica vel lanceolato-elliptica, 4-4.8 cm long, 1.7-2.1 cm lata, apice obtusa vel rotundata, basi versus in petiolum attenuata vel cuneata, nervo medio supra impresso, subtus prominente, lateralibus et venis obsoletis, glabra, supra olivacea dense glanduloso-punctata subtus pallidiora sparse glanduloso-punctata, margine integra paullo recurvata, petiolo 2-3 mm longo, supra applanato; pedunculi axillares, applanati, 2-3 mm longi, 1-2-flori, pedicelli 1-12 mm longi, glanduloso-punctati; bracteae triangulares, 1 mm longae, glabrae; alabastra ovoideo-fusiformia, 5 mm longa, apiculata, apiculo 1.5 mm longo; hypanthium globosum, 2 mm longum et latum, calyptra cuspidata 1.5-2 mm longa.

PUERTO RICO: Quebrada Grande, El Verde, Luquillo Mts., Aug. 1, 1977, R. O. Woodbury s. n. (Holotypus: UPR 2495); El Verde, Luquillo Mts., July 1961, R. O. Woodbury 5096 (UPR); El Verde, Eona Dora River area, June 22, 1960, R. O. Woodbury 3740 (NY); Guavate, April 1961,

Calyptranthes woodburyi Alain (R.O.Woodbury s.n.)

R. O. Woodbury 4869 (UPR); id., Aug. 2, 1977, R. O. Woodbury s. n., (UPR 2496); Carite, Sept. 1971, R. O. Woodbury s. n. (UPR 8818); Maricao, Monte del Estado, June 1975 (R. O. Woodbury s. n. (UPR 8822).

A species near to C. triflorum Alain, described from Puerto Rico; the main differences are: the sparsely pilose twigs, the larger and not cuspidate leaves, glandular-punctate above; in this species, the flowers are 1-2 on a short peduncle and the pedicel is well developed; the affinity lies in the cuspidate calyptra. Named in honor of R. O. Woodbury, the indefatigable collector of this species.

Some specimens are fruiting and the fruit description is as follows:

Fructiferi pedunculi usque 3.2 cm longi, glabri, glandulosi; fructi globosi, 6 mm diam., glandulosi, brunnei, glabri, apice hypanthi margine coronati.

C. zuzygium (L.) Sw., Nov. Gen. & Sp. Pl. 79. 1788.
Myrtus zuzygium L., Syst. Veg. ed. 10, 2: 1056. 1759.
Rare in moist forests on the north coast, Puerto Rico; Florida, Bahamas, Greater Antilles.

Myrciaria myrtifolia Alain, sp. nov.

Frutex vel arbor parva, 5 m alta, caulis 10 cm diam.; ramuli teretes vel leviter applanata, pubescentes, rami grisei cortice fisso; folia elliptica vel oblongo-elliptica, 1-2 cm longa, 0.5-1 cm lata, apice obtusa vel rotundata vel emarginata, apice ipso mucronulata, mucrone brunneo, basi obtusa vel rotundata, nervo medio supra impresso, subtus prominulo, nervis lateralibus obsoletis, supra nitida subtus opaca sparse punctata, margine integra, petiolo 2 mm longo supra applanato puberulo; flores in foliorum superiorum axillibus solitarii, pedicelli 1.5-2 mm longi, leviter compressi, puberuli; prophylla ovato-deltoidea, 1 mm longa, margine ciliata; hypanthium 1-1.5 mm longum campanulatum, glaber, glandulosum, calycis limbus 1.5-2 mm longus, glaber, glandulosus, lobi rotundati ciliolati; petala oblonga apice rotundata 2 mm longa, extus pilosula glandulosa; stamina numerosa; caetera ignota.

PUERTO RICO: Mountain ridge North of Coamo on road 14, May 20, 1971, R. O. Woodbury 21501 (Holotypus, NY); top of Cerro Cariblanco, R. O. Woodbury s. n. (UPR 5123); VIEQUES: May 24, 1978, R. O. Woodbury s.n. (UPR 5124).

This species is notable for its small leaves, probably the smallest in the genus, the absence of lateral nerves or reticulation, the puberulous branches. I do not know of any similar plant in the West Indies.

Psidium calyptranthoides Alain, sp. nov.

Arbor parva glabra, rami hornotini plus minus applanati, brunneo-glandulosi, lenticellosi, vetustiores grisei cortice striato et fisso; folia 2-3 mm longe petiolata, petiolo supra canaliculato,

Myrciaria myrtifolia Alain (R. O. Woodbury 21501).

basi articulato ; lamina elliptica usque oblongo-elliptica, 4.5-7 cm longa, 2.5-4.2 cm lata, apice acuminata apice ipso rotundato, basi in petiolum attenuata, nervo medio supra ad basim leviter impresso, subtus praesertim ad basim prominente, lateralibus utroque latere 5-7 saepe obsoletis ad marginem anastomosantibus, in utroque facie glanduloso-punctata, margine integra leviter revoluta, glaberrima; flores axillares, pedunculi filiformes, in nodi oppositi, 2.5-2.8 cm longi, brunneo-glandulosi; prophylla subulata, 1 mm longa, fimbriata, decidua; alabastra pyriformia, basi subcylindrica, apice globosa, apiculata, 7 mm longa, 4.5 mm lata ad apicem, 1.5 mm lata ad basim, dense glandulosa; calyx in alabastro clausum, ad anthesim irregulariter adaperiens, intus pilosus; petala elliptica, pilosa, stamina numerosa. Fructus non visi.

PUERTO RICO: Monte del Estado Forest, Maricao, 2800 ft. altitude, July 8, 1970, R. O. Woodbury 20506(Holotype: UPR; Isotype: NY); Dos Picachos, Luquillo Mts., May, 1960, R. O. Woodbury s. n. (UPR 2499).

In this large genus, it is still possible to find undescribed species. The present one resembles at first sight Calyptrogenia biflora Alain, from Hispaniola; the calyx opening irregularly instead of by a calyptra is so far the main generic difference. Rogers Mc Vaugh (Taxon 17: 409-410. 1968) questions the validity of Calyptrogenia. After much experience in the field, I am convinced this is a good genus. Much more material needs to be collected, both in flower or in fruit before this problem can be solved. Calyptrogenia so far in found only in Hispaniola.

PRIMULACEAE

Anagallis arvensis L.

PUERTO RICO: Cerro Avispa, Cercadillo, Cayey, A. & P. Liogier, L. F. Martorell 33862 (UPR); native of western Europe, now widespread as a weed. A new record for Puerto Rico.

CONVOLVULACEAE

Cuscuta campestris Yuncker

St. CROIX: in street, Christiansted, A. H. Liogier 34175 (UPR); cosmopolitan. A new record for St. Croix.

ASCLEPIADACEAE

Cynanchum grisebachianum (Schlecht.) Alain

St. JOHN: In thickets, near Coral Bay, A. H. Liogier 34241 (UPR); Puerto Rico, Lesser Antilles. A new record for St. John.

RUBIACEAE

Several authors have recently decided that Oldenlandia should be included into Hedyotis as a synonym. We have to establish the following new combinations for the Flora of Hispaniola:

Psidium calyptranthoides Alain (R. O Woodbury 20506).

Hedyotis nigrescens (Urban & Ekman) Alain, comb. nov.
Oldenlandia nigrescens Urban & Ekman, Ark. Bot. 24 (4): 36. 1931.
A narrow endemic in the mountains of the Dominican Republic, collected only once by Ekman (Type: Ekman 11712).

Hedyotis selleana (Urban) Alain, comb. nov.
Oldenlandia selleana Urban, Repert. Sp. Nov. 16: 145. 1919.
This species is endemic to Hispaniola, and has been collected many times, both in the Dominican Republic and in Haiti.

The genus Borreria Meyer is also considered as a synonym to Spermacoce L. The following species in the Flora of Hispaniola need to be transferred:

Spermacoce densiflora (DC.) Alain, comb. nov.
Borreria densiflora DC., Prodr. 4: 542. 1830.
Spermacoce spinosa L., Sp. Pl. ed. 2. 148. 1762, as name, not as to the plant, according to J. Steyermark.
Borreria spinosa (L.) Cham. & Schl., Linnaea 3: 340. 1828.
This species is found in Cuba, Jamaica, Hispaniola, the Lesser Antilles and continental tropical America. It is very rare in Hispaniola.

Spermacoce litoralis (Urban) Alain, comb. nov.
Borreria litoralis Urban, Repert. Sp. Nov. 20: 352. 1924.
This species, endemic to Hispaniola is found only on the northern coast both in Haiti and in the Dominican Republic.

Spermacoce rosea (Urban) Alain, comb. nov.
Borreria rosea Urban, Symb. Ant. 7: 414. 1912.
An endemic to the high mountains in the Dominican Republic. The type specimen is from Constanza (Tuerckheim 3377).

CUCURBITACEAE

Psiguria pedata (L.) Howard

St. CROIX: In forest, Estate Solitude, A. H. Liogier 34211 (UPR); Bahamas, Cuba, Hispaniola, Puerto Rico. A new record for St. Croix.

POTAMOGETONACEAE

Potamogeton illinoensis Morong

PUERTO RICO: in water, floating, Río Dorado, Toa Baja, A. H. Liogier 33773 (UPR); North America, Mexico, Central America, West Indies. A new record for Puerto Rico.

GRAMINEAE

Aristida swartziana Steud.

PUERTO RICO: In dry thickets, Maruca, Guánica, A. & P. Liogier, L. F. Martorell 33630 (det. S. Hatch); Jamaica, Hispaniola, Antigua,

Barbuda. A new record for Puerto Rico.

Brachiaria brizantha Stapf
PUERTO RICO: A weed, at Gurabo Station, A. & P. Liogier 33485 (UPR); this species has been introduced as an experimental fodder plant, and is rapidly becoming a weed; native of tropical Africa. "Signal grass".

Dichanthium annulatum (Forssk.) Stapf
St. CROIX: On roadside, Estate South Gate, A. H. Liogier 34185 (UPR); native of the Old World, introduced into the West Indies, a weed. New record for St. Croix.

Eragrostis curvula (Schrad.) Nees
PUERTO RICO: a weed in Santurce, A. Liogier 33717 (UPR); native of South Africa, introduced into the tropics and subtropics. A new record for Puerto Rico.

Rottboellia exaltata L.f.
St. CROIX: On roadside, Estate Canaan, A. Liogier 34228 (UPR); a native of southern Asia, introduced as a weed in the West Indies. A new record for St. Croix.

Rhynchelytrum repens (Willd.) Hitchc.
PUERTO RICO: In grassy places, Tortuguero, Vega Baja, A. H. & P. Liogier, L. F. Martorell 32992, 33473 (UPR); Las Mesas, Mayaguez, A. H. Liogier 30694 (UPR).
R. Fosberg and M.-H. Sachet (Smithsonian Contr. Bot. 47: 1-3. 1981) separate the two species: T. repens (Willd.) Hitchc. and T. rosea Nees; they are easily separated by the color of the spikelets, T. repens having pale glumes and T. rosea with pink glumes, among other differences. According to the two authors cited, T. repens is much rarer than T. rosea, and is more abundant in Africa.

CYPERACEAE

Bulbostylis capillaris (L.) Kunth ssp. antillana (Britt.) T. Koyama
St. CROIX: In sand, Sandy Point, A. H. Liogier 34220 (UPR); Puerto Rico, Lesser Antilles. A new record for St. Croix.

BROMELIACEAE

Tillandsia ariza-juliae L. B. Smith & Jiménez
PUERTO RICO: In forest, Maricao State Forest, A. H. Liogier 33783 (UPR) collected by Mr. Ramón Cantero; Hispaniola. A new record for Puerto Rico.

MUSACEAE

Heliconia subulata R. & P.
PUERTO RICO: In woods, Trujillo Alto, A. & P. Liogier 33489 (UPR) native of Guatemala through Central America, to Brazil and Bolivia. A new record for Puerto Rico.

STUDIES ON Mikania (COMPOSITAE)-IX

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Continued study of Mikania has resulted in the following comments on Mikania swartziana Griseb. and the description of one new species. The present paper is preliminary to a general treatment of the genus for the West Indies.

MIKANIA SWARTZIANA Griseb., Fl. Brit. W. Ind. 363. 1861.

This is the first described Mikania from the West Indies belonging to a closely related group of slender twiners possessing thinly pedicelled racemose capitulescences. The plant was originally cited as occurring in Jamaica and Cuba, but the Cuban plants are currently referred to under the later names M. alba Taylor, M. hioramii B.L.Robins., and M. lindenii Moore. It has also been reported in Haiti by Moscoso (1943), but this seems to be based on inaccurate determination. It appears that M. swartzana is a very rare plant that is endemic to Jamaica.

It has become apparent that the original diagnosis describes not only the Jamaican plant, but certain Mikania elements from Cuba. This is supported by the mention of this plant in Cuba by Grisebach (1861), thereby implying a specimen from there was utilized in preparing the original description. The matter is further complicated in that the type specimen of M. swartziana is composed of four separate fragments belonging to two different species, both from Jamaica. The essence, then, is that two or possibly three different species were utilized in preparing the description of M. swartziana. The description is unnecessarily broad and describes any of the previously mentioned species. It is therefore necessary to define the morphological limits of M. swartziana to reflect its correct status. This can only be accomplished by determining which of the two elements that compose the type more nearly matches the original description.

The largest fragment of the type (element A) is on the left side of the sheet and consists of a stem about 25 cm long, three poorly pressed leaves, and a capitulescence. The leaves are ovate, 5-nervate, and darkened on drying. The capitulescnce is composed of rather dense racemes with the heads borne close together. The exterior bracts are as long or slightly longer than the pedicel. The corolla is funnelform while the achene is densely glandular. The remaining three fragments (element B) are the two fragments on the right side and one on the upper center of the sheet. They are all the same and consist of primarily capitulescenses with a few

bracteal leaves. The heads are more distantly spaced on the rachis of the capitulescence. The exterior bracts are much shorter than the pedicels. Corollas are tubular and the achene glabrous. The leaves are elliptic-oblong, 3-nervate, and have not darkened on drying.

It is my judgment that the salient characters of the original description correspond more closely with element B. This is seen in the trinervate leaves, the heads being more distantly spaced, the clavate (more tubular) corolla, and the glabrous achenes. Therefore, the portions of the type specimen identified as element B in this paper are designated as the lectotype of M. swartziana. Additionally, this choice will better preserve current usage that describes M. swartziana as having trinervate leaves (Adams 1972 and Urban 1907).

Lectotype: Jamaica, Swartz s.n. (S).

Additional specimen examined: Jamaica, Wright s.n.(BM).

The original choice of the type was unfortunate since three other specimens, apparently part of the same collection (therefore isotypes), are housed at Stockholm. The type appears to have been selected because it had more material on the sheet. Two of the other specimens possess cauline leaves and capitulescences of what is now M. swartziana and either would have constituted a homogenous type. The third specimen of this collection is essentially identical with element A, other than having two extraneous leaves of M. swartziana attached to the sheet, but not connected to the major portion of the specimen. This specimen can now be described as follows:

MIKANIA TENELLA W.Holmes, sp. nov.

Suffrutex volubilis; foliis ovatis, 4-7.5 cm longis et 3-5 cm latis, apice caudatis breviter, basi rotundis, marginibus integris; racemis ca. 10 cm longis et 10 cm latis; capitulis ca. 3 mm longis; corollis 1.7-1.8 mm longis; dentibus limbi triangulatis, ca. 0.3 mm longis; achaenis ca. 1 mm longis; pappi setis 27-33, ca. 2 mm longis; scabridis.

Twining vine; stems terete, striate, glabrous; internodes 8-9 cm long. Leaf blades ovate, 4-7.5 cm long, 3-5 cm wide, apices narrowed to short caudate tips, margins entire, bases rounded, upper surfaces glabrous, the nerves and veins obscure, lower surfaces glabrous, 5-nervate with a pair of nerves originating very near the base, a second more prominent pair separating ca. 1 cm above the first, tertiary veinlets forming a somewhat obscure reticulate-areolate pattern below; petioles flexous, 8-10 mm long, glabrous. Capitulescence a compound raceme, ca. 10 cm high and 10 cm in diameter, the head bearing regions of the branchlets ca. 1.5 cm long, the heads 1.5-2 mm apart; lower bracts similar to cauline

leaves, much reduced upwards, lanceolate, ca. 5 mm long; branchlets angular, glabrous; pedicels 0.8-1 mm long, glabrous. Heads ca. 3 mm long; exterior bracts subulate, ca. 1 mm long, glabrous, borne at the base of the pedicel. Phyllaries elliptic-ovate, ca. 2 mm long, glabrous, apices rounded, obscurely puberulent. Corolla ca. 1.7-1.8 mm long, tube ca. 0.75 mm long, throat funnelform, ca. 0.75 mm long, teeth triangular, ca. 0.3 long, sparingly glandular. Achenes (immature) ca. 1 mm long, densely glandular. Pappus bristles white, ca. 2 mm long, scabrid, gradually thinning from base to apex (Fig. 1).

TYPE: Jamaica, Swartz s.n (S).

Mikania tenella is one of two species of the West Indies having a racemose capitulescence with the exterior bracts being longer in length than the pedicel. The other is the Cuban M. alba Taylor. That species differs in possessing thicker, prominently 3-nervate, lance-ovate leaves with the margins often being coarsely dentate. Opposite petioles are connected by a thickened stipule-like enation, a trait absent in M. tenella. The racemose capitulescence of M. alba has slightly larger heads that are more remotely spaced on the branchlets. The plant does not darken upon drying as does M. tenella.

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Grisebach, A.H.R. 1861. Flora Brit. W. Ind. Lovell Reeve & Co. London. p.363.

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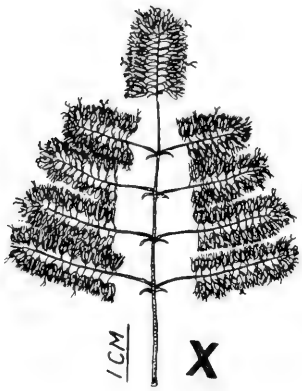
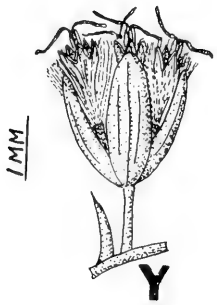
Urban, I. 1907. Symb. Ant. 5: 216-217.





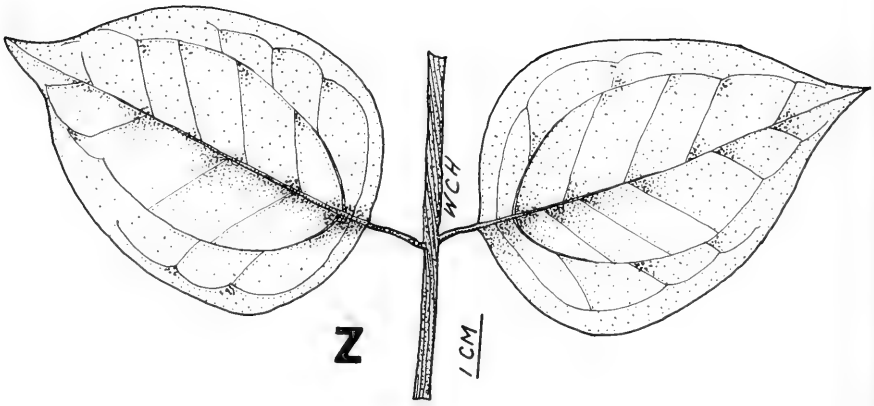


Fig. 1. Mikania tenella W. Holmes. X. Capitulescence. Y. Head with exterior bract. Z. Leaves and stem.

A NEW POROPHYLLUM (ASTERACEAE : TAGETEAE) FROM SOUTHCENTRAL MEXICO

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Recent collections by the present author from the state of Hidalgo, Toliman Canyon, near Zimapan, has revealed the following cliff-dwelling novelty.

Porophyllum zimapanum B.L. Turner, sp. nov.

A Porophyllum warnockii floribus glabris, corollae tubulis faucibusque aequalibus, achaeniis parvioribus fere glabris, pappis 3-4 mm longis, phyllariis ca. 9 mm long apicibus pubescentibus differt.
Suffruticose glabrous perennial herbs, 30-40 cm high, pendant from vertical bluffs. Stems bright green, wiry, 4-5 sulcate. Leaves mostly alternate, filiform, 3-5 cm long, glabrous, with 1-3 pustulate glands, 1-2 mm long, the larger mostly positioned 1-4 mm below the apex which, upon drying, causes the apex to recurve. Heads single, ca. 30-flowered, on somewhat recurved peduncles, 1-2 cm long. Involucre cylindric, ca. 30-flowered, glabrous except for the abruptly obtuse apices of each bract which bear a tuft of soft puberulent hairs; bracts 5, ca. 9 mm long, 1.5 mm wide, with 2 rows of 2-3 linear, orangish pustules. Receptacle hemispheric, glabrous, ca. 1.5 mm across. Corollas glabrous, pale yellow, ca. 5.5 mm long; tube 2.5-3.0 mm long, gradually merging into a narrowly funneliform throat, 2.5-3.0 mm long, the lobes 5, acute, 0.5-0.7 mm long. Achene body linear, ca. 5.5 mm long, black, very sparsely white-hispid, especially above; pappus of ca. 20 hispidulous setae 2-4 mm long.

TYPE : MEXICO. Hidalgo: exactly 10.5 mi W of Hotel Fundicion (in Zimapan) by dirt road to the very bottom of Barranca Toliman, then downstream to just before the barranca is at its narrowist. Plant found only upon vertical cliffs. 15 Mar 1983, B. L. Turner 15093 (holotype TEX; isotypes to be distributed).

Among the floral features the most remarkable is the tufted (pubescent) involucral bracts, unknown among most Porophyllums of my acquaintance. The filiform leaves are also unique and differ from those of P. warnockii in possessing a large, linear, pustulate gland 2-4 mm below the apex, which upon drying causes the tip to recurve in the manner of a shepherd's cane. The comparable gland of P. warnockii, as noted by Johnson (1969), is

terminal and the leaves do not recurve dramatically at their apices. It should also be noted here that Johnson compares P. warnockii to P. filiforme, a species of northcentral Mexico with purple flowers and involucres, a species clearly remote from both P. warnockii and P. zimapanum.

Porophyllum zimapanum is, however, clearly related to P. warnockii. The latter is known only from the type collections (Mexico State, District Temascaltepec, Nanchititla, along cliffs, Hinton 8469) and it too has filiform leaves and is a local bluff-dwelling species. They differ in a number of characters including both floral and involucral features as follows:

P. zimapanum	P. warnockii
1. tube/throat ratio ca. 1:1	1. tube/throat ratio ca. 2:1
2. corolla ca. 5.5 mm long, glabrous	2. corolla ca. 7.0 mm long, hispidulous
3. achene body ca. 5.5 mm long	3. achene body ca. 8.0 mm long
4. pappus 3-4 mm long	4. pappus 6-8 mm long
5. involucre 9 mm long	5. involucre 12-14 mm long
6. phyllaries pubescent at apex	6. phyllaries glabrous

Porophyllum zimapanum occurs sporadically along the spectacular Barranca Toliman, along with several other cliff-dwelling endemics including Eupatorium karwinskianum and Polygala minutifolia Rose, the latter being, in habit, remarkably similar to Porophyllum zimapanum.

LITERATURE CITED

Johnson, R. R. 1969. Monograph of the plant genus Porophyllum (Compositae:Helenieae). Univ. Kansas Sci. Bull. 47: 225-267.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXX

Harold N. Moldenke

PAEPALANTHUS DUIDAE var. *PARVIFOLIUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis uniformiter brevioribus 1.5--3 cm. longis recedit.

This variety differs from the typical form of the species in its leaves being uniformly shorter, mostly only 1.5--3 cm. long.

The variety is based on *S. S. Tillett, P. Colvée, & al. 752-349* from an elevation of 2750 m. between "Estaciones M1 y M2, unos km al NNO del farallón del punto S del tepuí, en una zona escencialmente plana, con pequeñas depresiones y colinas, mayormente de piedra arenisca, escasamente cubierta por una vegetacion de 2--3 dm, con abundante agua; las pequeñas colinas y sitios protegidos en las grietas con arbustos hasta 2.5 m. Cerro Matahuaca, al NE de, y casi contigua con, Cerro Duida, esta immediatemente al N de La Esmeralda (Lat. 03°10' N, Long. 65°31' O), en el Alto Orinoco, Territorio Federal Amazonas, Venezuela", between February 2 and 9, 1975, and is deposited in the Britton Herbarium at the New York Botanical Garden.

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ADDITIONAL NOTES ON THE *ERIOCAULACEAE*. XC

Harold N. Moldenke

LACHNOCAULON ANCEPS (Walt.) Morong

Additional bibliography: Mold., Phytologia 54: 70 & 80--81. 1983.

Additional citations: FLORIDA: Hillsborough Co.: *Cochrane, Cochrane, & Hansen 8846* (Ld, Ws). Leon Co.: *N. C. Henderson 64-252* (Go). Sarasota Co.: *Perkins 475* (It). Volusia Co.: *R. Kral 18449* (Mi). County undetermined: *Chapman s.n.* [Florida] (N). ALABAMA: Coffee Co.: *Haynes 7285* (N). Covington Co.: *R. Kral 20629* (Mi). Mobile Co.: *Thomas, Allen, & Landry 43088* (Ne--103266). Washington Co.: *R. Kral 26526* (Mi). MISSISSIPPI: George Co.: *J. Taylor 21370* (Ne--165937). Pearl River Co.: *S. Darwin 1435* (Ne--177268); *F. H. Sargent 9218* (Go). Stone Co.: *Thomas, Allen, & Landry 42957* (Ne--101794). LOUISIANA: Beauregard Par.: *Thomas & al. 14556* (Ne--53078), *23981* (Ne--53079, Ne--62125). Natchitoches Par.: *Carroll 1800* (Ne--181703); *R. Kral 16942* (Mi), *20685* (Mi); *Thomas, Allen, & al. 41401* (Ne--106222); *Thomas & Pias 49237* (Ne--122341). Sabine Par.: *Carroll 1742* (Ne--181481). Saint Tammany Par.: *R. D. Thomas 65311* (N--160313, Ne--160314); *Thomas & al. 40549* (Ne--93203), *49486*

(Ne--123530); *Thomas & Moreland 65853* (Ne--159003). Vernon Par.: *R. D. Thomas 38123* (Ne--87156); *Thomas & al. 14560* (Ne--53077); *Thomas & Grelen 71863* (Ne--175087), *71890* (Ne--175739). Washington Par.: *R. D. Thomas 29196* (Ne--65746). TEXAS: Hardin Co.: *Correll, Correll, Amerson, & Watson 38791* (N, N); *Crockett 560* (It). Newton Co.: *Correll & Ogden 25132* (N). Tyler Co.: *Correll 35836* (N), *37248* (N). MOUNTED CLIPPINGS: Urb., Symb. Ant. 1: 492. 1900 (W).

LACHNOCAULON ANCEPS f. *GLABRESCENS* Mold.

Additional bibliography: Mold., Phytologia 41: 464. 1979; Mold., Fifth Summ. 18, 22, 32, 41, 91, & 606. 1980; Mold., Phytologia 50: 234 & 236 (1982), 52: 111 & 113 (1982), and 54: 81. 1983.

Recent collectors have encountered this plant in black mucky soil in low marshy areas, in sandy peat of flatwoods bogs, in *Sarracenia*-type bogs, and "in fine sandy soil of open pastures with grass, small scattered pines, etc.", in flower in May and both in flower and fruit in July and September.

Material of this form has been misidentified and distributed in some herbaria as typical *L. anceps* (Walt.) Morong, *L. minus* (Chapm.) Small. and *Syngonanthus flavidulus* (Michx.) Ruhl.

Additional citations: GEORGIA: Brooks Co.: *R. Kral 28694* (Mi). FLORIDA: Hillsborough Co.: *Lakela 30131* (Ne--53081). Manatee Co.: *Perdue 1765* (Mi); *Tracy 7586* (It). LOUISIANA: Beauregard Par.: *R. Kral 20204* (Mi). Sabine Par.: *Carroll 1441* (Ne--181010). Vernon Par.: *Gregory & Eiten 23* (Mi).

LACHNOCAULON BEYRICHIANUM Sporleder

Synonymy: *Lachnocaulon beyrichianum* "Sporleder ex Korn." apud Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U.S. 521. 1979. *Eriocaulon beyrichianum* Sporleder, in herb.

Additional bibliography: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 520--522 & 524, fig. 302. 1979; Mold., Phytologia 41: 463--467 (1979) and 42: 41. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 16, 18, 19, 22, 25, 413, & 606. 1980; Duncan & Kartesz, Vasc. Fl. Ga. 36. 1981; Wunderlin, Guide Vasc. Fl. Cent. Fla. 125 & 126. 1982.

Additional illustrations: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 522, fig. 302. 1979.

Recent collectors have encountered this plant at the sandy edges of pocosins, in areas of longleaf pine-turkey oak sandhills and their margins, in bulldozed sandy areas in slash pine savannas, and in bogs and their margins, in both flower and fruit in July. Wunderlin (1982) lists it from the "Margins of ponds and wet prairies. Occasional; nearly throughout [central Florida]", flowering there in the summer.

Additional citations: NORTH CAROLINA: Bladen Co.: *DePoe & DePoe 7423* (Ne--76809); *R. Kral 14657* (Mi), *27194* (Mi, W--2673950), *27199* (Mi). New Hanover Co.: *Godfrey Pl. Exsicc.*

Gray. 926 (It, Mi). GEORGIA: Baker Co.: *Thorne & Ford 2024* (It). FLORIDA: Lake Co.: *Nash 148* (It). Polk Co.: *Schallert s.n.* [4/30/41] (It). Saint Lucie Co.: *R. Kral 18378* (Mi). Volusia Co.: *R. Kral 20441* (Mi).

LACHNOCAULON CUBENSE Ruhl.

Additional bibliography: Mold., Phytologia 36: 497. 1977; Mold., Phytol. Mem. 2: 89 & 606. 1980.

LACHNOCAULON DIGYNUM Körn.

Additional bibliography: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 520 & 527--529, fig. 306. 1979; Mold., Phytologia 41: 465. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 22, 25, 26, 413, & 607. 1980.

Additional illustrations: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 528, fig. 306. 1979.

LACHNOCAULON EKMANNII Ruhl.

Additional bibliography: Mold., Phytologia 37: 22 & 23. 1977; Mold., Phytol. Mem. 2: 89 & 607. 1980.

LACHNOCAULON ENGLERI Ruhl.

Additional synonymy: *Lachnocaulon emileri* Ruhl. ex Hocking, Excerpt. Bot. A.23: 389, sphalm. 1974. *Lachnocaulon engleri* var. *engleri* [Ruhl.] ex J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Kral in Godfrey & Wooten, Aquat. Wet. Pl. Southeast. U.S. 520, 524, 526, & 527, fig. 305. 1979; Mold., Phytologia 41: 465 & 466. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 22, 25, 213, & 607. 1980; Mold., Phytologia 50: 261. 1982; Wunderlin, Guide Vasc. Pl. Cent. Fla. 126. 1982; Mold., Phytologia 53: 344. 1983.

Additional illustrations: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 526, fig. 305. 1979.

Wunderli (1982) calls this plant "bog-buttons" and lists it from wet prairies, "Occasional; nearly throughout [central Florida], where it is said to flower in the "Summer".

Additional citations: FLORIDA: Lake Co.: *Nash 1184* (It--isotype). Martin Co.: *R. Kral 18235* (Mi). Okaloosa Co.: *N. C. Henderson 64-351* (Co). County undetermined *Chapman s.n.* [sandy shores of the Gulf] (N).

LACHNOCAULON ENGLERI f. *ABLUDENS* Mold.

Additional bibliography: Mold., Phytologia 41: 465. 1979; Mold., Phytol. Mem. 2: 22 & 607. 1980.

LACHNOCAULON ENGLERI var. *CAULESCENS* Mold.

Additional bibliography: Mold., Phytologia 41: 465. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 22, 25, 413, & 607. 1980.

LACHNOCAULON GLABRUM Körn.

Additional bibliography: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 524. 1979; Mold., Phytologia 41: 466. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 22, 25, 4k3, & 607. 1980; Wunderlin, Guide Vasc. Pl. Cent. Fla. 126. 1982; Mold., Phytologia 52: 112 (1982), 53: 286 & 463 (1983), and 54: 81. 1983.

Recent collectors have encountered this plant in sandy peat of pineland savanna pond margins and in sandy peat of slash pine-palmetto flatwoods bogs. Kral reports that it forms large circular tufts of hundreds of scapes in Sarasota County, Florida. It has been found in both flower and fruit by recent collectors in July and August.

The *Abel s.n.* [25 March '72], distributed as *L. glabrum,* actually is *Syngonanthus flavidulus* (Michx.) Ruhl.

Additional citations: FLORIDA: Brevard Co.: *R. Kral 18418* (Mi). Broward Co.: *D. Weber 26* (Ne--173099). DeSoto Co.: *R. Kral 17969* (Mi). Palm Beach Co.: *Muenscher & Muenscher 14057* (It). Sarasota Co.: *R. Kral 17855* (Mi).

LACHNOCAULON MINUS (Chapm.) Small

Additional & emended bibliography: Hocking, Excerpt. Bot. A. 23: 292 & 389 (1974) and A.31: 17 & 18. 1978; Monteiro-Scanavacca & Mazzoni, Revist. Bras. Bot. 1: [59]. 1978; Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 520, 524, 525, & 527, fig. 304. 1979; Mold., Phytologia 41: 463--467. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 197. 1980; Mold., Phytol. Mem. 2: 16, 18, 19, 22, 25, 413, & 607. 1980; Duncan & Kartesz, Vasc. Fl. Ga. 36. 1981; Mold., Phytologia 52: 111 & 112. 1982; Wunderlin, Guide Vasc. Pl. Cent. Fla. 125 & 126. 1982.

Additional illustrations: Kral in Godfrey & Wooten, Aquat. Wetl. Pl. Southeast. U. S. 525, fig. 304. 1979.

Wunderlin (1982) avers that this species grows along the margins of ponds and wet prairies, occasionally, but nearly throughout central Florida, flowering there in "Summer". He calls it "bog-buttons".

The *Sieren 288,* distributed as *L. minus,* actually is *L. anceps* (Walt.) Morong, while *Lakela 30131* is *L. anceps* f. *glabrescens* Mold.

Additional citations: NORTH CAROLINA: Brunswick Co.: *Bradley & Stevenson 3306* (Mi). Onslow Co.: *Randolph & Randolph 977* (It). SOUTH CAROLINA: Berkeley Co.: *Bozeman & Logue 11355* (Ne--53080). Jasper Co.: *Wiegand & Manning 688* (It). GEORGIA: Baker Co.: *Thorne 5047* (It). Early Co.: *Thorne 4964* (It). FLORIDA: Leon Co.: *N. C. Henderson 64-238* (Go). Lake Co.: *Nash 1295* (It). Suwannee Co.: *Wiegand & Manning 689* (It). Volusia Co.: *Curtiss 6894* (It). Walton Co.: *Curtis 3022* (It, Mi), *5911* (It).

LEIOTHRIX Ruhl.

Additional & emended bibliography: Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908; J. C. Willis, Dict. Flow. Pl., ed. 5, 376. 1925; Knuth, Feddes Repert. Spec.

Nov. Beih. 43: [Init. Fl. Venez.] 181. 1927; J. C. Willis, Dict. Flow. Pl., ed. 6, imp. 1, 376 (1931), ed. 6, imp. 2, 376 (1948), ed. 6, imp. 3, 376 (1951), and ed. 7, 418, 633, & 1074. 1966; Rouleau, Guide Ind. Kew. 106, 180, & 270. 1970; Hocking, Excerpt. Bot. A.23: 291, 292, & 389. 1974; Galvão & Cavalcante, Bot. Mus. Para. Goeldi, ser. 2, Bot. 1-40 Ind. 3, 14, & 15. 1975; Thanikaimoni, Trav. Sect. Scient. Techn. Inst. Franç. Pond. 13: 132 & 285. 1976; C. D. Cook in Heywood, Flow. Pl. World 282. 1978; Giulietti, Bol. Bot. Univ. S. Paulo 6: 63. 1978; Hocking, Excerpt. Bot. A.31: 17 & 18. 1978; Monteiro-Scanavacca & Mazzoni, Revist. Bras. Bot. 1: [59]--64, fig. 1--12. 1978; Mold., Phytologia 41: 118 (1978) and 41: 467--470 & 508. 1979; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43]--45, 47--49, 54, & 59, fig. 90--100. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 206. 1979; Angely, S. Am. Bot. Bibl. 2: 671. 1980; Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytologia 45: 36, 40, & 507. 1980; Mold., Phytol. Mem. 2: 116, 122, 134, 145--147, 174, 180, 401, 404, 405, 419, 424, 425, 427, 428, 444, 446, 607--608, & 627. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980; Mold., Phytologia 50: 245, 262, & 508. 1982; Tillett & Steyerm., Ernstia 9: 3. 1982; Badillo, Schnee, & Rojas, Ernstia 14: [Clav. Fam. Pl. Sup. Venez., ed. 6] 213. 1983; Mold., Phytologia 52: 506 (1983), 53: 460--461 & 504 (1983), and 54: 66. 1983.

LEIOTHRIX AFFINIS Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 15. 1976; Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 286. 1928 (N, W).

LEIOTHRIX AMAZONICA Mold.

Additional bibliography: Mold., Phytologia 25: 95. 1972; Galvão & Cavalcante, Bot. Mus. Para Goeldi, ser. 2 Bot., 1-40 Ind. 3 & 15. 1975; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Steyermark & Wurdack describe this plant as having ascending, membranous, pale-green, pubescent leaves, tawny-brown involucres, and powdery-white flowering-heads "with grayish outer margins" and describe is as frequent in swampy savannas, at 1940 m. altitude, in both flower and fruit in February. Their collection has previously been cited erroneously and distributed as *L. flavescens* (Bong.) Ruhl.

Additional citations: VENEZUELA: Bolivar: *Steyermark & Wurdack 400*(W--2168508, W--2407718).

LEIOTHRIX ANGUSTIFOLIA (Körn.) Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.31: 18. 1978; Mold., Phytologia 41: 467. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX ARAXAËNSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 398. 1928 (W) & 1: pl. 195 (Ld, N, W).

LEIOTHRIX ARECHAVALETAE (Körn.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 25. 1977; Mold., Phytol. Mem. 2: 180 & 607. 1980.
Additional citations: URUGUAY: *Herter 1774* [Herb. Herter 95663] (E--1098751), *1774b* (E--1314659).

LEIOTHRIX ARETIOIDES Ruhl.
Additional bibliography: Mold., Phytologia 25: 96. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX ARGENTEA Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 467. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX ARGYRODERMA Ruhl.
Additional bibliography: Mold., Phytologia 35: 15 (1976) and 37: 25. 1977; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Additional citations: BRAZIL: Rio de Janeiro: *Lua & Nogueira 16* (Fe--14448).

LEIOTHRIX ARGYRODERMA var. *BREVIPES* Mold.
Additional bibliography: Mold., Phytologia 41: 467--468. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX ARRECTA Ruhl.
Additional bibliography: Mold., Phytologia 37: 25. 1977; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Additional citations: BRAZIL: Minas Gerais: *Maguire, Mendes Magalhães, & Maguire 49065* (W--2435330).

LEIOTHRIX ARRECTA var. *SENAEANA* Ruhl.
Additional bibliography: Mold., Phytologia 25: 97. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX BARREIRENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 97. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 283--284. 1928 (W).

LEIOTHRIX BECKII (Szysz.) Ruhl.
Additional bibliography: Mold., Phytologia 25: 97. 1972; Mold., Phytol. 2: 145 & 607. 1980.
Recent collectors have found this plant among low vegetation in wet sites on rocky hills, at 2300 m. altitude. Araujo & Maci-

el report it "frequent" or "very frequent in shaded places. It has recently been collected in both flower and fruit in August and October.

Additional citations: BRAZIL: Rio de Janeiro: *Araujo & Maciel 4597* [Herb. FEEMA 20802] (N), *5214* [Herb. FEEMA 22973] (N); *Maas & Martinelli 3170* (Ld).

LEIOTHRIX BECKII var. *FALCIFOLIA* Beauverd

Additional bibliography: Mold., Phytologia 25: 97. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 297. 1908 (W).

LEIOTHRIX CELIAE Mold.

Additional bibliography: Mold., Phytologia 25: 97. 1972; Mold., Phytol. Mem. 2: 116 & 607. 1980.

LEIOTHRIX CRASSIFOLIA (Bong.) Ruhl.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 280 & 333. 1855; Mold., P-ytologia 25: 97. 1972; Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43], 45, 47, 54, & 59, fig. 90--94. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional illustrations: Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: 59, fig. 90--94. 1979.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach, Smith, & Ayensu 28777* (W--2653334); *Irwin, Maxwell, & Wasshausen 20073* (W--2598327). MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 34. 1831 (W); Kunth, Enum. Pl. 3: 572. 1841 (W).

LEIOTHRIX CURVIFOLIA (Bong.) Ruhl.

Additional bibliography: Mold., Phytologia 41: 468. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 206. 1979; Mold., Phytol. Mem. 2: 145, 419, 446, & 607. 1980.

Additional citations: BRAZIL: Minas Gerais: *Irwin, Santos, Souza, & Fonsêca 22230* (W--2582561A). MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 27 & 28. 1831 (W, W); Kunth, Enum. Pl. 3: 574. 1841 (W, W).

LEIOTHRIX CURVIFOLIA var. *GLABRESCENS* Ruhl.

Additional bibliography: Mold., Phytologia 35: 15 (1976) and 37: 270. 1977; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach, Smith, & Ayensu 28792* (W--2653332).

LEIOTHRIX CURVIFOLIA var. *LANUGINOSA* (Bong.) Ruhl.

Additional bibliography: Mold., Phytologia 41: 468. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 206. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 27. 1831 (W); Kunth, Enum. Pl. 3: 574. 1841 (W).

LEIOTHRIX CURVIFOLIA var. *MICROPHYLLA* Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 26 & 33. 1977; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 36203* (W--2709590); *Irwin, Maxwell, & Wasshausen 20074* (W--2598307). MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 296. 1928 (W).

LEIOTHRIX CURVIFOLIA var. *PLANTAGO* (Mart.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 26. 1977; Mold., Phytol. Mem. 2: 145, 419, & 607. 1980.
Additional citations: BRAZIL: Minas Gerais: *Hatschbach 30178* (W--2705857); *Hatschbach, Smith, & Ayensu 28797* (W--2653333); *Irwin, Maxwell, & Wasshausen 20311* (W--2598442); *L. B. Smith 6840* (W--2120209). MOUNTED CLIPPINGS: Körn. in Mart., Fl. Bras. 3.(1): 426. 1863 (W).

LEIOTHRIX CURVIFOLIA var. *PROLIFICA* Ruhl.
Additional bibliography: Mold., Phytologia 25: 99. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX CURVIFOLIA var. *SETACEA* Ruhl.
Additional bibliography: Mold., Phytologia 41: 468. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Additional citations: BRAZIL: Minas Gerais: *Hatschbach 30064* (W--2705961); *Hatschbach, Smith, & Ayensu 28962* (W--2653336); *Irwin, Maxwell, & Wasshausen 20798* (W--2598308), *21002* (W--2705961).

LEIOTHRIX CURVIFOLIA var. *SUBGLAUCESCENS* Ruhl.
Additional bibliography: Mold., Phytologia 25: 99. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1983.

LEIOTHRIX CUSCUTOIDES Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 26. 1977; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX DIELSII Ruhl.
Additional bibliography: Mold., Phytologia 41: 468. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.
Recent collectors refer to this plant as a small herb, to 15 cm. tall, the inflorescences white, and have encountered it in restinga, flowering in October. The *Maas & Carauta 3148* collection, cited below, is a mixture with *Paepalanthus tortilis* (Bong.) Mart.
Additional citations: BRAZIL: Rio de Janeiro: *Maas & Carauta 3148* in part (Ut--3551128); *Sagadas-Vianna, Lau, Ormond, Machline, & Lorêdo 158* (W--2370791).

LEIOTHRIX DIELSII var. *VILAVELHENSIS* Mold.
Additional bibliography: Mold., Phytologia 35: 15. 1976; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX DISTICHOCLADA Herzog

Additional bibliography: Mold., Phytologia 29: 289. 1974; Mold., Phytol. Mem. 2: 145 & 607. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.

Recent collectors describe this plant as a slender tufted herb, 25--35 cm. tall, the leaves more or less erect, distichously arranged, pale-green, the involucral bractlets pale-brown or whitish and pale-brown only at the base, the flowering-heads white, and the florets "white or off-white". They have encountered it in "disturbed marshes below sandstone rock outcrops", in "marshes in areas of sandstone, metamorphic and quartzite rock outcrops with associated marshes and damp flushes", among sandstone rocks and in open scrub on rocky hillsides, and in campo rupestre, at 500--1850 m. altitude, in both flower and fruit in February, March, and July.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18760* (W--2936309), *19552* (Ld, N, W--2936305), *19585* (Ld, N, W--2936288), *19732* (Ld, N, W--2936321), *19901* (Ld, N, W--2936311); *Mori & Benton 13596* (Ld, N); *Mori, King, Santos, & Hage 12483*(Ld, W--2854267), *12590* (Ld, W--2854266).

LEIOTHRIX DISTICHOCLADA f. *BRACTEOSA* Herzog

Additional bibliography: Mold., Phytologia 25: 99. 1972; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX DISTICHOCLADA var. *GLANDULOSA* Herzog

Additional bibliography: Mold., Phytologia 29: 289. 1974; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 20: 88. 1924 (W).

LEIOTHRIX DISTICHOPHYLLA Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 129--130. 1973; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 287--288. 1928 (W).

LEIOTHRIX DUBIA Alv. Silv.

Additional bibliography: Mold., Phytologia 41: 468. 1979; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: BRAZIL: Minas Gerais: *Irwin, Fonsêca, Souza, Santos, & Ramos 27648a* (W--2861739); *Irwin, Maxwell, & Wasshausen 20979* (W--2598448). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 193. 1928 (Ld).

LEIOTHRIX DUBIA var. *VILLOSA* Mold.

Additional bibliography: Mold., Phytologia 33: 22. 1976; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX ECHINOCEPHALA Ruhl.

Additional bibliography: Mold., Phytologia 41: 468--469. 1979;

Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 40914* (W--2840086).

LEIOTHRIX EDWALLII Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 22. 1976; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Serr. Min. 70. 1908 (W).

LEIOTHRIX FLAGELLARIS (Guill.) Ruhl.

Additional bibliography: Mold., Phytologia 25: 130. 1973; Mold., Phytol. Mem. 2: 145 & 607. 1980.

LEIOTHRIX FLAVESCENS (Bong.) Ruhl.

Additional bibliography: Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.].181. 1927; Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 116, 122, 134, 145, 146, 174, 401, 405. 419, 424, 425, 427, 428, & 607. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980; Tillett & Steyerm., Ernstia 9: 3. 1982; Mold., Phytologia 50: 245 (1982) and 54: 66. 1983.

Recent collectors have encountered this plant along sandy roadsides, in wet places with sandy soil in campo rupestre, around rocky exposures, and "frequent" in wet soil of brejo, at 950--2600 m. altitude, in both flower and fruit in February, March, July, and August. They describe the plant as a rosette herb, to 70 cm. tall, forming tussocks of pale-green or bright-green, concolorous, slightly fleshy, soft, ascending, rather broad leaves, the scapes (peduncles) yellow-brown, to 50 cm. long, the inflorescences white or brownish-white, the outer involucral bractlets pale-brown or "very pale brown", the inner ones whitish, and the florets white. The leaves on *Fosberg 43329* are rather shorter than usual.

Harley and his associates found the plant growing in marshes "in areas of sandstone, metamorphic, and quartzite rock outcrops with associated marsh and damp flushes", "in open scrub on white sand with damp areas and extensive sedge meadows (brejo) partly burned over", and "in damp flushes on lower escarpments in a region of sandstone, conglomerate, metamorphic, and quartzite rock outcrops with associated scrubby vegetation with damp flushes, grassland, and marshes in some areas". Tessmann & Frenzel found it "em lugares pantanosos de vez em quando", describing it as having the "flor branca, anteras branca amarelada". Other collectors have referred to it as an "infrequent herb in wet sand on sandstone outcrops with a sterile white sand overlying black sand with *Ericaceae, Weinmannia,* and melastomes abundant.

Material of this species has been misidentified and distributed in some herbaria as *Paepalanthus* sp.

Knuth (1927) cites *Connell & Quelch 9, 10,* & *327* and *ImThurn 60* from Roraima, Venezuela.

The *Steyermark & Wurdack 400*, distributed and previously cited by me as *L. flavescens*, actually is *L. amazonica* Mold., while *Maguire & Fanshawe 32537* is *L. flavescens* var. *alpina* Mold. and *Steyermark 93201* is *L. umbratilis* Mold.

Additional citations: VENEZUELA: Amazonas: *Steyermark 58252* (W--1901766). Bolivar: *Steyermark 94503* (W--25841120); *Steyermark & Liesner 128132* (Ld). PERU: Amazonas: *Luteyn & Lebron-Luteyn 5525* (N). BRAZIL: Bahia: *Carvalho & Gatti 834* (Ld); *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18837* (Ld, N, W--2936287), *19586* (Ld, N, W--2936307), *19662* (Ld, N, W--2936290); *Irwin, Harley, & Smith 32384* (W--2709588); *Mori 12957* (Ld, N); *Mori, King, Santos, & Hage 12498* (Ld, W--2854262), *12510* (Ld, W--2854274). Distrito Federal: *Héringer, Filgueiras, Mendonça, & Pereira 7488* (W--2971677). Minas Gerais: *Hatschbach 41333* (N), *41526* (Ld), *42869* (Ld, W--2931777); *Maguire, Mendes Magalhaes, & Maguire 49248* (W--2435295). Paraná: *Dombrowski 6892* (Ld); *Reitz & Klein 17467* (W--2548326), *17908* (W--2548327); *Smith, Klein, & Hatschbach 14564* (W--2573032); *Tessmann & Frenzel 763* (Eu--4763). Santa Catarina: *Reitz 4921* (W--2321365); *Reitz & Klein 5874* (W--2321244); *Ule 1306* (W--2699201). São Paulo: *Fosberg 43329* (W--2724068). MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 28. 1831 (W); Klotzsch in Schomb., Faun. Fl. Brit. Guian. 1064. 1848 (W); Kunth, Enum. Pl. 3: 575. 1841 (W).

LEIOTHRIX FLAVESCENS var. *ALPINA* Mold.

Additional bibliography: Mold., Phytologia 37: 27. 1977; Mold., Phytol. Mem. 2: 116, 122, & 607. 1980; Mold., Phytologia 50: 245. 1982; Tillett & Steyerm., Ernstia 9: 3. 1982.

Recent collectors describe this plant as having its leaves stiff, brittle, lustrous medium- to light-green, the peduncles lustrous medium olive-green, the "phyllaries" lustrous medium-brown, and the flower-heads chalk-white to tan-gray, the plants to 30 cm. tall. They have encountered it on open sandy banks along rivers and "locally frequent" on savannas, as well as in dry sand, at 1100--2750 m. altitude, in both flower and fruit in February and November.

The Maguire & Fanshawe collection, cited below, was previously distributed as and even cited by me as typical *L. flavescens* (Bong.) Ruhl. The *Steyermark, Huber, & Carreño 128165* collection, also cited below, is a mixture with *Syngonanthus acopanensis* Mold.

Additional citations: VENEZUELA: Amazonas: *Tillett, Colvée, & al. 752-355* (Ve). Bolívar: *Steyermark, Esponosa, McDiarmid, & Brewer-Carías 116061* (Ld); *Steyermark, Huber, & Carreno 128165* in part (Ld). GUYANA: *Maguire & Fanshawe 32537* (N, W--2168883).

LEIOTHRIX FLAVESCENS var. *CHIMANTENSIS* Mold., Phytologia 54: 66. 1983.

Bibliography: Mold., Phytologia 54: 66. 1983.

Collectors describe this plant as having green leaves and gray or pale-gray flower-heads. They have found it growing in sandy

openings, in wet open fields, forming small colonies in grass and low scrub of *Mallophyton chimantensis*, and "frequent in rocky areas in *Chimantaea mirabilis* vegetation, at altitudes of 2200--2450 m., in both flower and fruit in January and February.

Citations: VENEZUELA: Bolívar: *Huber & Steyermark 7003* (Ld), *7017* (Ld), *7185* (Ld); *Steyermark, Huber, & Carreño E. 128255* (Ld), *128382* (Ld--type).

LEIOTHRIX FLAVESCENS var. *GLABRA* Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 131. 1973; Mold., Phytol. Mem. 2: 145 & 607. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 291. 1928 (W).

LEIOTHRIX FLAVESCENS var. *PARVIFOLIA* Mold.

Additional bibliography: Mold., Phytologia 29: 289. 1974; Mold., Phytol. Mem. 2: 146 & 607. 1980.

Additional citations: BRAZIL: Paraná: *Dombrowski 9440* (Ld).

LEIOTHRIX FLEXUOSA Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 45. 1973; Mold., Phytol. Mem. 2: 146 & 607. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 302, pl. 189. 1928 (Ld, N, W).

LEIOTHRIC FLUITANS (Mart.) Ruhl.

Additional bibliography: Monteiro-Scanavacca & Mazzoni, Bol. Bot. Univ. S. Paulo 4: 105--112. 1976; Mold., Phytologia 37: 27--28. 1977; Monteiro-Scanavacca & Mazzoni, Revist. Bras. Bot. 1: [59]--64, fig. 1--12. 1978; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43], 45, 47, 49, & 54. 1979; Mold., Phytol. Mem. 2: ;46, 607, & 627. 1980; Mold., Phytologia 50: 262. 1982.

Additional illustrations: Monteiro-Scanavacca & Mazzoni, Revist. Bras. Bot. 1: 61 & 62, fig. 1--12. 1978.

Monteiro-Scanavacca & Mazzoni (1978) have studied in detail the sporogenesis, development of gametophytes, embryo, endosperm, and the wall of the dispersal unit of this species. The microspore tetrads are of the tetrahedral type. The pollen-grains are shed at the two-cell stage. The pendulous, orthotropous ovule is bitegmic and tenuinucellate. Megasporogenesis and development of the female gametophyte conform to the *Polygonum* type. An oblique T-shaped tetrad of megaspores is usual and an endothelium is present. Embryo development follows the Asteroid type. The endosperm is free nuclear and becomes cellular later. The wall of the dispersal unit is formed by the pericarp and the seed coat.

LEIOTHRIX FLUMINENSIS Ruhl.

Additional bibliography: Mold., Phytologia 29: 289--290 (1974) and 41: 469. 1979; Mold., Phytol. Mem. 2: 146, 419, & 607. 1980.

LEIOTHRIX FLUMINENSIS var. *PUBERULA* Mold.
Additional bibliography: Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 146, 419, & 607. 1980.

LEIOTHRIX FULGIDA Ruhl.
Additional bibliography: Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 146 & 607. 1980.

LEIOTHRIX GLANDULIFERA Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 132. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 294. 1928 (W).

LEIOTHRIX GLAUCA Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED ILLUSTRATIONS & CLIPPINGS: Alv. Silv., Fl. Mont. 1: 279, pl. 185. 1928 (Ld, W).

LEIOTHRIX GOMESII Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 132. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: Fl. Mont. 1: 289. 1928 (W).

LEIOTHRIX GOUNELLEANA Beauverd
Additional bibliography: Mold., Phytologia 25: 132. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 298. 1908 (W).

LEIOTHRIX GRAMINEA (Bong.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 28. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 27. 1831 (W); Kunth, Enum. Pl. 3: 574. 1841 (W).

LEIOTHRIX HATSCHBACHII Mold., Phytologia 25: 229, nom. nud. & 27: 349--350, fig. 1. 1973.
Additional bibliography: Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Illustrations: Mold., Phytologia 27: 350, fig. 1. 1973.
Additional citations: MOUNTED ILLUSTRATIONS: Mold., Phytologia 27: 350, fig. 1. 1973 (Ld—original drawings).

LEIOTHRIX HETEROPHYLLA Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED ILLUSTRATIONS & CLIPPINGS: Alv. Silv., Fl. Mont. 1: 300, pl. 187. 1928 (Ld, W).

LEIOTHRIX HIRSUTA (Wikstr.) Ruhl.

Additional bibliography: Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 146 & 608. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.

Recent collectors describe this plant as an erect, tufted, sun-loving herb, 30--50 cm. tall, the leaves distichous, erect, bright- or light- to mid-green, boat-shaped and keeled at the apices, with soft, white, spreading hairs, the heads, including the bractlets, pale-cream or off-white to white, the old involucral bractlets pale-brown, or "stems and leaves green, hairy, heads white. They have found it growing in tufts in restinga and open restinga, "infrequent in shade on damp ground", "in damp sand in open restinga in areas of mixed restinga with high forest, bushy areas, damp open ground, and marshes", in a region of waterworn horizontally bedded sandstone at the soil surface, with damp sand, sedge marsh, exposed rock, and waterfalls, the vegetation open scrub to closed low woodland in the drier areas", in wet ground on campo rupestre, in damp sand of shallow campo normally flooded, and in "open scrub on white sand with damp areas and extensive sedge meadows (brejo)", from sealevel to 1000 m. altitude, in both flower and fruit from January to March, in flower also in September. Araujo & Maciel refer to it as a "frequent heliophile".

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 17974* (K), *18007* (N), *18054* (W--2936310), *18828* (Ld, N), *19201* (N); *Mori, King, Santos, & Hage 12627* (Ld, W--2854277); *Mori, Mattos Silva, Kallunki, Santos, & Pereira dos Santos 9664* (N), *9695* (N, N); *Santos, Mori, & Mattos Silva 3359* (Ld). Rio de Janeiro: *Araujo & Maciel 5233* [Herb. FEEMA 22970] (N); *Lira 202* [Rocha 140; Herb. FEEMA 17468] (Ld); *Souza 102* [Herb. FEEMA 17319] (Ld). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 530 & 532. 1841 (W, W).

LEIOTHRIX HIRSUTA var. *BLANCHETIANA* (Körn.) Ruhl.

Additional bibliography: Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 146 & 608. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.

Recent collectors refer to this plant as an herb, to 12 cm. tall. the "stems" [peduncles] and leaves pale-green, white-hairy or hispid, the leaves suberect, soft, pale-green, to 5 mm. wide, the heads white or stramineous, 5 mm. wide, the involucral bracts very pale-brown or stramineous, hairy. They have found it growing in restinga alagado and in "sandy soil of probably original restinga", at 10 m. altitude, in both flower and fruit in February, May, and October. Harley and his associates found it in damp sand on shallow campos normally flooded and in "open scrub on white sand with damp areas and extensive sedge meadows (brejo) partly burned over" in a general region of "mixed restinga on drier ground with areas of normally wet sedge meadows". It has been found from sealevel to 950 m. altitude.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18054* (Ld, N), *18822* (Ld, N); *Har-*

ley, Renvoize, Erskine, Brighton, & Pinheiro in Harley 16663 (W--16663); *Mattos Silva & Santos 756* (Ld); *Mori, Mattos Silva, & Santos 10508* (N). Rio de Janeiro: *Araujo & Maciel 5239* [Herb. FEEMA 22961] (N); *Maas & Carauta 3141* (Ld).

LEIOTHRIX HIRSUTA var. *OBTUSA* Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 23. 1976; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 291. 1928 (W).

LEIOTHRIX HIRSUTA var. *TONSILIS* Mold.
Additional bibliography: Mold., Phytologia 41: 469. 1979; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX HIRSUTA f. *VIVIPARA* Mold.
Additional bibliography: Mold., Phytologia 29: 290. 1974; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX ITACAMBIRENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 307. 1928 (W) & pl. 194 (Ld).

LEIOTHRIX LANIFERA Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 133. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 295. 1928 (W).

LEIOTHRIX LINEARIS Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 133. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 298. 1928 (W).

LEIOTHRIX LONGIPES Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 303--304. 1928 (W) & pl. 190 (Ld).

LEIOTHRIX LUXURIANS (Körn.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 28 & 31. 1977; Mold., Phytol. Mem. 2: 146, 444, & 608. 1980.
Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 35480* (W--2709589); *Hatschbach 30065* (W--2706044); *Irwin, Maxwell, & Wasshausen 20168* (W--2569050A).

LEIOTHRIX MENDESII Mold.
Additional bibliography: Mold., Phytologia 25: 134. 1973; Angely,

S. Am. Bot. Bibl. 2: 671. 1980; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX MICHAELII Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 304. 1928 (W) & pl. 191. 1928 (Ld).

LEIOTHRIX MICHAELII var. *LONGIPILOSA* Mold.
Additional bibliography: Mold., Phytologia 25: 134. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX MILHO-VERDENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 134. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 291--292. 1928 (W).

LEIOTHRIX MUCRONATA (Bong.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 28. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1980; Mold., Phytologia 53: 460--461. 1983.
Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 28. 1831 (W).

LEIOTHRIX MUCRONATA var. *GLABRA* Mold., Phytologia 53: 460--461. 1983.
Bibliography: Mold., Phytologia 53: 460--461. 1983.
The Steyermark collection cited below, the type collection of this taxon, was previously incorrectly distributed and cited as *Syngonanthus acopanensis* Mold.
Citations: VENEZUELA: Bolivar: *Steyermark 75926*(W--2407779--type).

LEIOTHRIX NUBIGENA (Kunth) Ruhl.
Additional bibliography: Mold., Phytologia 37: 28. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS: Steud., Syn. Pl. Glum. 2 [Cyp.]: 281. 1855 (W).

LEIOTHRIX OBTUSIFOLIA Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 23. 1976; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Serr. Min. 69. 1908 (W); Alv. Silv., Fl. Mont. 1: pl. 182. 1928 (Ld, W).

LEIOTHRIX PEDUNCULOSA Ruhl.
Additional bibliography: Mold., Phytologia 29: 291. 1974; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX PILULIFERA (Körn.) Ruhl.
Additional bibliography: Mold., Phytologia 29: 291 (1974) and 45: 36. 1980; Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX PILULIFERA var. *HARLEYI* Mold., Phytologia 45: 36. 1980.
Bibliography: Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytologia 45: 35. 1980; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19328* (N--isotype).

LEIOTHRIX POLYSTEMMA Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 135. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 293--294. 1928 (W).

LEIOTHRIX POLYSTEMMA var. *ROBUSTA* Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 135. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 294. 1928 (W).

LEIOTHRIX PROLIFERA (Bong.) Ruhl.
Additional bibliography: Mold., Phytologia 25: 135. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 32. 1831 (W); Kunth, Enum. Pl. 3: 577. 1841 (W).

LEIOTHRIX PROPINQUA (Körn.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 28--29. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX RETRORSA Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 185. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 299. 1928 (W) & pl. 186. 1928 (Ld).

LEIOTHRIX RUFULA (A. St.-Hil.) Ruhl.
Additional synonymy: *Leiothrix rufula* "L. C. Rich. in Walp." in herb.
Additional bibliography: Mold., Biol. Abstr. 64: 4787. 1977; Mold., Phytologia 37: 29. 1977; Mold., Phytol. Mem. 2: 146, 404, & 608. 1980.
Recent collectors refer to this plant as a heliophile, frequent in restinga.
Additional citations: BRAZIL: Rio de Janeiro: *Araujo & Maciel 3530* [Herb. FEEMA 16159] (Ld), *5176* [Herb. FEEMA 23036] (N). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 530. 1841 (W); Mart., Flora 24, Beibl. 2: 58. 1841 (W); A. St.-Hil., Linnaea 16: Lit. 187. 1842 (W); Walp., Ann. 1: 890. 1848 (W).

LEIOTHRIX RUFULA var. *BREVIPES* Mold.
Additional bibliography: Mold., Biol. Abstr. 64: 4787. 1977; Mold., Phytologia 37: 29. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX RUFULA var. *ELATIOR* (Körn.) Ruhl.
Additional bibliography: Mold., Phytologia 25: 136. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX SCHLECHTENDALII (Körn.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 29. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.
Recent collectors describe this plant as having the "shoots flattened", leaves gray, and flower-heads white, and have found it growing among sandstone rocks and open scrub on rocky hillsides, in wet sandy soil among rocks, and on campo rupestre, at 500--1100 m. altitude, in both flower and fruit in February, March, and July.
Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18760* (Ld), *18760a* (Ld, N, N), *18770* (Ld, N); *Hatschbach & Guimaraes 42352* (Ld, N, W--2931619), *42361* (Ld); *Mori & Benton 13528* (Ld, N); *Mori, King, Santos, & Hage 12369* (Ld, W--2854244); *Ribeiro, Mattos Silva, & Hage 25* (Ld).

LEIOTHRIX SCLEROPHYLLA Alv. Silv.
Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 37: 29. 1977; Monteiro, Giulietti, & Castro, Bol. Bot. Univ. S. Paulo 7: [43], 45, 47, 54, & 59, fig. 95--100. 1979; Mold., Phytol. Mem. 2: 146 & 608. 1980.
Illustrations: Monteiro, Giulietti, & Castro, Bol. Bot. Univ. S. Paulo 7: 59, fig. 95--100. 1979.
Additional citations: BRAZIL: Minas Gerais: *L. B. Smith 6844* (W--2120213). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 183, 1928 (Ld).

LEIOTHRIX SINUOSA Giulietti
Additional bibliography: Mold., Phytologia 41: 470. 1978; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX SPERGULA Ruhl.
Additional bibliography: Mold., Phytologia 41: 470. 1979; Mold., Phytol. Mem. 2: 146 & 608. 1980.

LEIOTHRIX SPIRALIS (Bong.) Ruhl.
Additional bibliography: Mold., Phytologia 37: 29. 1977; Mold., Phytol. Mem. 2: 146 & 608. 1983.
Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 34, 1831 (W).

LEIOTHRIX STEYERMARKII Mold.
Additional bibliography: Mold., Phytologia 25: 137. 1973; Mold.,

Phytol. Mem. 2: 116 & 608. 1980.

The *Koyama & Agostini 7515*, distributed as *L. steyermarkii*, actually is the type collection of *Syngonanthus duidae* var. *longifolius* Mold.

LEIOTHRIX SUBULATA Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 137. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 288. 1928 (W).

LEIOTHRIX TENUIFOLIA Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 137. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 285. 1928 (W).

LEIOTHRIX TINGUENSIS Herzog

Additional synonymy: *Leiothrix tinquensis* Herzog, in herb.

Additional bibliography: Mold., Phytologia 33: 24. 1976; Mold., Phytol. Mem. 2: 146 & 608. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.

Recent collectors have encountered this plant in wet sandy depressions in pine woods, in both flower and fruit in May.

Additional citations: BRAZIL: Bahia: *Harley, Renvoize, Erskine, Brighton, & Pinheiro in Harley 16075* (W--2771329); *Mori & Boom 14147* (Ld, N).

LEIOTHRIX TRIANGULARIS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 186. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 305--306. 1928 (W) & pl. 192. 1928 (Ld, W).

LEIOTHRIX TRICHOPUS Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 137. 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 281. 1928 (W).

LEIOTHRIX TRIFIDA Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 186, 1973; Mold., Phytol. Mem. 2: 146 & 608. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. 1: 277. 1928 (W) & pl. 184 (Ld, W).

LEIOTHRIX TURBINATA Gleason

Additional bibliography: Mold., Phytologia 37: 29. 1977; Mold., Phytol. Mem. 2: 116 & 608. 1980.

Recent collectors found this plant growing on swampy savannas, at 2200 m. altitude, in both flower and fruit in January and February.

Additional citations: VENEZUELA: Amazonas: *Maguire, Wurdack, & Bunting 37031* (W--2168995), *37196* (W--2168991); *Maguire, Wurdack, & Maguire 42114* (W) *Steyermark & Delascio 129249* (Ld, Ld). Bolívar: *Steyermark, Huber, & Carreño E. 128376* (Ld); *Steyermark & Nilsson 593* W--2400113).

LEIOTHRIX UMBRATILIS Mold.

Additional bibliography: Mold., Phytologia 41: 470. 1979; Mold., Phytol. Mem. 2: 116, 147, & 608. 1980.

Recent collectors have encountered this plant in swampy savannas, in sheltered spots at the base of large rocks, and "in large grass-green clumps in rocky wet savannas dominated by *Stegolepis* and *Cottendorfia*, with *Nieyneria*, *Tofieldia*, *Xyris*, *Abolboda*, and *Lagenocarpus* also present, at 1490--2200 m. altitude, in flower in January, February, and May, and in fruit in May. Steyermark describes it as "terrestrial, leaves soft, membranous, rich-green". His *no. 93201*, cited below, was previously regarded by me as the closely related *L. flavescens* (Bong.) Ruhl.

Additional citations: VENEZUELA: Amazonas: *Maguire, Wurdack, & Maguire 42353* (W). Bolívar: *Maguire & Maguire 40419* (W--2169049); *Steyermark 93201* (Lw, N, W--2584115); *Steyermark, Berry, Dunsterville, & Dunsterville 117345* (Ld); *Steyermark, Huber, & Carreño E. 128376* (Ld).

LEIOTHRIX UMBRATILIS var. *BREVIPES* Mold.

Additional bibliography: Mold., Phytologia 41: 470. 1979; Mold., Phytol. Mem. 2: 116 & 608. 1980.

LEIOTHRIX VIVIPARA (Bong.) Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389 (1974) and A.31: 17 & 18. 1978; Mold., Phytologia 37: 30 (1977) and 41: 420. 1979; Mold., Phytol. Mem. 2: 147 & 608. 1980.

Hatschbach encountered this plant in sandy areas of campo rupestre.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 44686* (Ld); *Irwin, Santos, Souza, & Fonsêca 23372*(W--2582550A). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 577. 1841 (W).

LEIOTHRIX VIVIPARA var. *ANGUSTA* Ruhl.

Additional bibliography: Mold., Phytologia 41: 470. 1979; Mold., Phytol. Mem. 2: 147 & 608. 1980.

Additional citations: BRAZIL: Minas Gerais: *Irwin, Maxwell, & Wasshausen 21005* (W--2598445).

LEIOTHRIX VIVIPARA var. *LONGIPILOSA* Mold.

Additional bibliography: Mold., Phytologia 35: 16. 1976; Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytol. Mem. 2: 147 & 608. 1980.

MESANTHEMUM Körn.

Additional synonymy: *Mesanthium* Lotsy, Vortr. Bot. Stammesges. 3 (1): 707 sphalm. 1911.

Additional & emended bibliography: Durand, Ind. Gen. Phan. 454. 1888; Post & Kuntze, Lexicon 219, 361, & 623. 1904; Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247. 1911; Lotsy, Vortr. Stammesges. 3 (1): 707. 1911; Thonner, Flow. Pl. Afr. 121, pl. 15. 1915; J. C. Willis, Dict. Flow. Pl., ed. 5, 421 (1925) and ed. 6, 421. 1951; Goudet-Ducellier, Reserch. Palynol. Pl. Hydroph. [D. E.S. Fac. Sci. Univ. Dij.] 1--59. 1967; Rouleau, Guide Ind. Kew. 73, 120, & 270. 1970; Thanikaimoni, Trav. Sect. Scient. Techn. Inst. Franç. Pond. 12 (2): 81. 1973; Hocking, Excerpt. Bot. A.23: 389. 1974; Thanikaimoni, Trav. Sect. Scient. Techn. Inst. Franç. Pond. 13: 150 & 285. 1976; Giulietti, Bol. Bot. Univ. S. Paulo 6: 63. 1978; Hocking, Excerpt. Bot. A.31: 17 & 18. 1978; Mold., Phytologia 41: 421, 424, 470--473, & 508 (1979), 45: 40 & 508. 1980; Mold., Phytol. Mem. 2: 200, 201, 203, 205--211, 213, 215--217, 220, 224, 227, 229, 234, 236, 238, 241, 250, 404, 404, 405, 423, & 608--609. 1980; Mold., Phytologia 54: 72. 1983.

MESANTHEMUM AFRICANUM Mold.

Additional bibliography: Mold., Phytologia 35: 17. 1976; Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytol. Mem. 2: 238, 241, & 609. 1980.

MESANTHEMUM ALBIDUM H. Lecomte

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 41: 470--471. 1979; Mold., Phytol. Mem. 2: 205, 207, 208, 401, 404, & 609. 1980; Mold., Phytologia 54: 72. 1983.

MESANTHEMUM AURATUM H. Lecomte

Additional bibliography: Mold., Phytologia 41: 471--472. 1979; Mold., Phytol. Mem. 2: 206--208, 423, & 609. 1980.

MESANTHEMUM BENNAE Jacques-Félix

Additional bibliography: Hocking, Excerpt. Bot. A.31: 18. 1978; Mold., Phytologia 41: 472. 1979; Mold., Phytol. Mem. 2: 207 & 609. 1980.

MESANTHEMUM ERICI-ROSEBII T. Fries

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 33: 25. 1976; Mold., Phytol. Mem. 2: 209, 220, 224, 236, & 609. 1980.

MESANTHEMUM JAEGERII Jacques-Félix

Additional bibliography: Mold., Phytologia 41: 472. 1979; Mold., Phytol. Mem. 2: 208, 213, & 609. 1980.

MESANTHEMUM PRESCOTTIANUM (Bong.) Körn.

Additional bibliography: Mold., Phytologia 41: 472. 1979; Mold., Phytol. Mem. 2: 207--210 & 609. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Bong., Ess. Monog. Erioc. 35. 1831 (W); Kunth, Enum. Pl. 3: 579. 1841 (W); Meikle & Baldwin, Am. Journ. Bot. 39: 47, fig. 9--18. 1952. (Ld).

MESANTHEMUM PUBESCENS (Lam.) Körn.

Additional bibliography: Mold., Phytologia 29: 292. 1974; Mold., Phytol. Mem. 2: 250 & 609. 1980.

Croat refers to this plant as "diffuse, flowers white" and encountered it in marshy areas, in flower in January.

Additional citations: MADAGASCAR: *Croat 29999* (E--2599358). MOUNTED CLIPPINGS & ILLUSTRATIONS: Kunth, Enum. Pl. 3: 569. 1841 (W); Mold. in Humbert, Fl. Madag. 36: 31, fig. 4 (5--7). 1955 (Ld).

MESANTHEMUM RADICANS (Benth.) Körn.

Additional bibliography: Thonner, Flow. Pl. Afr. 121, pl. 15. 1915; Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 41: 473. 1979; Mold., Phytol. Mem. 2: 200, 201, 205--211, 213, 215--217, 220, 224, 227, 229, 234, 236, & 609. 1980.

Recent collectors have found this plant growing in large clumps in damp loam soil of swamps and marshes and "in flat swampy areas of sandy lake deposits, the vegetation of grass fields with spots of dense forest with trees no more than 6 m. tall", at 4900 feet altitude, in flower in January and both in flower and fruit in October. They describe it as an herb, with bulbous roots, medium-green leaves, white flowers, and creamy-white anthers.

Additional citations: LIBERIA: *Linder 44* (E--2271452). IVORY COAST: *Geerling & Bokdam 1962* (E--2422443). ZAMBIA: *Richards 27348* (E--2094570). TANZANIA: Tanganyika: *Balslev 16* (N). MOUNTED ILLUSTRATIONS: Thonner, Flow. Pl. Afr. pl. 15. 1915 (Ld).

MESANTHEMUM REDUCTUM H. Hess

Additional bibliography: Mold., Phytologia 25: 142. 1973; Mold., Phytol. Mem. 2: 234 & 609. 1980.

Citations: MOUNTED ILLUSTRATIONS: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 179, fig. 1--3. 1955 (Ld).

MESANTHEMUM ROSENI Pax

Additional bibliography: Mold., Phytologia 26: 45--46. 1973; Mold., Phytol. Mem. 2: 203, 423, & 609. 1980.

MESANTHEMUM RUBRUM Mold.

This taxon is now considered to be a synonym of *M. auratum* H. Lecomte, which see.

MESANTHEMUM RUTENBERGIANUM Körn.

Additional citations: Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247. 1911; Mold., Phytologia 37: 30. 1977; Hocking, Excerpt. Bot. A.31: 17 & 18. 1978; Mold., Phytol. Mem. 2: 250 & 609. 1980.

Croat refers to this plant as growing "in stalk-like clumps", the "flowers" white, and found it to be very localized in wet open areas in scrubby forests and along roadsides, growing to 1 m. tall, at 1365 m. altitude, in both flower and fruit in January.

Additional citations: MADAGASCAR: *Croat 29568* (E--2599360), *29908* (E--2599359). MOUNTED ILLUSTRATIONS: Mold. in Humbert, Fl. Madag. 36: 31, fig. 4 (1--4). 1955 (Ld).

MOLDENKEANTHUS P. Morat

Additional bibliography: Hocking, Excerpt. Bot. A.31: 17 & 18. 1978; Mold., Phytologia 41: 473 & 508 (1979) and 45: 40. 1980; Mold., Phytol. Mem. 2: 4, 250, & 609. 1980.

MOLDENKEANTHUS BOSSERI P. Morat

Additional bibliography: Mold., Phytologia 35: 17. 1976; Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytol. Mem. 2: 250 & 609. 1980.

Citations: MOUNTED ILLUSTRATIONS: P. Morat, Adansonia, ser. 2, 15: 467, pl. 2, 1976 (Ld).

MOLDENKEANTHUS ITREMENSIS P. Morat

Additional bibliography: Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytologia 41: 473. 1979; Mold., Phytol. Mem. 2: 250 & 609. 1980.

Citations: MOUNTED ILLUSTRATIONS: P. Morat, Adansonia, ser. 2, 15: 465, pl. 1. 1976 (Ld).

PAEPALANTHUS Mart.

Additional synonymy: *Papaelanthus* Ruhl. ex Domin, Ann. Jard. Bot. Buitenz., 24 [ser. 2, 9]: 247 sphalm. 1911. *Paepacantus* Kunth ex Mold., Phytol. Mem. 2: 424 in syn. 1980. *Peoplanthus* Tillett ex Mold., Phytol. Mem. 2: 429 in syn. 1980. *Paepacanthus* Rosa & Santos ex Mold., Phytologia 50: 262 in syn. 1982. *Poeplanthus* Kirkbr. ex Mold., Phytologia 50: 263 in syn. 1982.

Additional & emended bibliography: Sweet, Hort. Brit., ed. 2, 597. 1830; Loud., Hort. Brit., ed. 1, 37 (1830) and ed. 2, 37. 1832; G. Don in Loud., Hort. Brit., ed. 3, 37. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 719. 1839; Meisn., Pl. Vasc. Gen. 2: 312. 1843; Lindl., Veg. Kingd. , ed. 3, 122. 1853; Pfeiffer, Nom. Bot. 1 (2): 1150. 1874; Durand, Ind. Gen. Phan. 454. 1888; Post & Kuntze, Lexicon 623. 1904; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 483. 1906; Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908; Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247 & 248. 1911; Lotsy, Vortr. Bot. Stammesges. 3 (1): 706 & 707, fig. 480 (5--8). 1911; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 15. 1914; Thonner, Flow. Pl. Afr. 121. 1915; Arber, Bot. Gaz. 74: 84. 1922; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 179—182. 1927; Stapf, Ind. Lond. 6: 565. 1931; Bedevian, Illust. Polyglot. Dict. 260. 1936; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 483. 1941; Anon., Kew Bull. Gen. Ind. 111 & 209. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 483. 1959; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 251, 385, 418, 656, 821, & 1074. 1966; Rouleau, Guide Ind. Kew. 44, 66, 105, 138, & 270. 1970; Hocking, Excerpt. Bot. A.23: 290—292, 388, & 389. 1974; Napp-Zinn, Anat. Blatt. A (1): 168 & 360. 1974; Galvão & Cavalcante, Bol. Mus.

Para. Goeldi, ser. 2 Bot. 1-40 Ind.: 15. 1975; Arekal & Ramaswamy, Proc. 63rd Ind. Cong. 3 (6): 85. 1976; Thanikaimoni, Trav. Sect. Scient. Techn. Inst. Franc. Pond. 13: 172, 285, & 332. 1976; Latorre, Ortega, & Inca, Cienc. Naturaleza 18: 3 & 62. 1977; Anon., Roy. Bot. Gard. Kew Lib. Curr. Awaren. 8: 33 (1978) and 9: 23 & 33. 1978; Bodley, Lab. Anthrop. Wash. Univ. Rep. Invest. 55: 23. 1978; C. D. Cooke in Heywood, Flow. Pl. World 281 & 282, fig. 3. 1978; Giulietti, Bol. Bot. Univ. S. Paulo 6: [61]--65. 1978; Hocking, Excerpt. Bot. A.31: 16--18 (1978) and A.33: 89. 1979; Klein, Sellowia 31: 132. 1979; Mold., Phytologia 41: 422, 467, 473--485, & 509 (1979), 42: 29--36, 44, 205, 207, 208, & 509 (1979), and 43: 196--197 & 508. 1979; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43]--48, 52, & 57, fig. 45--69. 1979; Øllgaard & Balslev, Rep. Bot. Inst. Univ. Aarhus 4: 40 & 97. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 141, 206, 208, 292, 293, 314, & 341, fig. 49. 1979; Angely, S. Am. Bot. Bibl. 2: 666, 669--672, 674, 675, 678, & 679. 1980; Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytologia 44: 215, 384, 470--476, & 509, pl. 1--4 (1980) and 45: 38, 40, 270, & 296. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73--76. 1980; Mold., Phytol. Mem. 2: 65, 74, 76, 81, 90, 92, 96, 104, 109, 110, 116--118, 122, 124--126, , 129, 134, 149--160, 172, 175, 178, 183, 207--209, 216, 220, 227, 229, 250, 301, 357, 368, 369, 397, 398, 400--404, 424--429, 432, 442, 443, 445, 462, 609--620, 627, & 628. 1980; F. C. Seymour, Phytol. Mem. 1: 85 & 311. 1980; Cleef, Dissert. Bot. 61: 160/161. 1981; Cronq., Integ. Syst. Classif. 1118. 1981; Hocking, Excerpt. Bot. A.36: 22 & 23. 1981; Mold., Phytologia 49: 293, 380--381, & 510. 1981; Cronq. in S. P. Parker, Synop. Classif. Liv. Organisms 1: 472. 1982; Hensold, Abst. Bot. Soc. Am. Syst. Sect. 1982: 96. 1982; Hocking, Excerpt. Bot. A.39: 101. 1982; Mold., Phytologia 50: 242, 245--248, 262--264, 270, 506, 509, & 510 (1982), 51: 244--245 & 501 (1982), and 52: 19 & 119. 1982; Reis & Lipp, New Pl. Sources Drugs 22. 1982; Tillett & Steyerm., Ernstia 9: 3. 1982; Badillo, Schnee, & Rojas, Ernstia 14: [Clav. Fam. Pl. Sup. Venez., ed. 6] 213. 1983; Mold., Phytologia 52: 414 & 508 (1983), 53:264, 270, 328, 347, 348, & 367 (1983), and 54: 66--67 & 80. 1983.

It may be noted here that Bodley (1978) writes the name of the Order in which this genus belongs "*ERIOCAULES*". Cronquist (1981) comments that "There is no obvious reason why the *Eriocaulaceae* might not have been derived directly from the *Xyridaceae* or from some similar common ancestor with 6 functional stamens."

Latorre and his associates (1977) cite their *nos. 5683--5685* as unidentified species of *Paepalanthus*.

The *Cuatrecasas & Idrobo 27053* and *Øllgaard & Balslev 8460*, distributed as *Paepalanthus* sp., actually are *Eriocaulon microcephalum* H.B.K., while *Frenzel 738* is *E. sellowianum* Kunth, *Frenzel 763* is *Leiothrix flavescens* (Bong.) Ruhl., *Raynal-Roques 21497* is *Syngonanthus caulescens* (Poir.) Ruhl., *Granville 2611* is *S. gracilis* var. *glabriusculus* Ruhl., *Héringer & al. 4313* is *S. helminthorrhizus* var. *glandulosus* Mold., *Rosa, Murca Pires,*

& Rodrigues 894 is *S. humboldtii* var. *glandulosus* Gleason, *Black & Klein 54-17351* is *S. umbellatus* (Lam.) Ruhl., *Black 51-11027* is *S. xeranthemoides* (Bong.) Ruhl., and *Custodio Filho 611* is a sedge.

PAEPALANTHUS ACANTHOLIMON Ruhl.

Additional bibliography: Mold., Phytologia 35: 18. 1976; Hocking, Excerpt. Bot. A.31: 17. 1978; Mold., Phytol. Mem. 2: 149 & 609. 1980.

PAEPALANTHUS ACANTHOPHYLLUS Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389 (1974) and A.31: 18. 1978; Mold., Phytologia 41: 474. 1979; Mold., Phytol. Mem. 2: 149 & 609. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.

Recent collectors have encountered this plant in an "area of dry grassland on quartzite and fine white talc soils and some sandstone rock exposures" and on campo rupestre, at 1000--1500 m. altitude, in both flower and fruit in March and July.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 20000* (Ld, N); *Mori, King, Santos, & Hage 12516* (Ld, W--2854272).

PAEPALANTHUS ACCRESCENS Alv. Silv.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 26: 187. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 96--98, pl. 62 & 63 [a]. 1928 (Ld, Ld, W).

PAEPALANTHUS ACCRESCENS var. *GLABRESCENS* Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 144. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 98. 1928 (W).

PAEPALANTHUS ACTINOCEPHALOIDES Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 18. 1976; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 135--136. 1928 (W) & pl. 84. 1928 (Ld, W).

PAEPALANTHUS ACULEATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 28. 1976; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 179. 1928 (Ld).

PAEPALANTHUS ACUMINATUS Ruhl.

Additional bibliography: Mold., Phytologia 37: 31. 1977; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS ACUMINATUS var. *LONGIPILOSUS* Mold.
Additional bibliography: Mold., Phytologia 25: 145. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS ACUTALIS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 31. 1977; Mold., Phytol. Mem. 2: 150 & 609. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 258--259. 1928 (W) & pl. 170 [bis]. 1928 (Ld, W).

PAEPALANTHUS ACUTIPILUS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 31. 1977; Mold., Phytol. Mem. 2: 150 & 609. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 173--175. 1928 (W) & pl. 112. 1928 (Ld, W).

PAEPALANTHUS AEQUALIS (Vell.) J. F. Macbr.
Additional bibliography: Pfeiffer, Nom. Bot. 1 (2): 1150. 1874; Ruhl. in Wettstein, Denkschr. K, Akad. Wiss. Wien Math.-nat. 79: 87. 1908; Mold., Phytologia 37: 31. 1977; Mold., Phytol. Mem. 1: 150 & 609. 1980.
Ruhland (1908) cites an unnumbered Wacket collection from São Paulo, Brazil.
The *Brade 6584* and *Widgren s.n.* [1845], distributed as and previously cited by me as *P. aequalis,* seem actually to be *P. cachambuensis* Alv. Silv.
Additional citations: BRAZIL: Minas Gerais: *Mosén 4450* (N).

PAEPALANTHUS AEREUS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 187. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 161--162. 1928 (W) & pl. 102 (Ld, W).

PAEPALANTHUS ALBESCENS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 187. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 229--230. 1928 (W) & pl. 152. 1928 (Ld, W).

PAEPALANTHUS ALBICEPS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 47. 1973; Mold., Phytol. Mem. 2: 150, 424, & 609. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 172--173. 1928 (W) & pl. 111. 1928 (Ld, W).

PAEPALANTHUS ALBO-TOMENTOSUS Herzog
Additional synonymy: *Syngonanthus albo-tomentosus* Herzog ex Mold., Phytol. Mem. 2: 442 in syn. 1980.
Additional bibliography: Mold., Phytologia 41: 474. 1979; Mold., Phytol. Mem. 2: 150, 442, & 609. 1980.
Recent collectors describe this plant as having pilose leaves

and cream-colored inflorescences, but Brito & Vinha assert that the "flowers" were actually "yellow". Collectors have found it growing on natural campos, in flower in September and both in flower and fruit in August.

Additional citations: BRAZIL: Bahia: *Brito & Vinha 108* (Ld); *Mori, Mattos Silva, & Santos 10484* (N); *Santos, Mori, & Mattos Silva 3352* (Ld).

PAEPALANTHUS ALBO-VAGINATUS Alv. Silv.

Synonymy: *Paepalanthus albovaginatus* Alv. Silv. apud Worsdell, Ind. Lond. Suppl. 2: 182. 1941.

Additional bibliography: Mold., Phytologia 41: 474. 1979; Mold., Phytol. Mem. 2: 150, 424, & 609. 1980.

Recent collectors have found this plant growing on wet sandy campo, in flower in December.

Additional citations: BRAZIL: Paraná: *Dombrowski & Neto 327* (Ld); *Dusen 15586* (Mi, Ws); *Hatschbach 32963* (Ba), *42657* (Ld); *Jönsson 103la* (Mi, Ws), *1096a* (Mi, Ws). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 155. 1928 (Ld).

PAEPALANTHUS ALBO-VILLOSUS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 32. 1977; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 33--34. 1928 (W) & pl. 15 (Ld).

PAEPALANTHUS ALLEMANII C. Diogo

Additional bibliography: Mold., Phytologia 41: 474. 1979; Mold., Phytol. Mem. 2: 150 & 609. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 73. 1980.

Recent collectors describe this species as a fleshy-stemmed, erect herb, to about 25 cm. tall, with "the peduncles about as long again", the leaves soft, rather bright-green, squarrose, and the inflorescence heads ashy-gray. They have found it growing in the water in a region of open scrub on white sand with damp areas and extensive sedge meadows (brejo) partly burned over, as well as in wet places on campo rupestre, at 950--1000 m. altitude, in both flower and fruit in February and July.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr , Santos, & Pinheiro in Harley 18830* (Ld, N); *Mori, King, Santos, & Hage 12347* (Ld, W--2854245), *12630* (Ld, W--2854276).

PAEPALANTHUS ALMASENSIS Mold., Phytologia 45: 470--472, pl. 1. 1980.

Bibliography: Mold., Phytologia 45: 470--472, pl. 1. 1980; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Illustrations: Mold., Phytologia 45: 471, pl. 1. 1980.

Citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19768* (Ld--isotype, N--isotype).

PAEPALANTHUS ALPINUS Körn.

Additional bibliography: Mold., Phytologia 41: 475. 1979;

Mold., Phytol. Mem. 2: 109, 397, & 609. 1980.

Killip describes this plant as cespitose, with smooth leaves, and encountered it on paramos, at 3300--3500 m. altitude, in both flower and fruit in March. His collection, cited below, has previously been confused with *P. andiccla* Kŏrn. and *P. planifolius* var. *alpestris* Kŏrn. On the other hand, the *Cuatrecasas, Lopez Figueiras, & Rodriguez 28990,* distributed as *P. alpinus*, actually is *P. andicola* var. *villosus* Mold, and *Dwyer & Idrobo 8180* is *P. columbiensis* Ruhl.

Additional citations: COLOMBIA: Cundinamarca: *Cleef 3041* (W--2850655); *Killip 34148* (N, W--1770975).

PAEPALANTHUS ALSINOIDES C. Wright

Additional bibliography: Mold., Phytologia 37: 32. 1977; Mold., Phytol. Mem. 2: 90, 92, 397, 398, 424, & 609. 1980.

PAEPALANTHUS ALSINOIDES var. *MINIMUS* Jennings

Additional bibliography: Mold., Phytologia 37: 32. 1977; Mold., Phytol. Mem. 2: 90, 92, & 609. 1980.

Additional citations: ISLA DE PINOS: *Killip 45388* (Mi).

PAEPALANTHUS AMOENUS (Bong.) Kŏrn.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 388. 1974; Mold., Phytologia 37: 32. 1977; Mold., Phytol. Mem. 2: 150, 398, 425, & 609. 1980.

Recent collectors refer to this plant as 1.2 m. tall and have found it growing on periodically burned campo rupestre, in flower in March.

Additional citations: BRAZIL: Goiás: *Héringer 17689* (N); *Mendonça 77* (N).

PAEPALANTHUS AMOENUS var. *CURRALENSIS* Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 147. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS AMOENUS f. *PROLIFER* Mold.

Additional bibliography: Mold., Phytologia 25: 147. 1973; Hocking, Excerpt. Bot. A.23: 388. 1974; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS ANDICOLA Kŏrn.

Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 179. 1927; Mold., Phytologia 35: 19. 1976; Mold., Phytol. Mem. 2: 109, 116, 398, & 609. 1980.

Recent collectors describe this species as an herb, growing in cushion-like tufts or clumps, the leaf rosettes to 20 cm. in diameter, with thick underground stems, the peduncles somewhat flattened, the florets white or gray, and the bracts brown with white margins. They have found it growing in wet soil, on roadside banks and grassy paramos, and rocky subparamo grassland, at 1500--3750 m. altitude, in both flower and fruit in March, May, July, August, October, and November, in flower also

in June and September. Luteyn refers to it as "common" in Boyacá, while Fosberg & Schultes found it "common on small gently sloping paramos with brushy ravines, *Espeletia corymbosa* and *E. grandiflora* abundant". Knuth (1927) cites *Funck & Schlim 811* and *Jahn 19* from Trujillo, Venezuela.

Most of the collections cited below were originally distributed as and even, in many cases, previously cited by me as *P. columbiensis* Ruhl., a closely related taxon. Material has also been misidentified and distributed in some herbaria as *Xyris* sp. The *Killip 34148*, distributed as and previously cited by me as *P. andicola*, actually seems to be *P. alpinus* Körn., while *Burbidge 75/408* and *Core 997* are *P. andicola* var. *villosus* Mold. and *Fosberg 19174* is *P. meridensis* Klotzsch.

Additional & emended citations: COLOMBIA: Boyacá: *Luteyn, Lebrón-Luteyn, & Pabón E. 7685* (N). Cauca: *Pennell 6910* (N, W--1143727). Cundinamarca: *Cuatrecasas 9514* (N); *Cuatrecasas & Jaramillo 11969* (N, W--1850838); *Fosberg & Schultes 19217* (Ld, N, W--2108127); *Killip 34047* (N, S, W--1770913); *Køie 5101* (Cp, W--2253548); *R. E. Schultes 4058* (N, W--1995809). Norte de Santander: *García-Barriga & Jaramillo Mejía 19931* (W--2957934). Santander: *Cuatrecasas & García-Barriga 9878* (N, W--1798456). Valle: *Cuatrecasas 17841* (N, W--2916693). VENEZUELA: Merida: *Bernardi 6066* (N); *Castellano & Monasterio 120* (N).

PAEPALANTHUS ANDICOLA var. *VILLOSUS* Mold.

Additional bibliography: Mold., Phytologia 35: 19. 1976; Mold., Phytol. Mem. 2: 109, 116, & 609. 1980.

Recent collectors refer to this plant as forming tufts, the basal rosettes to 20 cm. in diameter, the leaves light-green, the flower-heads white, and the florets "whitish-black" or gray. They have found it growing in wet soil, in rocky subparamo grassland, and in paramo vegetation with *Espeletia* and *Puya*, at 2000--3530 m. altitude, in both flower and fruit in from December to June, in flower also in May and November. Luteyn and his associates refer to it as "common".

Material has been misidentified and distributed in some herbaria as *P. alpinus* Körn, typical *P. andicola* Körn, and *P. columbiensis* Ruhl.

Additional & emended citations: COLOMBIA: Cauca: *Core 997* (N). Cundinamarca: *Burbidge 75/408* (N); *Cuatrecasas, Idrobo, Jaramillo, & Mora 25624* (W--2342186); *García-Barriga 18034* (N); *Luteyn, Dumont, & Lebrón-Luteyn 4720* (N). VENEZUELA: Mérida: *López Figueiras & Rodriguez C. 9074* (W--2932347). Trujillo: *Cuatrecasas, López Figueiras, & Rodriguez 28990* (W--2907715).

PAEPALANTHUS APACARENSIS Mold.

Additional bibliography: Mold., Phytologia 25: 148. 1973; Mold., Phytol. Mem. 2: 117 & 609. 1980; Mold., Phytologia 54: 66. 1983.

PAEPALANTHUS APACARENSIS var. *HUMILIS* Mold., Phytologia 54: 66. 1983.

Bibliography: Mold., Phytologia 54: 66. 1983.

Collectors have found this plant growing on open sandy river-banks.

Citations: VENEZUELA: Bolívar: *Steyermark, Huber, & Carreno E. 127990* (Ld), *128164* (Ld--type).

PAEPALANTHUS APPLANATUS Ruhl.

Additional bibliography: Mold., Phytologia 37: 32. 1977; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS ARBORESCENS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 187. 1973; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 205--206. 1928 (W) & pl. 135 (Ld, W).

PAEPALANTHUS ARCHERI Mold.

Additional bibliography: Mold., Phytologia 37: 26 & 33. 1977; Angely, S. Am. Bot. Bibl. 2: 666. 1980; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS ARENICOLA Alv. Silv.

Additional bibliography: Mold., Phytologia 41: 475 (1979) and 42: 35. 1979; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Additional citations: ADDITIONAL ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 90. 1928 (Ld).

PAEPALANTHUS ARETIOIDES Ruhl.

Additional bibliography: Mold., Phytologia 41: 475. 1979; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 40838* (W--2850778).

PAEPALANTHUS ARGENTEUS (Bong.) Körn.

Additional bibliography: Mold., Phytologia 33: 30. 1976; Mold., Phytol. Mem. 2: 150 & 609. 1980; Mold., Phytologia 49: 293. 1981; Hocking, Excerpt. Bot. A.39: 101. 1982; Mold., Phytologia 52: 270. 1983.

The *Maguire, Maguire, & Murça Pires 44744*, previously cited as typical *P. argenteus*, is actually the type collection of its var. *viridis* Mold.

PAEPALANTHUS ARGENTEUS var. *VIRIDIS* Mold., Phytologia 49: 293. 1981.

Bibliography: Mold., Phytologia 20: 357 (1970) and 49: 293. 1981; Hocking, Excerpt. Bot. A.39: 101. 1982.

Citations: BRAZIL: Minas Gerais: *Maguire, Maguire, & Murça Pires 44744* (Ld--type, N--isotype).

PAEPALANTHUS ARGILLICOLA Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 33. 1977; Mold., Phytol. Mem. 2: 150 & 609. 1980.

Recent collectors refer to this plant as a frequent heliophile

with white flower-heads, and have found it growing in open or shrubby restinga, in flower in April and May.

Additional citations: BRAZIL: Rio de Janeiro: *Araujo & Maciel 3029* [Herb. FEEMA 14860] (Ld), *4427* [Herb. FEEMA 19713] (N). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 108--110. 1928 (W) & pl. 67 (Ld, W).

PAEPALANTHUS ARGILLICOLA var. *PILOSUS* Mold.

Additional bibliography: Mold., Phytologia 29: 297. 1974; Mold., Phytol. Mem. 2: 150 & 609. 1980.

PAEPALANTHUS ARGYROLINON Körn.

Additional bibliography: Mold., Phytologia 37: 33. 1977; Mold., Phytol. Mem. 2: 150 & 610. 1980.

PAEPALANTHUS ARGYROPUS Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 30. 1976; Mold., Phytol. Mem. 2: 150, 424, & 610. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 7. 1928 (Ld, W).

PAEPALANTHUS ARGYROPUS var. *BREVIFOLIUS* Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 149. 1973; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 22. 1928 (W).

PAEPALANTHUS ARGYROPUS var. *PUBESCENS* Alv. Silv.

Additional bibliography: Mold., Phytologia 25: 149. 1973; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 22. 1928 (W).

PAEPALANTHUS ARISTATUS Mold.

Additional bibliography: Mold., Phytologia 25: 149--150. 1973; Mold., Phytol. Mem. 2: 117 & 610. 1980.

Recent collectors refer to this plant as a prostrate herb, rooting at the nodes, with white heads, "formando pequeños cojines", and have found it growing on white sand savannas and in open, rocky, sandstone areas bordering wet savannas, at 100--1300 m. altitude, in both flower and fruit in April, May, August, and December.

Material of this taxon has been misidentified and distributed in some herbaria as *P. subtilis* Miq.

Additional citations: VENEZUELA: Amazonas: *Davidse, Huber, & Tillett 16947* (Ld); *O. Huber 2462* (Ve), *2473* (Ld); *Huber, Tillett, & Davidse 3707* (Ld). Bolívar: *Steyermark & Pruski 121066* (Ld).

PAEPALANTHUS ARMERIA Mart.

Additional bibliography: Mold., Phytologia 29: 297. 1974; Mold., Phytol. Mem. 2: 150 & 610. 1980.

[to be continued]

NOMENCLATURA PLANTARUM AMERICANARUM

II. GESNERIACEAE

A. Lourteig

1. Gesnera amplo Digitalis folio tomentose

Sous ce protologue, publié dans son Catalogue (Nova Plantarum Americanarum Genera p. 17. 1703), le Père Charles PLUMIER a fait dans ses Manuscrits, une longue description accompagnée d'une planche que BURMANN publie dans Plantarum Americanarum p. 126, tab. 134. 1757, avec une diagnose et une courte description. Entre ces deux publications LINNE (Spec. Plant. ed. 1. 612(2) 1753) décrit Gesneria tomentosa citant SLOANE et PLUMIER. Dans Spec. Plant. ed. 2. LINNE elimine le protologue de SLOANE qu'il introduit dans la synonymie de Gesneria humilis L.

En 1837 HOOKER décrit Rhytidophyllum auriculatum in Botan. Magaz.64: tab. 3562, basée sur une plante cultivée "de semences du Brésil", mais lui-même met un doute sur cette provénance, pensant que l'origine réelle doit être "West Indies" (Antilles).

A. P. de CANDOLLE, en 1839 dans le Prodromus, dans sa révision des Gesneriacées réalise que la plante de PLUMIER appartient au genre Rhytidophyllum et décrit Rhytidophyllum Plumerianum et cite le protologue de PLUMIER (1703), la publication de BURMANN, et un materiel de Santo Domingo "v. s. à cl. Bertero".

En 1865 HANSTEIN décrit Rhytidophyllum leucomallon in Linnaea 34:312 basée sur une collection de Hispaniola (Santo Domingo) Miragoan, leg. Jaeger 297; il cite Gesneria grandis Fischer ex Herb. Petropolis in synonymie.

URBAN dans sa révision de la famille pour les Antilles, Symb. Antil. 2: 1901 et 8: 1921 en ce qui concerne les espèces qui nous intéressent:
1) conserve Rhytidophyllum leucomallon Handstein, l.c.2: 383;
2) conserve Rhytidophyllum auriculatum Hooker, mais il établie 3 variétés dans cette espèce:

a) genuinum l.c. 2: 384; b) stipulare l.c. ; c) Plumerianum l.c. 385 basé sur Rh. Plumerianum DC, indiquant comme synonymes Gesneria tomentosa L. excl. synon. Sloane et Gesneria grandis Sprengel quant à la plante de Hispaniola; cite Plumier, Bertero 953 et Eggers 1749 b et 2001; et d) angustatum l.c. 385 basée sur un spécimen Picarda 541.

Revenant aux Manuscrits du Père PLUMIER, il a décrit longuement Gesnera amplo Digitalis folio tomentoso qu'il illustre par l'habitus et les analyses florales. Dans son troisième paragraphe, il termine sa description indiquant selon son habitude l'écologie et le nom du lieu de récolte. Mais, dans ce cas, après ces informations il donne une brève description d'une plante très semblable, indiquant cependant leurs différences dans la pubescence (ce qui est fondamental) et l'endroit où il l'a observée:

.....

" Tota planta tomento candicante obtegitur, plurimaque reperitur in via qua a Petit Goive tenditur ad Leoganam iuxta saxosum locum qui vulgo

dicitur Le Tapion du Petit Goive. Alia praeter hanc datur species huic prorsus similis, villosa equidem sed nullatenus tomentosa, hanc ultimam reperi iuxta Portum Pacis insulae eiusdem Sandominicanae et per varia loca Insulae Tortuosae. Variis mensibus florentem utramque observavi".

que l'on peut traduire ainsi:

Toute la plante recouverte d'un tomentum blanchâtre, plusieurs trouvées dans le Chemin qui mène à Petit Goive près de Leogana à coté de cet endroit rocheux que les gens appellent le Tapion du Petit Goive. Une autre, outre celle-ci, très semblable, villeuse surement mais en aucune manière tomenteuse, j'ai trouvé cette dernière près du Port de Paix dans l'île Sandominicana et dans divers endroits de l'île Tortuosa. J'ai observé les deux en fleur pendant plusieurs mois.

Les caractères morphologiques des especes de Rhytidophyllum sont en général semblables, mais c'est au niveau de la dermologie de leurs feuilles (surfaces et trichomes) que nous devons trouver leurs différences. Force est de reconnaître que, dans les descriptions de ces caractères, l'anarchie règne; il est très difficile de pouvoir les interpreter, à plus forte raison comparer des descriptions isolées du 19e. siècle faites dans trois pays.

HOOKER a écrit: .... "very wrinkled and bullate above and downy deep green, beneath paler and more downy, beautifully reticulate".....

De CANDOLLE, sans aucun doute a fait sa description sur le spécimen de Bertero car il donne une très bonne description de la pubescence, "..... supra pilis subclavellatis in medio areolarum subcongestis scabris, subtùs petiolis pedunculisque hirsutis,".....

HANDSTEIN décrit la pubescence de sa plante: ".... niveo densissimo arachnoideo-contexto vestitum",.....

Il est évident que PLUMIER a décrit une plante à pubescence blanchâtre densement tomenteuse qui est l'objet de son icône, et, qui a observé une autre qui n'a pas cette pubescence.

De CANDOLLE a conservé l'espèce de HOOKER malgré sa création de Rhytidophyllum Plumerianum tenant compte, probablement, de la différente relation longueur des inflorescences / longueur des feuilles. A cette époque il n'existait qu'une collection pour chaque espèce. Actuellement nous en possedons davantage.

D'après l'examen des spécimens, je peux constater: 1°) la variation du rapport L infloresc./ L feuilles; 2°) la présence ou l'absence d'auricules à l'insertion des pétioles. Ex. Eggers 3946 Rh. stipulare Urban cité par lui-même et determiné ultérieurement Rh. auriculatum Hooker par SKOG, représenté par 3 feuilles d'herbier dans la collection de Paris, montre des grandes auricules sur 2 feuilles et aucune sur l'autre. Eggers 2001 cité par URBAN sous variété Plumerianum et determiné par SKOG Rh. auriculatum montre une inflorescence qui dépasse longuement le feuillage.

Dans Rhytidophyllum leucomallon les inflorescences sont en général plus longues que les feuilles; néanmoins dans quelques collections elles dépassent sensiblement le feuillage: ainsi Eggers 3395 de Haïti, cité par URBAN et determiné par LEEUWENBERG comme cette espèce et représenté à Paris par 4 feuilles d'herbier, montre des inflorescences nettement plus longues, à peine plus longues (déjà en fruit) et une (encore jeune) qui n'arrive pas à la moitié de la longuer de la feuille. Les limbes foliaires sont decurrents le long du pétiole. URBAN faisait déjà noter que l'icône de PLUMIER ne correspondait pas à la description de de CANDOLLE: "OBS. Icon Plumeriana cum typo Candolleano ob folia basi obtusa aequilatera nec inaequilateraliter emarginata non bene quadrato" (Symb. Antil. 2: 385).

Le type de Rh. Plumerianum DC conservé à Genève n'a pas de pubescence tomenteuse arachnoïde blanchâtre sur les feuilles (étudié par P. LOWRY à ma demande et comparé à d'autres spécimens de G et P). Le type de R. auriculatum Hooker n'a pas non plus ce type de pubescence (étudié par L. SKOG, en prêt de K à US).

Ainsi je peux dire que l'espèce que PLUMIER a illustrée est Rh. leucomallum Handstein, de Petit Goive et la seconde, vraisemblablement, Rh. auriculatum Hooker, de Portus Pacis et Insula Tortuosa.

En résumé:

1. Rhytidophyllum leucomallon Handstein, Linnaea 34: 312. 1865 Type Jaeger 297.
   Gesnera amplo Digitalis folio tomentoso Plumier, Nov. Pl. Amer. Gen. 17. 1703 et MS.; Pl. Amer. Edit. Burmann 126, tab. 134. 1757.
   Rh. Plumerianum DC, Prodromus 7: 524. 1839 quoad syn. Plumier.
   Rh. auriculatum Hooker f. var. Plumerianum (DC) Urban, Symb. Antil. 2: 385. 1901; 8: 648. 1921.
   Gesneria leucomallon (Handstein) Kuntze, Revisio 2: 473. 1891.
   Gesneria grandis Fischer ex herb. Petropolis, nomen.

Spécimens: Santo Domingo: Eggers 3395 G,P. Poiteau ex herb. Poiret P. S.d. d. Jacquemont a. 1827 P. Nectoux P. Ex herb. Vaillant P.

2. Rhytidophyllum auriculatum Hooker, Bot. Mag. 64: tab. 3562. 1837 Type: "Santo Domingo", cult. incl. var. genuinum Urban, stipulare Urban et probablement angustatum (type non vu).
   Rh. Plumerianum DC, l.c. excl. cit. Plumier.

Spécimens: Santo Domingo: Eggers 2001 G, P; Sintenis 3946 G,P; 6637 P. Bertero 395 G; Poiteau G,P; Richard P; Fuertes 1102 P; Türckheim 2961 G, P.

2. Bellonia frutescens folio Melissae aspero

PLUMIER créa le genre Bellonia décrit dans son Nova Plantarum Americanarum. Genera p. 19-20, tab. 31. 1703, dédié à Petrus Bellonius, médecin qui publia des travaux sur les Conifères, les Oiseaux, les Poissons et l'Agriculture; mort en 1564. Une seule espèce appartenant à ce genre, elle fut décrite dans tous ses détails et illustrée par une grande branche (en partie coloriée à l'aquarelle) fleurie, avec quelques fruits immatures et qui ne montre pas d'épines. Cette icône a été reproduite par BURMANN, l.c. p. 35-36, tab. 47.

LINNE publia Bellonia aspera, Spec. Plant. ed. 1. 172 (1).1753 basée sur le protologue de PLUMIER de 1703; dans sa 2e. édition il ajoute la citation de la planche gravée de BURMANN.

SWARTZ publia Bellonia spinosa Prodromus 72. 1788, décrivant une plante qui se caractérise par la présence d'épines.

URBAN a eu toujours des doutes sur l'existance de ces deux espèces. En Symb. Antil. 2: 367.1901 après avoir traité Bellonia aspera L. il signale les différences entre cette espèce et B.spinosa Swartz: taille des fleurs, branches inermes, inflorescences latérales et terminales "corymboses". En 1920, Repert.Sp. Nov. Beihefte 5: 46. 1920 il s'interroge si cette espece ne serait pas la même que celle de LINNE, si, sur la planche, le dessin des épines avait été négligé et il note que l'espèce "est inconnue des botanistes d'aujourd'hui". L'année suivante, in Symb. Antil. 8: 645, il revient sur la question après avoir traité les deux espèces. Il considère que " les espèces épineuse ou inerme, très différentes par leur port, les feuilles, les fleurs et les fruits, sont à peine voisines".

L'illustration de PLUMIER montre des inflorescences cymeuses à deux quatre, plusieurs fleurs voire une fleur solitaire et non des corymbes; la gravure publiée par BURMANN montre des insertions un peu négligées). Dans les collections de l'herbier du Muséum, la grande majorité des spécimens porte des épines, le nombre des fleurs est de 1 ou 2 par inflorescence. La même observation a pu être faite par M. L. SKOG dans l'herbier National des Etats Unis. La taille des feuilles est presque toujours plus petite que sur le dessin de PLUMIER.Bien que nous ayons la certitude que PLUMIER dessina, en général, plus grand que nature, il est évident que la plante qu'il a illustrée,provenant sans doute d'un milieu humide, était d'une taille exceptionnelle,M. SKOG,après avoir cultivé les deux especes dans une serre,a eu la tres grande amabilité de me communiquer les résultats de son expérience: ces cultures ont donné des plantes tout à fait semblables.Les différences invoquées pendant si longtemps ne peuvent être que les conséquences du milieu écologique sur les plantes,qui, donc, appartiennent à une seule espèce.

En résumé:

Bellonia aspera Linnaeus, Spec. Plant. ed. 1. 172 (1). 1753; ed. 2. 244. (1).1762. Lamarck, Encyc. Méthod. 1: 397. 1785. Urban, Symb. Antil. 2: 267. 1901; Repert. Spec. Nov. Beihefte 5: 46. 1920; Symb. Antil. 8:645. 1921.Type: la planche de Burmann, l.c.
Bellonia frutescens folio Melissae aspero Plumier, Nova Pl. Amer . Gen. 19 - 20, tab. 31 et MS; Pl. Amer. Edit. Burmann 35 - 36, tab. 47.1756.
Belonia spinosa Swartz, Prodromus 72. 1788.

Remerciements

Je remercie sincèrement mes confrères: M. L. SKOG pour ses commentaires sur le type de Rh. auriculatum Hooker qu'il avait en prêt de l'Herbier de Kew ainsi que pour ses informations sur ses cultures de Bellonia aspera L.; M. Peter LOWRY pour l'étude du type de Rh. Plumerianum DC qu'il a faite à ma demande pendant sa visite à l'Herbier de Genève;
Madame Suzanne JOVET AST pour la traduction précise du texte de Plumier et la lecture de ce manuscrit.

Muséum National d'Histoire Naturelle,
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BOOK REVIEWS

Alma L. Moldenke

"SCIENCE: ITS HISTORY AND DEVELOPMENT AMONG THE WORLD'S CULTURES" by Colin A. Ronan, 543 pp., 249 b/w photo., 2 maps, 1 tab. & 66 fig. Facts on File, Inc., New York, N. Y. 10016. 1982. $29.95.

"The [definitely achieved] aim of this book [is] to take an overview of the development of science and scientific thought the world over from early times until now". With emphasis on conceptual changes rather than technological ones, the reading yields "an exciting adventure, partly because the thrill of discovery is exciting and partly because the story will carry us into stimulating times remote from our own." There are chapters on the origin of science, Greek, Chinese, Indian, Arabian, Roman, and medieval through modern science. Many excellent illustrations are on clustered pages but with their location indicated with the pertinent text.

"KNOTT'S HANDBOOK FOR VEGETABLE GROWERS - Second Edition" by Oscar A. Lorenz & Donald N. Maynard, ix & 390 pp., 44 b/w draw., 12 fig. & 183 tab. Wiley-Interscience of John Wiley & Sons, New York, N. Y. 10158. 1980. $18.95 paperbound spiral.

This much used handbook was first published in 1956; reappeared as a "revised printing" by Dr. Knott in 1962. Now under a different authorship it still remains the valuable Knott's "Handbook" with needful information updated "because of technological advances, government regulations and a constantly changing industry. ....Every effort has been made to include practical and current information." It is a storehouse of well organized information for growers, home gardeners, fieldmen, extension and research workers, agriculture, nutrition, applied botany, and biology students. First the vegetables are listed systematically and by scientific name and then by their common names in eight foreign languages. Some of the main topics covered are: planting, fertilization, irrigation, pest and weed control, harvesting and storage.

"A NEW LOOK AT THE DINOSAURS" by Alan Charig, 160 pp., 20 color photo., 63 b/w photo., 8 maps, 125 draw. & 36 tab. & charts. Facts on File, Inc., New York, N. Y. 10016. 1983. $15.95.

This excellent book, planned for interested educated general readership, was first published in England where the well-known author is connected with the British Museum (Natural History) and from where most of the copious, fine, illustrative materials came.

May this book be successful in the U. S. market! This is wished so that it may counterbalance many inaccuracies illustrated in our gaudy books designed especially for young boys and their teachers in the early school years. There are chapters on how dinosaurs were fossilized, where they have been found, pros and cons of what these remains tell of the lives of these certainly highly successful creatures that dominated much of this earth from 200 million to 65 million years ago and then died off relatively suddenly. Why? Read!
The author limits the term "dinosaur" to those *Saurichia* and *Ornithischia* of archisaur stock whose femurs are knobbed and carry the body aloft at about right angles as in birds and mammals and not as in most other reptilians and amphibians.

"INSECT PHYSIOLOGY" by W. Mordwe, G. J. Goldsworthy, J. Brady & W. M. Blaney, viii & 180 pp., 70 b/w fig. & 2 tab. John Wiley & Sons, New York, N. Y. 10158. [1980] 1981. $18.95 paperbound.

"Insects are of incalculable importance to man. They are our major rivals for domination of this planet, and yet paradoxically they are also vital to our survival on it.....The insect's homeostatic problems, which are inevitably its physiological problems, are the subject of this [interestingly presented] book." There are chapters on energy metabolism, transporting tissues, development, sensory systems, movement and behavior emphasizing experiments and observations on the biochemical and cellular levels as they direct whole body reactions set by the limits of their small size, their poikilothermy and their rigid impermeable exoskeleton to their environment. This text is an excellent one for an upper undergraduate course and important reading for more advanced students, teachers, and entomological workers.

"TEXAS WEATHER" by George W. Bomar, vii & 265 pp., 54 b/w photo., 72 fig, 40 maps & 32 tab. University of Texas Press, Austin P. O. Box 7819, Texas 78712. 1983. $22.50 clothbound & $9.95 paperbound.

This interesting book describes "graphically, pictorially and numerically.....those weather events that distinguish Texas as a land of climatic disparity.....explains why such diversity exists.....and furnishes fundamental [clear] knowledge with which readers can analyze and estimate nature's threat and thereby ascertain the course of action to be taken to preserve life and possessions." With its well illustrated chapters on fronts, floods, hurricanes, thunderstorms, tornadoes, heat waves, drought, snow, ice, and wind this book is actually a popular, accurate meteorology text with its examples taken from the Texas scene that has more weather extremes than any other U. S. state.

"THE FACTS ON FILE DICTIONARY OF BIOLOGY" edited by Elizabeth Tootill, 282 pp., 32 b/w fig. & 5 tab. Facts on File, New York, N. Y. 10016. 1982. $5.95 paperbound.

This dictionary of 3,100 biologically related terms that are clearly defined and provided with ample cross-referencing and helpful illustrations was first published in the United Kingdom a year earlier. It should serve effectively on routine biology lab book shelves, in public and school libraries for advanced students, in high schools, in community colleges and laboratory techniques' schools, and for the non-biology major university students.

"STOMATAL PHYSIOLOGY" edited by P. G. Jarvis & T. A. Mansfield, Society for Experimental Biology Seminar Series 8, viii & 294 pp., 95 b/w fig., 20 tab. & 39 photo. Cambridge University Press, Cambridge, U. K. and New York, N. Y. 10022. 1981. $49.50 clothbound & $19.95 paperbound.

Herein are 41 carefully prepared papers, mostly from the United Kingdom but also 1 each from the U.S., Australia, and Germany, that present a research progress report on such topics as ionic relations, anions, fluorescence, humidity responses, control of transpiration and photosynthesis, and responses to water-stressed plants, pollutants and pathogenic organisms. Some more years of similarly careful studies will be needed before broader conclusions can be drawn: nevertheless these reports should be of interest to many kinds of botany students, researchers, teachers and cytologists. There are 2 outstanding scanning electron micrographs of *Vicia faba* leaves with collapsed epidermal and guard cells exposed to SO_2 as an air pollutant and of turgid cells in clean air.

"THE SHROUD OF TURIN - The Burial Cloth of Jesus Christ", revised edition by Ian Wilson, iii & 320 pp., 64 b/w photo., 18 fig. & 2 maps on 40 unnumbered pages. Houghton Mifflin, Inc., Boston, Massachusetts 02108. 1983. $15.95 hardcover and Image Books for Doubleday & Company, Inc., Garden City 11530, New York. 1979. $4.95 paperbound.

"All that is asked of the reader is that he approach [the evidences of the textile experts, forensic scientists, physicists, photographers, criminologists, hematologists, historians, theologians and think about the unprovables]....step by step with an open mind". Appendix E lists 49 plant species whose pollen grains from the shroud have been identified by Dr. Max Frei as those of Mediterranean and Irano-Turanian areas. Questions come to mind that cannot be answered with certainty. The book provides interesting, historical reading and tantalizing conjectures. It is effectively illustrated.

"THE HUMAN BODY" edited by David Heidenstam, Ann Kramer, Ruth Midley & Susan Sturrock for the Diagram Group, 544 pp., 540 b/w fig. or diag., 95 tab., 15 photo., & 5 maps. Facts on File Inc., New York, N. Y. 10016. 1980. $24.95.

This publication is successfully and effectively "designed to provide clear, straightforward and unbiased explanations of every aspect of the body's functioning, care and development." It is a combination and adaptation of the Diagram Group's "Man's Body" 1976, "Woman's Body" 1977 and "Child's Body" 1977. The "well over 2,000 illustrations, charts and diagrams" are in clear outline and basically simple and with direct language that make our innards and exteriors much easier to visualize actively and passively in health and in illness. The forthright figures are much more comprehensible than partial or overdetailed ones in other books with the same general purpose. A few words are misspelled and in one case "stomach" is misused for "abdomen" or "belly".

"AN INTRODUCTION TO PLANT TAXONOMY" Second Edition by C. Jeffrey, ix & 154 pp., 6 b/w photo., 19 fig. & 7 tab. Cambridge University Press, Cambridge & London, U. K. & New York, N. Y. 10022. 1982. $24.95 clothbound & $12.50 paperbound.

This updated edition, with its expanded treatment of cultivated plant nomenclature, its outline classification of plants and its emphasis on the integrative and primal role of taxonomy to the whole field of botany, is welcomed. It is still introduced in non-technical terms so that it can be very helpful to amateur plant collectors, nature viewers and serious horticulturists as well as to college, university and botanical garden students taking plant classification courses. For such courses an auxiliary set of this book could be particularly helpful starting with the very first two chapters for the very first assignment, along with pages 129 and 130 on the contemporary taxonomist.

"A CHEMICAL FEAST" by W. Harding le Riche, ix & 204 pp., 1 b/w fig. & 32 tab. Facts on File Publications, New York, N. Y. 10016. 1982. $13.95.

The purpose of this common sense book is to counteract panic tendencies. "At present there are far greater risks in our lives than those inherent in our food and there are far more serious dangers in bacterial and viral food poisoning than there are in chemical additives, intentional or incidental." Among others, there are chapters on malnutrition in North America, natural poisons in food, water, food additives, parasites, hypoglycemia and allergy. "Certainly we must continue to put pressure on government and industry to police the substances they are introducing into the environment." This book has important messages for almost everyone.

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STUDIES ON THE SEEDLING TYPES OF DICOTYLEDONOUS PLANTS (MAGNOLIOPHYTA, MAGNOLIOPSIDA)

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ABSTRACT

Seedlings of dicotyledonous plants can be divided into 17 distinct types based on morphological and functional features of the seedling. The most primitive type of dicotyledonous seedling is that characterized by the genus Polyalthia (Annonaceae), herein termed the "Polyalthia type", as its seedling morphology is similar to that found in the seedlings of Cycas and Ginkgo (Pinophyta), and perhaps similar to those of the seed ferns (Pteridospermopsida). The "Magnolia type" is evolutionarily more advanced. From the Magnolia type, several different evolutionary lines of seedling development arose, with the Magnolia type evolving into different seedling types throughout the Magnoliopsida. Minor specialized seedling types evolved within several of the major lines. However, a number of evolutionary "dead ends" arose from the Polyalthia type which are restricted to families of flowering plants belonging to the Magnoliidae. Neoteny has likely played a major role in the developmental evolution of seed plant seedlings from progymnosperm seedling. The origin of the Polyalthia type from the Pinophyta (especially the seed ferns or Pteridospermopsida) can be explained using neoteny hypotheses. Using the most recent phylogenetic scheme for the Magnoliopsida proposed by Cronquist, the known seedling types for each family are noted.

INTRODUCTION

Early in the sixteenth century, botanists began to study the seedlings of vascular plants. Over the next two centuries, studies characterized the morphological and biological features of the seedling, noting in particular the relationships between the embryo and the resulting seedling. These early workers were struck with the diversity of seedlings found among the flowering plants, and particularly so among the dicotylendous members (Magnoliophyta, Magnoliop-

The present paper was largely prepared in China. An opportunity to visit the United States from September 1982 to September 1983 allowed me to complete my studies and prepare my remarks for publication. This was done at the Department of Botany, University of Maryland, College Park, MD. I wish to thank Dr. James A. Duke, Germplasm Resource Laboratory, U. S. Department of Agriculture, Beltsville, MD, for his comments, and Dr. James L. Reveal of the University of Maryland, for assisting me in preparing this paper for publication. This is Scientific Article A3558, Contribution No. 6633 of the Maryland Agriculture Experiment Station.

sida). As studies continued into the nineteenth century, more exacting details were learned and the diversity of seedling types documented. Soon, systems of seedling classification were proposed (Klebs 1885).

During the course of the present century, numerous studies have been conducted on seedlings, with the majority concentrating on dicotyledonous plants (e.g., Bokdom 1977; Burger, 1972; Duke 1965, 1969; Grushvitskyi 1963; Muller 1978; Vasilezenko 1960; Vogel 1980; Zhou 1955). Only one (Vogel 1980) has attempted to provide a detailed scheme of classification for dicotyledonous seedlings.

THE BASES FOR THE CLASSIFICATION OF SEEDLING TYPES

Seedling features critical to their classification may be found as the seed germinates and seedling growns. These features are mainly expressed morphologically, but can be influenced by their environment or ecological requirements. In the following section, germinal, morphological and ecological factors relating to the classification of mainly dicotyledonous seedlings are reviewed.

I. Germination Features

Seedlings are typically divided into two types, epigeal and hypogeal. In epigeal plants, the cotyledons withdraw from the seed coat and are carried above the soil level by an elongating hypocotyl. At this time the cotyledons are exposed to light and become photosynthetic. In hypogeal plants the cotyledons do not withdraw from the seed coat, and as the hypocotyl does not elongate, the cotyledons remain below soil level and do not become photosynthetic. Actually, the distinction is not so simple. There is a great deal of diversity in each type, and some seedlings cannot be easily characterized by either condition (e.g., Rhizophora, the mangrove seedling).

II. Morphological Features

Seedling morphology is critical to any scheme of classification of seedling types. Nonetheless, mere morphology is, in and of itself, not the only characters that can be used. Physiological functions often can determine morphology of seedling structures. Photosynthetic cotyledons are generally thin, while cotyledons with a primary storage function tend to be thick and massive. The elongation of the hypocotyl -- an important morphological character -- while a genetic feature of the species, in some cases, is related to ecologically factors associated with the habitat (see below). If the epicotyl does not elongate, the first true leaves of the seedling are arranged in a rosette. Some cotyledons are morphologically similar to mature leaves, but this is the exception. Most cotyledons are simple and lack the elaborate venation patterns or lobing features of mature leaves. Still, some cotyledons may be lobed while the mature leaves are entire.

The embryo is the originator of the seedling. If the embryo occupies the whole seed and is without endosperm or perisperm, the seed is said to be exalbuminous. If the embryo does not occupy the whole of the seed because of the presence of endosperm or perisperm, the seed is said to be albuminous. The presence or absence of these nutritive substances can determine the function of coty-

ledon of the seedling and thus classification of the seedling into specific types. Furthermore, the size of the embryo influences the seedling type. Large seeds often have thick, food storing cotyledons or hypocotyls, or have massive amounts of endosperm. Such plants often belong to the hypogeal types.

The endosperm or perisperm are technically not part of the seedling. Yet their presence affects the function of the parts of the seedling. In exalbuminous seeds, the cotyledons do not have any absorptive function. Exalbuminous seeds that are photosynthetic are always epigeal, while those that have a storage function are always hypogeal. In albuminous seeds, on the other hand, the cotyledons always have an absorptive function no matter if they are epigeal or hypogeal. In albuminous seeds which are epigeal, however, the cotyledons will be photosynthetic once they are exposed to light, while the cotyledons of a hypogeal seedling remains absorptive.

The fruit wall and testa are not part of the seedling, but whether or not the fruit wall or testa persists around the cotyledons is a character that can be used in the classification of seedling types.

III. Ecological Features

The ecological conditions of a given habitat can determine the general kinds of seedlings present. On the floors of tropical rain forests where the rays of the sun rarely penetrate, the epigeal types of seedlings with their photosynthetic requires are scarce. Here the hypogeal types whose cotyledons have the storage function are common. In the grasslands, however, epigeal seedlings types are often the only kinds found. Some ecological setting have unusual seedlings. The seacoast mangrove forests are characterized by a special viviparied seedling type, whereas parasitic plants, such as Cuscuta, have a simplistic seedling type unique to many parasitic plants.

The above characteristics are not equally important. Some may be important for only a single seedling type. Great stress has been placed on the function of the morphological features in this system of seedling classification. The morphology and function of a plant are not isolated but coincide with each other. In short, function determines morphology and morphology embodies function.

A CLASSIFICATION SCHEME FOR THE SEEDLINGS OF MAGNOLIOPSIDA

The proposed new classification of dicotyledonous seedlings is based on my research in the field and laboratory using many species native to the People's Republic of China, as well as those which have been introduced into my native country. In addition, I have consulted a large body of literature (see the literature cited section below) which has concentrated on the study of seedling types in both the temperate and tropical regions of the world. I have concentrated mainly on the works published in English, German and Russian as well as a few studies published to date in Chinese.

The following system tends to stress functional features and not merely morphological ones. The proposed system is somewhat similar to that published by Vogel (1980). In the

appendix, I have attempted to show the areas of agreement and disagreement in the two systems by providing a summary of the seedling types in those families of dicotyledonous plants recognized by Cronquist (1981). Vogel tended to stress seedling development stages and their respective morphologies. This works well when one has seeds in hand and is able to follow the development of the seedling. With the growing need to identify seedlings, especially for agricultural purposes, it is equally important to be able to recognize seedlings "in the field". Therefore, I have given less emphasis to developmental stages than Vogel. In my opinion, knowledge of the general habitat can often allow one to determine the functions associated with the various structures of the seedling. Thus, the combination of function and morphology makes for excellent "field" characters in classifying types of seedlings.

Some efforts, such as that by Muller (1978) who wrote keys to individual species, work well for geographically limited regions of the world -- especially the temperate portions of the world. In the tropics, however, such an effort is at yet impossible although Duke (1965, 1969) and Burger (1972) have presented studies showing the kinds of efforts that can be made for certain groups of tropical species.

My effort is to provide a set of general features which may be used to define groups of seedlings. At this stage, this will be an aid in the study of the phylogeny of the Magnoliopsida. In time, I hope, this system of seedling classification will become more sophisticated and will be able to more exactly define evolutionary units within the dicotyledonous plants. Finally, with time, it is hoped that a system of classification can be developed for all dicotyledonous plants no matter the species or where, in the world, the plant is found.

A total of 17 seedling types are recognized in the present paper. Vogel (1980) recognized a total of 16 seedling types, with a number of subdivisions within some types. Our definitions of seedling types do not always overlap and a summary table of our similarities and differences is presented below.

1. Polyalthia Type (fig. 1)
The mature seed is filled with copious endosperm and the embryo is very small. During germination the cotyledonary petioles elongate first; they push out the radicle, hypocotyl and plumule from the testa. The radicle emerges and develops into a sturdy root system, while the hypocotyl fails to elongate and remains subterranean. The cotyledons have an absorptive function, remain embedded in the testa, and absorb the nutrients from the endosperm. Both the fruit wall and the testa, or only the testa, remain persistent around the cotyledons. The fruit wall and the testa are shed with the cotyledons. The epicotyl and plumule grow upward and elongate into a shoot. Leaves may be spirally arranged, or the first two may be opposite. All leaves may be fully developed at the seedling stage, or the lowest ones may be scale-like.

The Polyalthia type of seedling is characteristic of a portion of the Annonaceae, and is the only known type in the Myristicaceae, both members of the Magnoliales. It is found, with the Magnolia type, in the Aristolochiaceae. Paeoniaceae only has this type of seedling. The Polyalthia type is rare in

the more advanced families, being otherwise found only in Euphorbiaceae.

2. Euryale Type (fig. 2)
The mature seed is filled with copious endopserm and the embryo is very small. During germination the epicotyl elongates and the plumule develops and breaks out of the testa at the apex of the seed. The cotyledons, however, remain in the testa where they serve as a haustorium which absorbs the nutrients from the endosperm. The cataphylla are lanceolate or sagittate. There is a transition from the narrow cataphylla to true leaves which takean orbicular form. The radicle and hypocotyl are abortive, and at the apex of the epicotyl are enormous adventive roots which form the root system of the seedling.

The Euryale type is typical of hydric species. It likely evolved from the Polyalthia type. This type is rare and specialized, being recorded so far only from the Nymphaeaceae.

3. Mezzetiopsis Type (fig. 3)
The mature seed is filled with copious endosperm and the embryo is small. During germination the radicle is pushed out from the testa and grows downward developing the root system. The hypocotyl elongates and is either curved in a loop above the ground or is erect and carries the cotyledons, enclosed in the testa, above the soil. The cotyledons have an haustorial function and absorb the nutrients from the endosperm. The cotyledons remain in the testa and attached to the top of the hypocotyl, and thereby block the development of the epicotyl and plumule. In this condition the seedling enters a resting stage during which the nutrients of the endosperm are transfered into the hypocotyl which becomes rather sturdy. The cotyledons and testa are shed together and then the plumule develops into a shoot. Only rarely does the plumule start to develop before the cotyledons and testa are lost.

This type of seedling is common in Annonaceae. It is otherwise infrequent and rather scattered (e.g. Menispermaceae, Euphorbiaceae, Rubiaceae) in the Magnoliopsida.

4. Magnolia Type (fig. 4)
The mature seed is filled with copious endosperm and the embryo is small. The cotyledons have both the absorptive and photosynthetic functions. During germination the radicle breaks out of the testa and grows downward developing into the root system. At the same time the hypocotyl elongates and brings the cotyledons to a position above the soil level. At first, while the cotyledons are still underground, they have an absorptive function taking nutrients from the endosperm. However, upon reaching the soil level, the cotyledons withdraw from the testa, unfold, expand, and when exposed to light take on a photosynthetic function. The epicotyl and plumule develop into a shoot. In most instances, the first few leaves are well developed and spirally arranged. Occasionally the first two leaves are opposite.

The Magnolia type is the most common in the Magnoliopsida. More than half of the dicotyledonous plant families have this type of seedling, at least in part. The Magnolia type is the only type found in such less advanced families as Magnoliaceae, Illiciaceae, Degeneraceae and Monimiaceae. Likewise, it is the only type is such more advanced families

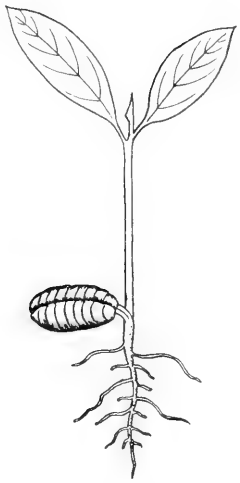


Fig. 1. Polyalthia type

Polyalthia cerasoides (Roxb.) Benth. et Hook. f. ex Bedd. (Annonaceae)

Fig. 2. Eurale type

Eurale ferox Salisb. (Nymphaeaceae)

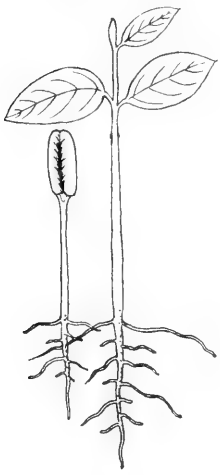


Fig. 3. Mezzettiopsis type

Mezzettiopsis creaghii Ridl. (Annonaceae)

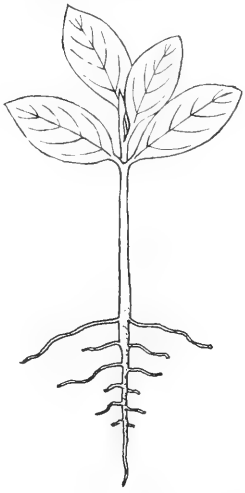


Fig. 4. Magnolia type

Magnolia denudata Desr. (Magnoliaceae)

as Convolulaceae, Scrophulariaceae, Gesneriaceae, Campanulaceae, Caprifoliaceae and Dipsacaceae.

5. Peperomia Type (fig. 5)
The mature seed is filled with copious endosperm and the embryo is very small. During germination the cotyledonary petioles elongate and push the hypocotyl and radicle from the testa. The radicle grows downward and forms a tap root. The hypocotyl does not elongate but remains subterranean. One of the cotyledonary petioles continues to elongate, withdraws the cotyledonary blade from the testa, grows upwardly and exposes the blade to light whereupon it assumes a photosynthetic function. The other cotyledon remains in the testa below the soil level and absorbs the nutrients from the endosperm.

The Peperomia type has only been recorded from species of Peperomia (Piperaceae).

6. Cyclamen Type (fig. 6)
The mature seed is filled with abundant endosperm and the embryo is small. During germination the radicle breaks out of the testa first, grows downward and forms a taproot. The hypocotyl does not elongate but remains subterranean where it becomes swollen and tuberlike taking on a food storing function. The cotyledons do not develop well, are generally scale-like, and may even abort. The epicotyl often does not develop and even it will abort. The plumule produces only a single leaf with a long petiole during the seedling stage. When subsequent leaves do emerge, the internodes do not elongate and the leaves are often arranged in a rosette.

The Cyclamen type is known only in herbaceous dicotyledonous plants of temperate and cold regions. To date, it has been found in Anemone (Ranunculaceae), Corydalis (Fumariaceae), and Cyclamen (Primulaceae).

It should be noted that the reports of a "monocotyledonous" embryo for Cyclamen (Cronquist 1981) are without foundation (see Vogel 1980).

7. Sterculia type (fig. 7)
The mature seed is filled with copious endosperm and a large, thin embryo. During germination the radicle emerges first and grows downward forming the root system. The hypocotyl elongates and extends the cotyledons above the soil level. At first the endosperm surrounds the cotyledons and the cotyledons are absorptive, but as the cotyledons separate, the endosperm adhers to the undersurface of each of the cotyledon blades forming a compound structure which does not separate until shedding. Once the cotyledons are exposed to light, they have a photosynthetic function. The epicotyl and the plumule develop into a shoot. The first two leaves are always opposite, and the subsequent leaves are spirally arranged.

The Sterculia type is rare and has been recorded only in Sterculia (Sterculiaceae). This type is probably a specialization of the Mezzettiopsis type.

8. Cinnamomum Type (fig. 8)
The mature seed is exalbuminous and the embryo is large and occupies the whole of the seed. During germination the radicle emerges first, grows downward and develops a sturdy taproot system. The hypocotyl does not elongate and remains subterranean. Only rarely does it elongate and carry the cotyledons above the soil level. The massive cotyledons are enclosed in

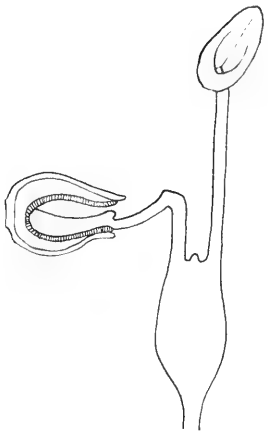


Fig. 5. Peperomia type

Peperomia peruviana Dahlst.
(Piperaceae)
(after Hill 1906)

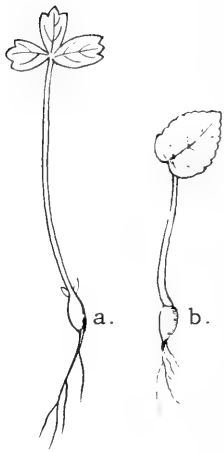


Fig. 6. Cyclamen type

a. Anemone nemerosa L.
(Ranunculaceae)
b. Cyclamen persicum Mill.
(Primulaceae - after Csapody 1968)

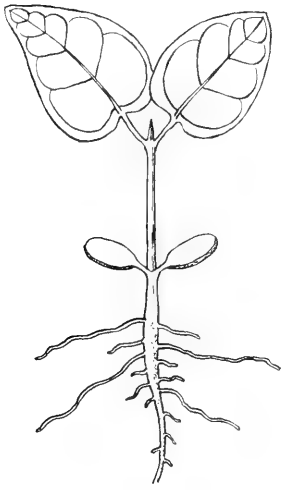


Fig. 7. Sterculia type

Sterculia lanceolata Cav.
(Sterculiaceae)

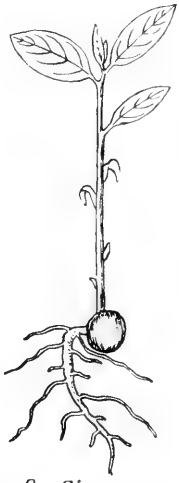


Fig. 8. Cinnamomum type

Cinnamomum camphora (L.) Presl
(Lauraceae)

the testa and have a food storage function. The epicotyl and plumule emerge opposite the root and gradually develop into a shoot. At first only spirally arranged, scale-like leaves are seen. Gradually, these give way to normal leaf development.

The Cinnamomum type is common among families of woody Magnoliopsida with exalbuminous seeds bearing large embryos and massive cotyledons. Seedlings of this type may be seen in Lauraceae, Fagaceae, Juglandaceae, Bombacaceae, Connaraceae, Mimosaceae, Caesalpiniaceae, Rosaceae, Combretaceae, Sapindaceae, Burseraceae, Anacardiaceae, Simaroubaceae, and Bignoniaceae. In a strict sense only Lauraceae belongs to the Cinnamomum type. As noted below in the discussion of the Chimonanthus type, the seedlings of the others families referred to the Cinnamomum type (which diagnostically cannot be distinguished from those in the Lauraceae) probably evolved secondarily from the Chimonanthus type.

9. Ceratophyllum Type (fig. 9) This type of seedling is a specialized hydric form. Its essential characteristics are the aborted radicle, the poorly developed (or even aborted) hypocotyl, and the exalbuminous seeds. There are two subtypes.

9a. Ceratophyllum Subtype (fig. 9a) The mature seed is exalbuminous and has a small but well developed embryo (Ceratophyllaceae) or one that is scarcely differentiated into parts (Utricularia). During germination the cotyledons break out of the testa, grow upward, and while still under the water, take only a photosynthetic function when exposed to light. The plumule develops into a shoot. Its leaves are linear, with the first pair always inserted into the node of the cotyledons; the remaining leaves are whorled. The radicle is aborted, and no adventitious roots are formed.

The Ceratophyllum type is reported only in Ceratophyllaceae and in the genus Utricularia (Lentibulariaceae).

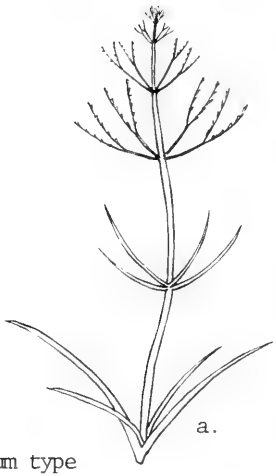
9b. Nelumbo Subtype. (fig. 9b) The mature seed is exalbuminous and a large, even edible embryo. During germination the epicotyl and plumule break out and form a shoot. The shoot's first leaves, which have long petioles, are simple and pass gradually into normally developed leaves. The cotyledons have a food storage function, are massive, and are adnate to each other at the base. The radicle and hypocotyl both abort and at the node of the stem, many adventitious roots are formed.

The Nelumbo subtype is known only in Nelumbo (Nelumbonaceae).

These subtypes are specialized seedling types and are not evolutionarily significant. It is important to note, however, that the seedling development of Nelumbonaceae is different from that found in the closely related Nymphaeaceae where Nelumbo and its related genera are sometimes referred.

10. Chimonanthus Type (fig. 10) The mature seed is exalbuminous but with embryo is of various sizes. During germiantion the radicle breaks out of the testa, grows downward and develops into a root system. The elongating hypocotyl withdraws the cotyledons from the testa and lifts them above the soil level. Subsequently, the cotyledons unfold and assume a photosynthetic function. The epicotyl may or may not deve-

b.



a.

Fig. 9. Ceratophyllum type

b. Nelumbo subtype

Nelumbo nucifera Gaertn.
(Nelumbonaceae)

a. Ceratophyllum subtype

Ceratophyllum demersum L.
(Ceratophyllaceae)

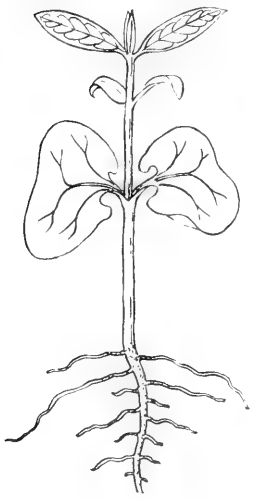


Fig. 10. Chimonanthus type

Chimonanthus praecox (L.) Link
(Calycanthaceae)

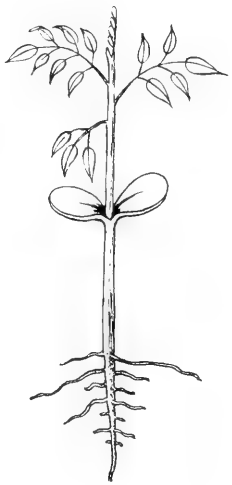


Fig. 11. Sophora type

Sophora japonica L.
(Fabaceae)

lop. The plumule develops into a shoot and its first leaves generally are well developed and arranged spirally or opposite.

The Chimonanthus type, named for the genus Chimonanthus of the Calycanthaceae, is essentially the same as the Macaranga type proposed by Vogel. Unfortunately, he placed both albumenous and exalbuminous members in his type. The Chimonanthus type does resemble the Magnolia type, where Vogel placed of his Macaranga type families, but the Chimonanthus is here defined as those families in which the seeds are always exalbuminous.

This is a common seedling type in both herbaceous and woody members of Magnoliopsida being found with equal frequency in the more primitive and more advance families. Like the Magnolia type, this seedling type is exceedingly common and widespread in the Magnoliopsida. The Chimonanthus type likely gave rise to the derrived Cinnamomum type as noted above. The two differ in that the Chimonanthus type seedlings are epigeal with thin, photosynthetic cotyledons, while the seedlings of the Cinnamomum type are hypogeal with massive, non-photosynthetic cotyledons. An examination of recent phylogenetic systems of classification for the Magnoliopsida (Bedell & Reveal 1983) shows that these two conditions occur in overlapping families. It is likely that in most of the advanced dicotyledonous families, the Cinnamomum type secondarily evolved from the Chimonanthus type.

11. Sophora Type (fig. 11)
The mature seed is exalbuminous and the embryo is fairly large. During germination the radicle breaks out of the testa and grows downward forming a sturdy taproot. The cotyledons are fleshy and even massive due to their food storing function, yet the hypocotyl elongates and brings the cotyledons to or above the soil level. Once exposed to light, the cotyledons assume a photosynthetic function. Shortly thereafter, the cotyledons are shed. When the epicotyl and plumule develop into a shoot, its first two leaves are always opposite while the subsequent leaves are arranged spirally or are opposite.

The Sophora type is derived from the Chimonanthus type, differing only in the massive nature of the cotyledons. This seedling type is found in the Rosaceae, Fabaceae, Dipterocarpaceae, Anacardiaceae Meliaceae among other families.

12. Ternstroemia Type (fig. 12)
The mature seed is exalbuminous and a large embryo. During germination the seed splits along the margin and the hypocotyl emerges. The radicle grows downward and develops into a root system. The erect hypocotyl is fusiform and has a food storage function. The two cotyledons are either small and scale-like or lacking entirely. When the plumule develops into a shoot, the first leaves are always scale-like, but the next ones are fully developed. The leaves are spirally arranged or the lower two may be opposite.

The Ternstromia type is derrived from the Chimonanthus type, differing in its reduced or abortive cotyledons and swollen hypocotyl. This type is known only from the Lecythidaceae and the Ternstromiaceae (included in the Theaceae by Cronquist 1981).

13. Garcinia Type (fig. 13)
The mature seed is exalbuminous

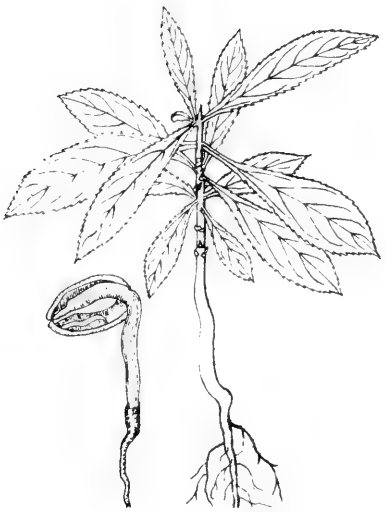


Fig. 12. Ternstroemia type

Ternstromia elongata (Korth.) Koord
(Theaceae - after Vogel 1980)

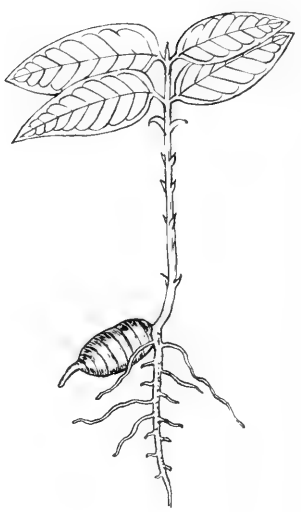


Fig. 13. Garcinia type

Garcinia oligantha Merr.
(Clusiaceae)

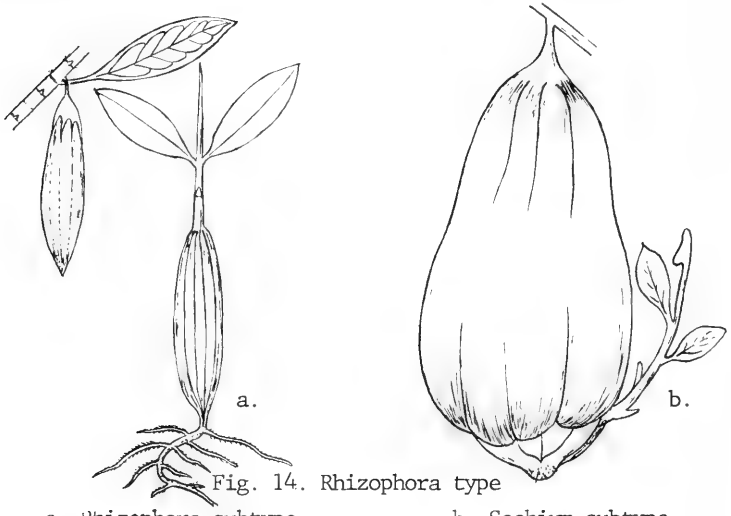


Fig. 14. Rhizophora type

a. Rhizophora subtype

Bruguiera sexangula (Lour.) Poir.
(Rhizophoraceae)

b. Sechium subtype

Sechium edule Sw.
(Cucurbitaceae)

and the embryo is mostly large. During germination either the radicle breaks out of the testa and grows downward and develops into a sturdy root system, or the primary root does not develop fully or fails to develop altogether. If the primary root fails, an accessory root can develop at the junction between the epicotyl and the hypocotyl which will replace the primary root. The hypocotyl is a massive, swollen body with a food storing function. It completely fills the testa which remains persistent until long after germination. The cotyledons are rudimentary or absent due to abortion. The epicotyl and plumule develop into a seedling shoot. Its first leaves are always scale-like and spirally arranged or opposite. Such first leaves gradually pass into normal leaves.

The Garcinia type of seedling is rare. It has been reported only in the tropical genus Garcinia (Clusiaceae) and in Barringtonia (Lecythidaceae).

14. Rhizophora Type (fig. 14) The essential characteristics of this type is the vivipary which is the result of specialized ecological conditions. Two subtypes can be distinguished.

14a. Rhizophora Subtype (fig. 14a) The mature seed is albuminous and the embryo often large and green. During germination the hypocotyl (with the radicle) breaks out of the testa and fruit wall of the young fruit and grows downward, developing into a large fusiform body which slowly enlarges and accumulates food. The cotyledons are reduced; they have an absorptive function and serve to pass nutrients (including salt) from the parent plant to the growing seedling before it detaches. When the fruit is mature (defined as when the cotyledons are detached or the fruit petiole is broken), the seedling drops from the parent plant. The seedling, depending on the weight of the hypocotyl (and the depth of the water under the tree) may either plant itself in the mud or fall into the water, drift ashore, and quickly develop a sturdy root system. Only at this time does the epicotyl and plumule emerge and develop a shoot. All the leaves are decussate, and the lowest pair are always scale-like.

The Rhizophora Subtype has been recorded from the mangrove genera of Rhizophoraceae, in Avicenia (Verbenaceae), and in Aegiceras (Myrsinaceae). Like other types of seedling associated with aquatic habitats, this subtype is a highly specialized modification and is of no particular phylogenetic significance.

14b. Sechium Subtype (fig. 14b) The mature seed is exalbuminous and the embryo is large. During germination the cotyledons enlarge and break out of the testa from one side, attaching directly onto the fleshy fruit wall and absorbs nutrients from the young fruit. Subsequently, the cotylendons rapidly enlarge 2-3 times their previous size, and push the immature radicle and hypocotyl out of the fruit, but these structures do not develop further. The epicotyl and plumule elongate and develop into a seedling shoot without tendrils. The first leaves are scale-like, but subsequent leaves gradually develop into normal, spirally arranged leaves. The seedling remains in this condition until the the parental plant dies. Upon its death, the vivparious seedlings fall to the ground.

The Sechium Subtype is known only from a monotype genus, Sechium (Cucurbitaceae), native to tropical South America. The edible fruit of S. edule Swartz contains one enormous seed.

15. Loranthus Type (fig. 15)
The mature seed is filled with copious endosperm and a small embryo. During germination the hypocotyl and radicle (which cannot be readily differentiated) jointly break out of the fruit wall and form a short column. Shortly thereafter the end of the column enlarges and forms a haustorial disk covered with a glutinous substance. The cotyledons, which have an absorptive function, remain in the seed and absorb the nutrients from the endosperm. In some, the cotyledons will withdraw from the fruit wall, but have no significant photosynthetic function. If the seedling germinates on a suitable host, the haustorial disk will attach itself to the host and grow into its tissue. The plumule will then develop into a seedling shoot and eventual produce normal leaves. The resulting plant is hemiparasitic as the mature plant is fully photosynthetic.

The Loranthus type is restricted to representative, hemiparasitic genera of Loranthaceae and Viscaceae.

16. Pyrola Type (fig. 16)
The mature seeds is filled with copious endosperm and a small embryo. During germination the radicle breaks out of the testa, grows downward, and develops into a taproot. The hypocotyl and the cotyledons abort, or occasionally the hypocotyl elongates and brings the cotyledons above the soil level. The plumule aborts and adventitious buds form the seedling shoots.

The Pyrola type is known only from Pyrola (Pyrolaceae) and some genera belonging to the Gesneriaceae.

17. Orobanche Type (fig. 17)
The mature seed is filled with copious endosperm and a very small, essentially undifferentiated embryo. During germination a slender, unbranched axis develops, yet there is not differentiation between the radicle and the hypocotyl. Before contact with a host, the axis elongates, and when contact is made, a haustorial disk is form at the point of contact which pierces the epidermis of the host plant and fuses with its tissue. A paratic life thus is established.

The Orobanche type is unlike any normal type of seedling development. As such it is of no particular phylogenetic significance. It is reported in Orobanche (Orobanchaceae) but should be expected in other genera of the family as well, the monotypic Cuscutaceae, and perhaps some species of Balanophoraceae and Pyrolaceae (notably the genus Moneses).

ORIGIN AND EVOLUTION OF THE SEEDLING CONDITION

Seedlings were long divided into two types, epigeal and hypogeal. Little agreement has been reached as to which of these two conditions was the most primitive. Vasilezenko (1946) stated with certainty that the hypogeal condition was the more primitive. This contradicted the earlier conclusion of Compton (1912) and Takhtajan (1948) that the epigeal condition was the less advanced of the two.

Vasilizenko argued that the hypogeal type was found among the primitive families of seed plants, notably Cycadaceae and

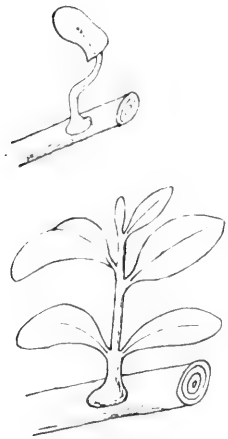


Fig. 15. Loranthus type

Loranthus parasiticus (L.) Merr. (Loranthaceae)

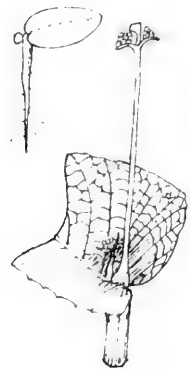


Fig. 16. Pyrola type

Monophyllaea horsfieldii R.Br. (Pyrolaceae)
(see Serebriakov 1952)

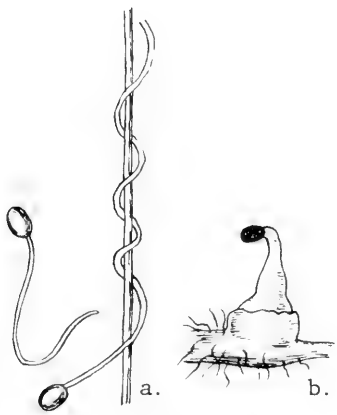


Fig. 17. Orobanche type

a. Cuscuta chinensis Lam. (Cuscutaceae)
b. Orobanche minor Sutton (Orobanchaceae)
(after Caspody 1968)

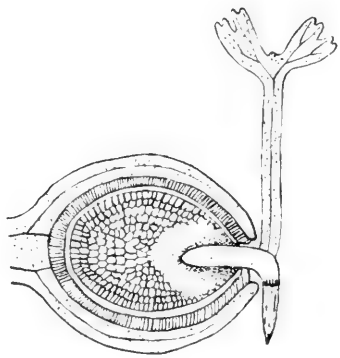


Fig. 18. The seedling of a pteridosperm

(after Chamberlain 1935)

Ginkgoaceae, and that in the Magnoliopsida, the hypogeal condition was more predominant among the polypetalous angiosperms than the more advanced gamopetalous members. Grushvitski (1963) felt that of the two major hypogeal conditions, the cotyleon type with an absorptive function was more primitive than that with a storage function. Compton (1912) and Takhtajan (1948) argued that the epigeal condition is more primitive because in those families of flowering plants with both seedling conditions, epigeal seedlings are found in the less advanced members while hypogeal seedlings are found in the more advanced members of the same family. Hill and De Fraine (1913) and Grushvitski argued that the epigeal condition was more primitive because the epidermis of the cotyledons of the hypogeal type (which are located underground) have stomata, and therefore must have evolved from a cotyledon type that had stomata. In short, the exposed epigeal condition gave rise to the hidden hypogeal type.

In part, the problem of which is the most primitive type is clouded by the superficial division of all seedlings into two type. Such a classification is based on an outward phenomenon -- whether during germination the cotyledons are above or below the soil -- and fails to scrutinize other critical morphological and physiological features of the seedling. The attempts to divide seedlings into finer classificatory groupings, such as proposed here, should permit a more exact resolution of the problems relating to the origin and evolution of the seedling.

It is generally agreed that the most primitive of the extant flowering plants are those belonging to the Magnoliidae (Cronquist 1981; Dahlgren et al. 1981; Takhtajan 1980; Thorne 1981, 1983). Not all concur which order of the extant Magnoliidae should be considered the less specialized. Cronquist defines the Magnoliales to include the Annonales, and begins his system with the Winteraceae. Dahlgren in his most recent work begins with Annonaceae (Annonales) and places the Magnoliales after it, the Aristolochiales and the Rafflesiales. Takhtajan essentially concures with Cronquist, while Thorne (1983) agrees with Cronquist and Takhtajan that Winteraceae is the premiere family.

Among the Magnolales as defined by Cronquist, there are three seedling types: the Polyalthia, Mezzettiopsis and Magnolia types. Winteraceae has the Magnolia type (Lubbock 1892), as does Magnoliaceae itself, and it is found, with the other two types, in the Annonaceae. So far as known, only the Polyalthia type is found in the Myristicaceae.

Turning to the gymnosperms, only two of these three types are found: Polyalthia and Magnolia. Cycadales and Ginkgoaceae only have the Polyalthia type. Among the Pinales, Keteleeria and some Araucaria have the Polyalthia type; otherwise, the Magnolia type of seedling predominates. Ephedraceae has the Magnolia type, but Gnetaceae and Welwitschiaceae (all members of the Gnetopsida) have a specialized seedling type which cannot be compared with those found among the Magnoliopsida.

The Cycadopsida and Ginkgopsida are considered to be more primitive than the Pinopsida, with all three not having "a common ancestor short of the

Archaeopteridales" (Cronquist 1971, p. 419). On the basis of this finding, it would seem the Polyalthia type of seedling would be somewhat more primitive than the more widespread and common Magnolia type.

The origin of angiospermous plants has long been considered a mystery. The majority of most modern botanists consider that the Magnoliophyta originated from the extinct seed ferns (e.g., see Cronquist 1968, 1981), the Pteridiospermopsida of the Pinophyta. Unfortunately, no pteridosperm fossil embryos or seedlings have been found, and in fact, Taylor (1981) reports seedlings only for fossil members of Araucariaceae (it is the Polyalthia type of seedling!). This is not surprising for like Cycas and Ginkgo of today, the seeds of pteridosperms likely matured and were dropped from the parent plant before the embryo developed. It was only after ripening that the embryo of such plants probably developed.

It is likely that the embryo of the pteridosperms was somewhat similar to that found in Cycas, that is, it had two cotyledons, and a plumule, hypocotyl and a radicle. Chamberlain (1935) proposed that the seedlings of the pteridosperms were hypogeal with the cotyledons remaining subterranean and within the seed serving as a haustorium absorbing nutrients from the endosperm. He drew a hypothetical seedling for a pteridosperm (fig. 18), and this type of seedling would fall into my Polyalthia type.

From the above evidence, the Polyalthia type of seedling must be considered the most primitive. That is, the seedling arose from an albuminous seed, with the cotyledons remaining subterranean and absoptive. Among the early Magnoliopsida, this kind of seedling is the only type found in the Myristicaceae, and occurs with two other seedling types in the Annonaceae. The Myristicaceae are not the most primitive type of angiosperm as the plants are dioecious and this is a specialization. Although Dahlgren and his fellow workers (1981) argue that Annonaceae is the most primitive family, I believe the most ancient surviving angiosperm is the Winteraceae which has a Magnolia type of seedling.

How does one explain this? In evolutionary processes, the speed of each stage in the development of morphological features of the plant body is not necessarily in concert. Thus, in some families with more specialized (or advanced) flowers (features which tend to be emphasized in systems of angiosperm classification), other less obvious features (such as anatomical characteristics) may not be so specialized. Thus one can find families of flowering plants with a combination of advanced and primitive features. The same should be true to seedling types as well.

The most ancient angiosperm was likely a small tree or shrub (Stebbins 1965; Doyle & Hickey 1976), with a xylem system consisting only of tracheids, and a flowering structure composed of many parts (Cronquist 1968). The seeds were probably fairly large and albuminous (Takhtajan 1964), and the resulting seedling was of the Polyalthia type.

Although I have affirmed that the Polyalthia type of seedling is the most ancient, how can the existence of stomata on the cotyledons of hypogeal seedlings, and those of

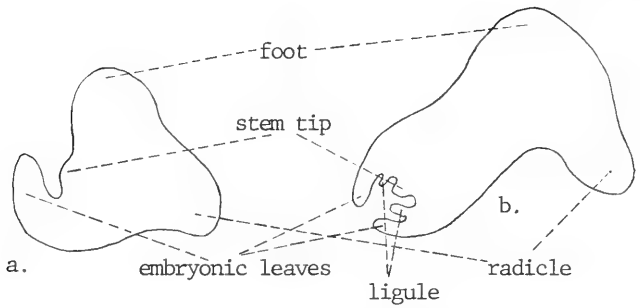


Fig. 19. The embryo structure of the fern. (a.) Pteridium aquilinum (b.) Selaginella martensii. Both figures simplified; see Smith 1955.

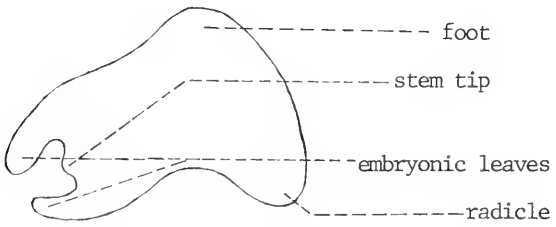


Fig. 20. The hypothetical structure of a progymnosperm embryo.

Cycas and Ginkgo be explained? This condition must be traced back to a fern group known as the progymnosperms or Archaeopteropsida of Polypodiophyta. It is likely that the seed ferns evolved from the progymnosperms, and therefore the embryo of both taxa were not only different (as obvious by the fact one formed seeds and the other did not), but that they were related as well (if one evolved from the other). The embryo of the true fern may be generally divided into a stem tip, an embryonic leaf, a radicle and a foot (fig. 19a). I believe the embryo of the progymnosperm (fig. 20) was not like that of the true ferns, however, but rather more like Selaginella (fig. 19b) where one also finds a stem tip, a radicle and a foot as before, but now two embryonic leaves. While I do not suggest that the progymnosperms evolved from the Lycopodiophyta, the similarities are striking. The stem tips develops into the shoot; the radicle develops into a primary root; the foot is a haustorium which absorbs nutrients from the female gametophyte; and, the embryonic leaves develop into seedling leaves (which are in the position of cotyledons) which have stomata. I postulate that the

embryo of the seed fern lacked a foot, that the plumule of the seed fern corresponded to the stem tip of the progymnosperm, that the radicles corresponded in each taxon, and that the cotyledons of the seed ferns correspond to the first two embryonic leaves of the progymnosperms.

I am the first to admit that the morphological shifts represented by the evolution of the seed habit was a qualitative leap, and certainly the embryonic changes from the progymnosperms to the seed ferns must have been a qualitative leap as well. This was manifested in the loss of the foot, and in the embryonic leaves remaining in the female gametophyte where they served as an haustorium to replace the function of the foot. We can use the neoteny hypothesis to explain this process (see Takhtajan 1976). When the embryo of the progymnosperm evolved into the embryo of the seed fern, the foot of the former disappeared in the developmental process of the embryo. The two embryonic leaves at the early period of the differentiation matured quickly so that they did not have to enlarge further, and thus (1) did not have to grow above the soil level, and (2) were not required to assume a photosynthetic function. In short, the seed leaves later period of development was arrested, and their function changed from a photosynthetic one to an absorptive one. Thus, the photosynthetic first leaves of epigeal progymnosperm seedlings were changed, via neoteny, into the haustorial cotyledons of hypogeal seed ferns. Evolutionarily, the stomata of the cotyledons that have remained in hypogeal seedlings likely have done so because they have been neither selected for or against (Grant 1971).

EVOLUTIONARY RELATIONSHIPS AMONG DICOTYLEDONOUS SEEDLING TYPES

There are four basic types of dicotyledonous seedlings, namely Polyalthia, Magnolia, Chimonanthus and Cinnamomum. Within the primitive families of the Magnoliopsida, all four types are found. In fact, three of the four types occur in the Magnoliales and nine of the 17 types recognized in this paper are found in the Magnoliidae as defined by Cronquist (1981). As can be seen, even the most primitive angiosperms displayed a wide array of seedling plasticity.

Like the evolution of the dicotyledonous subclasses, the evolution of the seedlings found in the Magnoliidae produced an array to dead ends, with only a single successful line of development continuing into the Asteridae (fig. 21). It was the Magnolia type that gave rise to a series of addition basic groups, notably the Chimonanthus type which can be separated into four groups each of which is associated with a major dicotyledonous subclasses, notably an expression herein called the Hamamelis group (Hamamelididae), a Thea group (Dilleniidae), a Rosa group (Rosidae), and finally a Aster group (Asteridae). A small number of additional types evolved as more specialized seedling expressions (Sophora, Garcinia and Ternstroemia). All of these came from various groups of the Chimonanthus type.

The loss of endosperm allowed the Magnolia type to evolve into the Chimonanthus type. It was through a series of minor modifications, all within the Chimonanthus theme, that the Chimonanthus type gave rise repeatedly to the Cinnamomum type. These are not technically

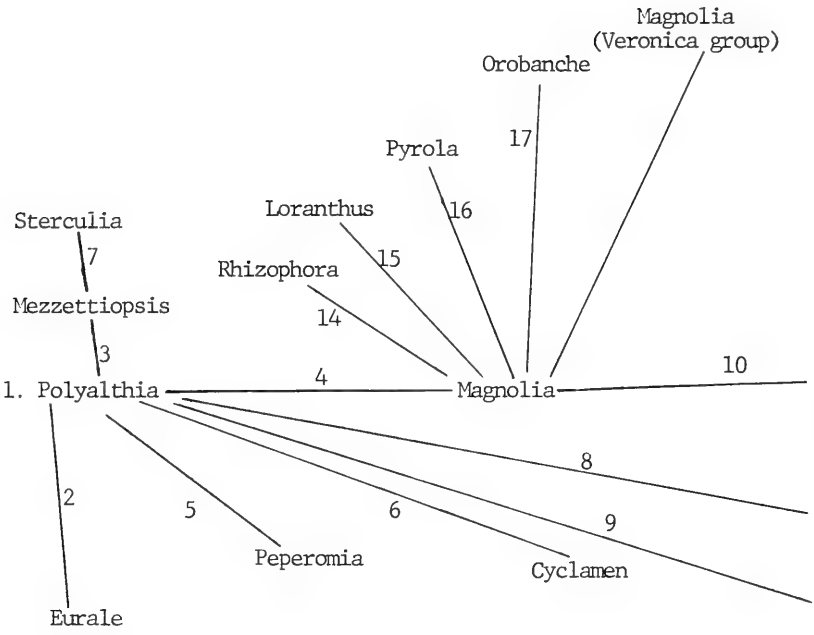
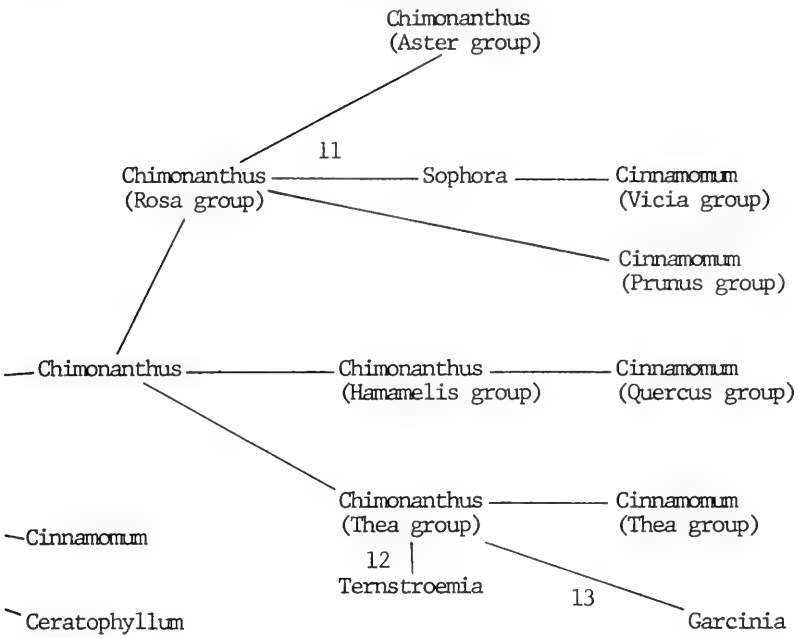


Fig. 21. Evolutionary Relationship of Magnoliopsida Seedling Types. -- From the original Polyalthia type evolved a number of specialized lines of seedling development. Only the Magnolia type evolved further. Line 2 is an aquatic form of the Polyalthia type, evolving into the Eurale type as a result of the abortion of the hypocotyl and radicle. In line 3, the Mezzettiopsis type, the hypocotyl of the Polyalthia type elongates and extends the cotyledons, endosperm and testa to a point above the soil level. From this type, line 7 to the Sterculia type, evolved with the cotyledons and its surrounding endosperm withdrawing from the testa, but with the endosperm adhering to the lower surface of the cotyledons. Line 5 to the Peperomia type evolved as a specialized line from the Polyalthia type in which one cotyledon extends above the soil level and is photosynthetic, while the other remains in the testa. In line 6, to the Cyclamen type, the hypocoty become swollen and forms a tuber, with poorly developed or aborted cotyledons. The resulting seedling has but a single leaf. In lines 8 and 9, the endosperm is lost. Line 8 consists of plants with massive cotyledons which have a storage function (Cinnamomum type), while in line 9 (Ceratophyllum type) the hypocotyl and radicle are aborted. Line 4 to the Magnolia type is representative of seedlings in which the hypocotyl elongates from the endospermous seed, and the cotyledons become photosynthetic. As with the Polyalthia type, a



number of specialized lines evolved from the Magnolia type. Those plants with viviparous seedlings formed line 14, the Rhizophora type. In line 15, the Loranthus type, the radicle end of the seedling forms a haustorium. In line 16, the Pyrola line, the plumule aborts and the adventitious buds form the seedling shoot. A truly parasitic line (line 17) leds to the Orobanche type. Here the seedling becomes simple and the end of the radicle forms an haustorium. The final expression of the Magnolia type is its Veronica group in which small seeds with little endosperm occur. Line 10, the Chimonanthus line, evolved from the Magnolia type and may be recognized by the absence of endosperm. From various expressions within the epigeal Chimonanthus type, herein called the Rosa, Hamamelis and Thea groups, specialized seedling types developed involving a change to a hypogeal condition with the cotyledons becoming massive and assuming a storage function. This resulted in the formation of a series of isolated groups all of the Cinnamomum type. The Sophora type, line 11, differs from the Chimanthus type only the somewhat swollen cotyledons. The Ternstroemia type (line 12) is a line of epigeal seedlings with aborted cotyledons and a swollen hypocotyl. The Garcinia type, line 13, is a line of hypogeal seedlings with aborted cotyledons and a massive hypocotyl. The ultimate line in the exalbuminous seedlings is the Aster group of the Chimoanthus type which has small seeds.

the same as the Cinnamomum type as strictly defined, but cannot otherwise be distinguished.

In addition to the Chimonanthus type, a series of specialized types also evolved from the Magnolia type, all albuminous expressions. The Magnolia type is widespread in the dicotyledonous plants, and this line of evolutionary development gave rise to a series of specialized, hemiparasitic and parasitic seedling expressions. The final expression of the Magnolia type is the Veronica group (fig. 21). The development of the Aster and Veronica groups relate to the reduction in seed size as the Magnoliopsida evolved. In the Veronica group, a small amount of endosperm persists, whereas in the Aster group, all vestiges of the endosperm is gone. Still, in the Veronica group, it is necessary for photosynthesis to occur quickly after the cotyledons emerge from the ground, or they shall cease to function.

Each specialized type is concerned with a definite ecological condition; e.g., the Rhizophora type grows in tropical mangroves and is viviparious; the Ceratophyllum type has an aborted radicle and hypocotyl with the resulting plants free-floating; and the wholly or partially parasitic plants have a series of unique types of seedling development. As would be expected, such ecologically specialized seedlings are widely scattered throughout the various subclasses of the dicotyledons.

APPENDIX

TABLE I. **Comparison of Ye and Vogel Seedling Classification**

Ye		Vogel	Vogel		Ye
1	Polyalthia	6a, 7a	1	Macaranga	4, 10
2	Eurale	--	2a	Sloanea	4, 11
3	Mezzettiopsis	7b, 8, 10	2b	Palagium	8
4	Magnolia	1, 2a	3	Sterculia	7
5	Peperomia	11c	4	Ternstromia	12
6	Cyclamen	5	5	Cyclamen	6
7	Sterculia	3	6a	Heliciopsis	1, 8
8	Cinnamomum	2b, 6a, 6b, 7a, 7b, 8, 11b, 12	6b	Koordersiodendron	8
			7a	Horsfieldia	1, 8
			7b	Pseudavaria	3, 8
9a	Ceratophyllum	--	8	Blumeodendron	3, 8
9b	Nelumbo	--	9	Rhizophora	14a
10	Chimonanthus	1	10	Coscinium	3
11	Sophora	2a, 11a	11a	Eudertia	11
12	Ternstromia	4	11b	Chisocheton	8
13	Garcinia	13, 14	11c	Streblus	5
14a	Rhizophora	9	12	Cynometra	8
14b	Sechium	--	13	Barringtonia	13
15	Loranthus	--	14	Garcinia	13
16	Pyrola	--	15	Hodgsonia	--
17	Orobanche	16	16	Orobanche	17

KEY TO THE SEEDLING TYPES

A. Seedling not viviparous or forming an haustorial tip; seedling free-living.
  B. Cotyledons and plumule present and well developed.
    C. Terrestrial plants with the radicle developing into a sturdy taproot.
      D. Germination cryptocotylar, the cotyledons never withdrawing from the testa.
        E. Seeds albuminous; embryo small; cotyledons thin, with an absorptive function.
          F. Hypocotyle not elongating.....1. Polyalthia
          FF. Hypocotyle elongating..... 3. Mezzettiopsis
        EE. Seeds exalbuminous; embryo large; cotyledons massive, with a foodstorage function..... ..... 8. Cinnamomum
      DD. Germination phanerocotylar, with one or more cotyledons withdrawing from the testa.
        E. Seeds albuminous.
          F. Two cotyledons withdrawing from the testa.
            G. Cotyledons not adhering to the endosperm, thin and photosynthetic on both surfaces..... 4. Magnolia
            GG. Cotyledons adhering to the endosperm when withdrawn from the testa, photo-synthetic above, absorptive below..... 7. Sterculia
          FF. One cotyledon withdrawing from the testa, the other remain within..... ..... 5. Peperomia
        EE. Seeds exalbuminous.
          F. Cotyledons thin and leaf-like, only with a photosynthetic function..... ..... 10. Chimonanthus
          FF. Cotyledons somewhat thick and fleshy, with foodstorage and some photosynthetic functions..... 11. Sophora
    CC. Aquatic plants with the radicle and hypocotyl aborted and never emerging from the seed.
      D. Seeds albuminous; cotyledons with an absorptive function..... 2. Eurale
      DD. Seeds exalbuminous; cotyledons with a food storage or photosynthetic function.
        E. Cotyledons with a photosynthetic function, thin and green..... 9a. Ceratophyllum
        EE. Cotyledons with a food storage function, massive and yellowish.....9b. Nelumbo
  BB. Cotyledons or plumule reduced or absent; seedling with only a single leaf, or if more, then the cotyledons reduced or absent and the hypocotyl swollen.
    C. Plumule not aborted.
      D. Seedling with a single leaf..... 6. Cyclamen
      DD. Seedlings with more than a single leaf; cotyledons reduced or absent; hypocotyl swollen.
        E. Seedling free from both the testa and the fruit wall..... 12. Ternstroemia
        EE. Seedling not free from the testa and/or the fruit wall which remains persistent around

the swollen hypocotyl..... 13. Garcinia
CC. Plumule aborted; cotyledons sometimes reduced.....
..... 16. Pyrola
AA. Seedlings viviparous or forming an haustorium.
B. Seedlings viviparous.
C. Hypocotyl fusiform..... 14a. Rhizophora
CC. Hypocotyl not fusiform..... 14b. Sechium
BB. Seedlings forming an haustorium.
C. Seedlings green..... 15. Loranthus
CC. Seedlings non-photosynthetic..... 17. Orobanche

The following appendix attempts to summarise the known seedling types (according to the system presented in this paper) for the Magnoliopsida. The families not represented indicate families of flowering plants which remain to have their seedling examined. I would appreciate reprints of papers dealing with families which have been examined but for which I have not seen the published reports. The system of classification here is that proposed by Cronquist (1981). I have not attempted to bring his system up to date (see Cronquist 1983).

I. Magnoliidae
1. Magnoliales
1. Winteraceae - 4
2. Degeneriaceae - 4
3. Himantandraceae
4. Eupomatiaceae
5. Austrobaileyaceae
6. Magnoliaceae - 4
7. Lactoridaceae
8. Annonaceae - 1, 3, 4
9. Myristicaceae - 1
10. Canellaceae
2. Laurales
11. Amborellaceae
12. Trimeniaceae
13. Monimiaceae - 4
14. Gomortegaceae
15. Calycanthaceae - 10
16. Idiospermaceae
17. Lauraceae - 8
18. Hernandiaceae - 8
3. Piperales
19. Chloranthaceae
20. Saururaceae
21. Piperaceae - 4, 5
4. Aristolochiales
22. Aristolochiaceae - 1, 4
5. Illiciales
23. Illiciaceae - 4
24. Schisandraceae
6. Nymphaeales
25. Nelumbonaceae - 9b
26. Nymphaeaceae - 2
27. Barclayaceae
28. Cabombaceae
29. Ceratophyllaceae - 9a
7. Ranunculales
30. Ranunculaceae - 4, 6
31. Circaeasteraceae
32. Berberidaceae - 4
33. Sargentodoxaceae
34. Lardizarabalaceae - 4
35. Menispermaceae - 3, 4
36. Coriariaceae
37. Sabiaceae - 4
8. Papaveraceae
38. Papaveraceae - 4
39. Fumariaceae - 4, 6

II. Hamamelididae
9. Trochodendrales
40. Tetracentraceae
41. Trochodendraceae
10. Hamamelidales
42. Cercidiphyllaceae
43. Eupteleaceae
44. Platanaceae - 4
45. Hamamelidaceae - 4
46. Myrothamnaceae
11. Daphniphyllales
47. Daphniphyllaceae
12. Didymelales
48. Didymelaceae
13. Eucommiales
49. Eucommiaceae - 4
14. Urticales
50. Barbeyaceae
51. Ulmaceae - 4, 10
52. Cannabaceae - 4
53. Moraceae - 4, 8, 11
54. Cecropiaceae
55. Urticaceae - 10
15. Leitneriales
56. Leitneriaceae
16. Juglandales
57. Rhoipteleaceae

58. Juglandaceae - 8, 10
17. Myricales
59. Myricaceae - 10
18. Fagales
60. Balanopaceae
61. Fagaceae - 8, 10
62. Betulaceae - 8, 10
19. Casuarinales
63. Casuarinaceae - 10

III. Caryophyllidae
20. Caryophyllales
64. Phytolaccaceae - 4
65. Achatocarpaceae
66. Nyctaginaceae - 4
67. Aizoaceae - 4
68. Didiereaceae
69. Cactaceae - 4
70. Chenopodiaceae - 4
71. Amaranthaceae - 4
72. Portulacaceae - 4
73. Basellaceae - 4
74. Molluginaceae - 4
75. Caryophyllaceae - 4
21. Polygonales
76. Polygonaceae - 4
22. Plumbaginales
77. Plumbaginaceae - 4

IV. Dilleniidae
23. Dilleniales
78. Dilleniaceae - 4
79. Paeoniaceae - 1
24. Theales
80. Ochnaceae - 8, 11
81. Sphaerosepalaceae
82. Sarcolaenaceae
83. Dipterocarpaceae - 8, 11
84. Caryocaraceae
85. Theaceae - 8, 10, 12
86. Actinidiaceae - 4
87. Scytopetalaceae
88. Pentaphylacaceae
89. Tetrameristaceae
90. Pellicieraceae - 8
91. Oncothecaceae
92. Marcgraviaceae - 10
93. Quiinaceae
94. Elatinaceae - 10
95. Paracryphiaceae
96. Medusagynaceae
97. Clusiaceae - 8, 10, 13
25. Malvales
98. Elaeocarpaceae - 4
99. Tiliaceae - 4
100. Sterculiaceae - 4, 7
101. Bombacaceae - 4, 8
102. Malvaceae - 4
26. Lecythidales
103. Lecythidaceae - 8, 10, 13
27. Nepenthales
104. Sarraceniaceae
105. Nepenthaceae
106. Droseraceae - 4
28. Violales
107. Flacourtiaceae - 3, 4
108. Peridiscaceae
109. Bixaceae - 4
110. Cistaceae - 4
111. Huaceae
112. Lacistemataceae
113. Scyphostegiaceae
114. Stachyuraceae
115. Violaceae - 4
116. Tamaricaceae - 10
117. Frankeniaceae
118. Dioncophyllaceae
119. Ancistrocladaceae - 4
120. Turneraceae - 4
121. Malesherbiaceae
122. Passifloraceae - 4
123. Achariaceae
124. Caricaceae - 4
125. Fouquieriaceae
126. Hoplestigmataceae
127. Curcurbitaceae - 8, 10, 11, 14b
128. Datiscaceae
129. Begoniaceae - 10
130. Loasaceae
29. Salicales
131. Salicaceae - 10
30. Capparales
132. Tovariaceae
133. Capparaceae - 10
134. Brassicaceae - 10
135. Moringaceae - 8
136. Resedaceae - 10
31. Batales
137. Gyrostemonaceae
138. Bataceae
32. Ericales
139. Cyrillaceae
140. Clethraceae - 4
141. Grubbiaceae
142. Empetraceae - 4
143. Epacridaceae
144. Ericaceae - 4
145. Pyrolaceae - 16, 17
146. Monotropaceae
33. Diapensiales
147. Diapensiaceae
34. Ebenales
148. Sapotaceae - 4, 8, 11
149. Ebenaceae - 3, 4

150. Styraceae - 4
151. Lissocarpaceae
152. Symplocaceae - 4
35. Primulales
153. Theophrastaceae
154. Myrsinaceae - 4, 14a
155. Primulaceae - 4, 6

V. Rosidae
36. Rosales
156. Brunelliaceae
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DESCRIPTIONS OF VARIOUS SEEDLINGS OF LEGUMINOUS PLANTS

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ABSTRACT

Thirty-six species of leguminous plants (Mimosaceae, Caesalpiniaceae and Fabaceae) from Australia, Africa and the United States belonging to Acacia, Bauhinia, Cassia, Erythrina, Parkinsonia and Prosopis are illustrated and described.

The legumes, in the broad sense, belong to one of the largest of the flowering plant families. Many legumes are of economic importance as green vegetables, an important source of drugs and medicines, animal fodder, and in the tropics a source of firewood. Many leguminous species are weedy. As a result, special concern has been given to the identification of leguminous seedlings so that good forest and pasture management can be practiced in the developing countries of the world.

Seedlings are often different from the adult stage. The juvenile leaves of leguminous seedlings are often simplier than the adults. The first true leaves are often simple, while the later leaves are often compound with the number of leaflets increasing gradually until it reaches the constant number of the species.

In this paper, seeds of leguminous plants were obtained by Dr. James A. Duke of the Economic Plants Laboratory, United States Department of Agriculture, Beltsville, MD from a variety sources. The seeds were sown in the greenhouse of the Department of Botany, University of Maryland, College Park, MD. Of the 38 species of seeds obtained for this study, most germinated and produced healthy seedlings. A few became diseased and died at an early age. Two species, Acacia senegal and Prosopis tamarugo, failed to germinate.

Seedlings of six genera were

The present paper was prepared in the United States. An opportunity to visit the United States from September 1982 to September 1983 allowed me to do this work and prepare the present paper for publication. This was done at the Department of Botany, University of Maryland, College Park, MD. Dr. James A. Duke, Germplasm Resources Laboratory, U.S. Department of Agriculture, Beltsville, MD, obtained the seeds from a variety of sources and presented them to me. The seedlings were grown in the greenhouse at the University of Maryland. Dr. James L. Reveal of the University assisted me in preparing this paper for publication. This is Scientific Article A3559, Contribution No. 6634 of the Maryland Agricultural Experiment Station.

examined: Acacia and Prosopis (Mimosaceae); Bauhinia Cassia and Parkinsonia (Caesalpiniaceae); and Erythrina (Fabaceae). The species are arranged alphabetically in the following section. The illustrations are arranged accordingly and follow the same sequence.

1. Acacia acuminata Benth.

Root system with many laterals. Hypocotyl pale green, suffused with purple, glabrous, ca 20 mm long. Cotyledons foliaceous, 3x6 mm, oblong, becoming reflex when the seedling at the 3-leaf stage and deciduous at the 6-leaf stage, sessile; apex rounded; base somewhat auriculate; upper surface green; under surface pale green and suffused with purple. First leaf pinnate with 3 or 4 pairs of leaflets; petiole 4-6 mm long, pubescent, somewhat purplish. Second leaf bipinnate with one pair of pinnae; pinna with 2-4 pairs of leaflets; petiole 4-8 mm long, pubescent and somewhat purplish. Third to sixth leaves bipinnate and otherwise similar to the second leaf only with the petiole flattened and the seventh leaf reduced to a phyllode. Stipule scale-like, caducous. Leaflets 2x4 mm-2.5x6 mm, obovate-oblong; apex minutely apiculate; base obtuse, oblique; upper surface green; under surface pale green; margin pubescent. Flattened petiole 25-35 mm long, 2-3 mm wide, pubescent, somewhat purplish. Epicotyl not evident. Internode short, less than 5 mm long in the 4-leaf stage.

Fig. 1. Seedlings stages of Acacia acuminata: a) 2 days old; b) 5 days old; c) 25 days old. Source: Seedlot No. 11150. Locality: Harrogin, Western Australia. Germination time: 9 days.

2. Acacia albida Delile

Root system with some laterals; taproot yellowish with the outer layer soon eroded and brownish. Hypocotyl pale green, glabrous, 30-45 mm long. Cotyledons foliaceous, somewhat fleshy, 5x9 mm, ovate to elliptic, sessile; apex rounded; base auriculate; upper surface green; under surface pale green; nerves conspicuous. First leaf bipinnate with 1 pair of pinnae; pinna with about 7 pairs of leaflets; petiole ca 6 mm long, pubescent. Second to fifth leaves same as the first. Stipule spinous, ca 2 mm long. Leaflets oblong, ca 2x5 mm, glabrous, green; apex rounded; base rounded or obtuse, oblique. Epicotyl conspicuous in 5-leaf stage. Internodes up to 8 mm long, pubescent, green.

Fig. 2. Seedling of Acacia albida: 17 days old. Source: Seedlot No. ISRA/CNRF Senegal (821598). Locality: Senegal. Germination time: 17 days.

3. Acacia aneura F. Muell.

Root system with few laterals; taproot white with the outer layer soon eroded and brownish. Hypocotyl pale green and somewhat purplish, glabrous, 30 mm long. Cotyledons foliaceous, 3x6 mm, oblong, glabrous, sessile; apex rounded; base somewhat auriculate; upper surface green; under surface pale green. First leaf pinnate with 2 pairs of leaflets; petiole 5 mm long, glabrous, green. Second leaf bipinnate with 1 pair of pinnae; pinna with 2 or 3 pairs of leaflets. Third leaf petiole flattened or all leaves reduced to a phyllode. Fourth leaf reduced to a phyllode. Stipules scale-like, green. Leaflets 2x6 mm or 3x8 mm, oblong or obovate-oblong, green, glabrous; apex

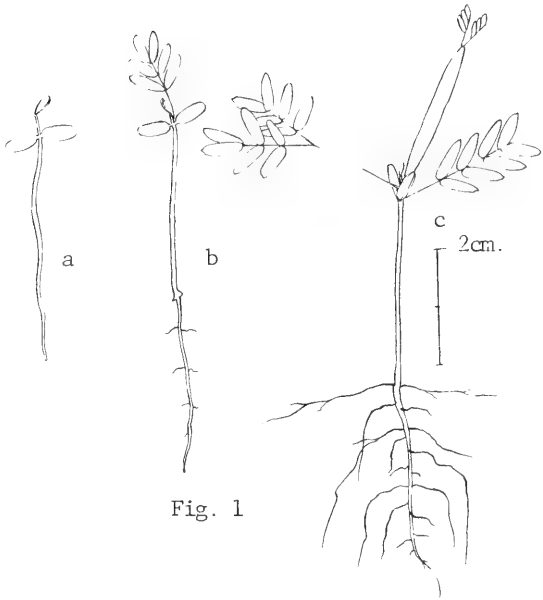


Fig. 1

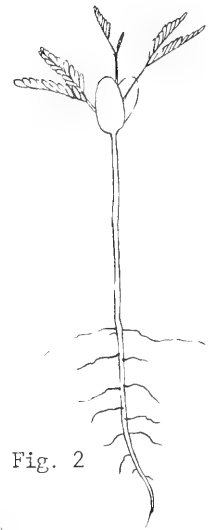


Fig. 2

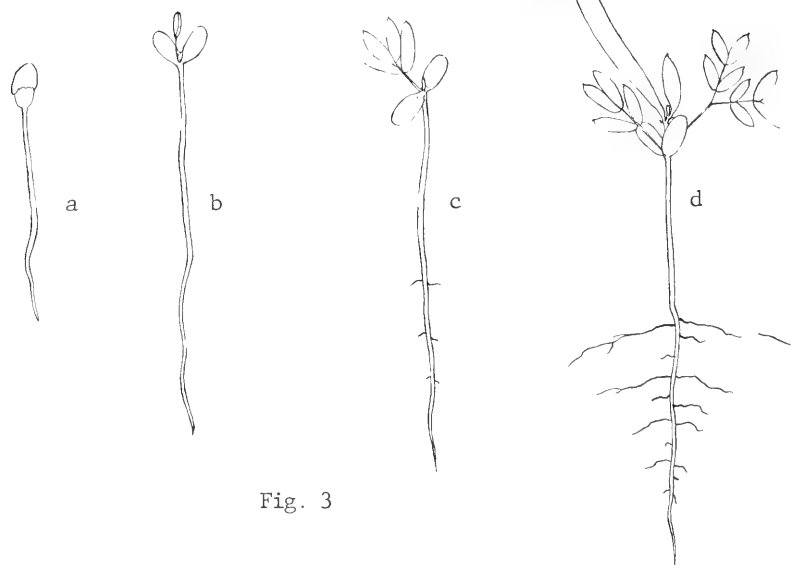


Fig. 3

minutely apiculate; base obtuse, oblique. Flattened petioles and phyllodes up to 40 mm long and 5 mm wide, somewhat curved like a sickle, tapering at both ends, green and shining, 3- or 5-nerved. Epicotyl not evident. Internodes less than 5 mm long in 5-leaf stage, pubescent.

Fig. 3. Seedlings stages of Acacia aneura: a) germinating seedling; b) 3 days old; c) 8 days old; d) 26 days old. Source: Seedlot No. 13481. Locality: 6 km east of Charleville, Queensland, Australia. Germination time: 5 days.

4. Acacia auriculiformis A. Cunn. ex Benth.

Root system with numerous laterals. Hypocotyl 30 mm long, glabrous, pale green, suffused with purple. Cotyledons foliaceous, 3x6 mm, oblong or elliptic, glabrous, sessile; apex rounded; base somewhat auriculate; upper surface green; under surface pale green and somewhat purplish, soon becoming green. First leaf pinnate with 4-6 pairs of leaflets; petiole 5 mm long, pubescent. Second leaf bipinnate with 1 pair of pinnae; pinna with 4 or 5 pairs of leaflets; petiole 10 mm long, pubescent. Third leaf same as the second one, only with a flattened petiole. Fourth leaf or more reduced to phyllodes. Stipules small, ovate, pubescent. Leaflets 3x8 mm-4x10 mm, oblong or obovate-oblong, green, glabrous; apex minutely apiculate or rounded; based rounded and oblique. Phyllodes 5x40 mm or more long, linear, tapering at both ends, green and shining, with 2 or 3 conspicuous nerves. Epicotyle not evident. Internodes up to 5 mm long in the 4-leaf stages, pubescent.

Fig. 4. Seedling stages of Acacia auariculiformis: a) germinating seedling; b) 9 days old; c) 23 days old. Source: Seedlot No. 13191. Locality: Darwin, Northern Territory, Australia. Germination time: 10 days.

5. Acacia baileyana F. Meull.

Root system with numerous laterals; taproot white. Hypocotyl purplish, glabrous, up to 25 mm long. Cotyledons foliaceous, about 3x7 mm, oblong, soon reflexed and deciduous at the 2- or 3-leaf stage; apex rounded; base somewhat auriculate; upper surface deep green; under surface green and suffused with purple. First leaf pinnate with 4 or 5 leaflets; petiole ca 5 mm long, glabrous, pointed at the top of the rachis. Second leaf bipinnate with 1 pair of pinnae; pinna with 5 pairs of leaflets; petiole ca 7 mm long, glabrous or with scattered, minute hairs. Third and fourth leaves similar to the second leaf, but the petiole becoming longer. Eighth leaf bipinnate with 4 pairs of pinnae; petiole rounded, not at all flattened. Stipules small, scale-like, purple. Leaflets oblong or obovate-oblong, up to 2x9 mm, glabrous; apex minutely apiculate; base obtuse or rounded, oblique; upper surface green; under surface pale green and somewhat purplish. Epicotyl not evident. Internodes less than 5 mm long at 5-leaf stage, pubescent.

Fig. 5. Seedlilng stages of Acacia baileyana: a) germinating seedling; b) 9 days old. Source: Seedlot No. 11664. Locality: Canberra, Australia Capital Territory. Germination time: 10 days.

6. Acacia cambagei R.T. Baker

Root system with moderate lateral; taproot white with the

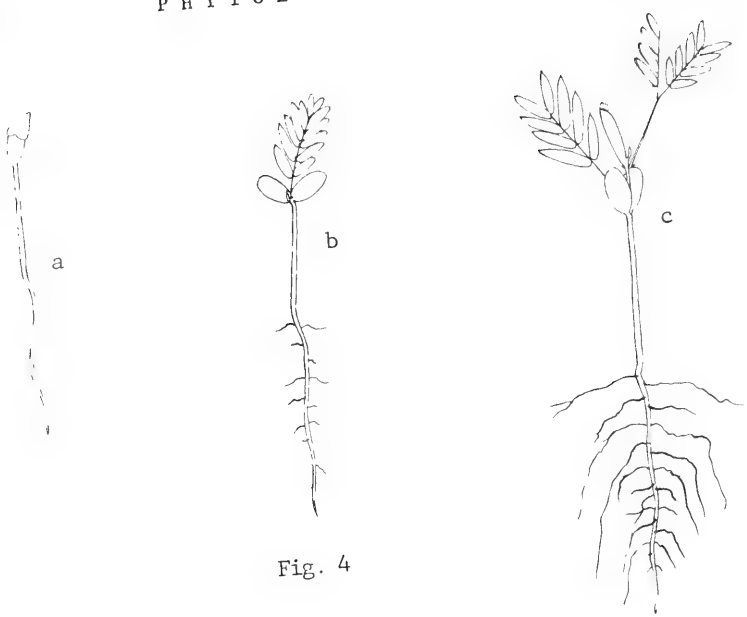


Fig. 4

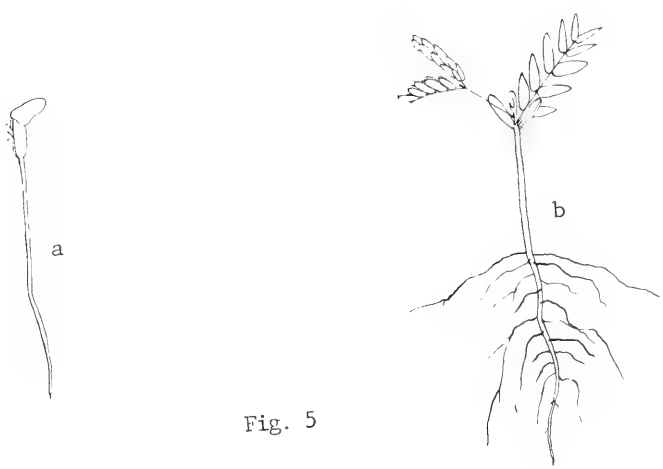


Fig. 5

outer layer eroded and becoming yellowish-brown. Hypocotyl glabrous, pale green or somewhat purplish, terete, up to 35 mm long. Cotyledons foliaceous, somewhat fleshy, ca 10x12 mm, elliptic; apex rounded; base auriculate; upper surface green; under surface pale green; nerves inconspicuous. First leaf pinnate with 4 pairs of leaflets; petiole 10 mm long, glabrous, pale green; rachis pointed at the apex. Second leaf similar to the first one and opposite it. Third leaf or more reduced to phyllodes. Stipules scale-like, caducous. Leaflets ca 3x10 mm, oblong or ovate-oblong, glabrous, green; apex minutely apiculate or rounded; base obtuse, oblique. Phyllodes ca 45 mm long and 4 mm wide, linear, attenuated at both ends, pubescent with scattered, minute, appressed hairs, green and shining, 2 or 3 nerved. Epicotyle 1 mm long. Internode less than 5 mm long at 3-leaf stage, pubescent.

Fig. 6. Seedling stages of Acacia cambagei: a) germinating seedling; b) 3 days old; c) 19 days old. Source: Seedlot No. 13487. Locality: 98 km W of Winderah, Queensland, Australia. Germination time: 5 days.

7. Acacia crassicarpa A. Cunn. ex Benth.

Root system with numerous laterals. Hypocotyl purple, glabrous, 15-20 mm long. Cotyledons foliaceous, 3x8 mm, oblong, glabrous, sessile; apex rounded; base somewhat auriculate; upper surface green; under surface purple. First leaf pinnate with 3 pairs of leaflets; petiole 5 mm long, pubescent. Second leaf bipinnate with 1 pair of pinnae; pinna with 3 or 4 pairs of leaflets; petiole 8-20 mm long, pubescent. Third leaf same as the second only the petiole flattened in some. Fifth leaf reduced to a phyllode. Stipules small, subulate. Leaflets 2x5 mm-3x7 mm, ovate-oblong, glabrous; apex acute or obtuse; base obtuse, oblique; upper surface green, under surface pale green or suffused with purple. Phyllodes 10x20 mm-15x60 mm, oblanceolate, green and shining, with an apex acute and attenuated base, 3-nerved. Epicotyl not evident. Internode up to 5 mm long at 5-leaf stage, pubescent.

Fig. 7. Seedling stages of Acacia crassicarpa: a) germinating seedling; b) 3 days old; c) 22 days old. Source: Seedlot No. 13367. Locality: 7 km from Daintree, Queensland, Australia. Germination time: 10 days.

8. Acacia dealbata Link

Root system with few laterals. Hypocotyl purple, glabrous, ca 20 mm long. Cotyledons foliaceous, 2.5x7 mm, oblong, glabrous, becoming reflexed when the first leaf unfolds and deciduous at 3-leaf stage; apex rounded; base somewhat auriculate; upper surface green; under surface purplish but becoming green. First leaf pinnate with 3 pairs of leaflets; petiole ca 5 mm long, pubescent. Second leaf bipinnate with 1 pair of pinnae; pinna with 4 pairs of leaflets; petiole ca 10 mm long, pubescent. Third leaf similar to second one; petiole flattened until the 10-leaf stage. Stipules small, scale-like, brown. Leaflets 2-6 mm-3x10 mm, oblong, glabrous; apex minutely apiculate or obtuse; based obtuse, oblique; upper surface green; under surface pale green and suffused with purple. Epicotyl not evident. Internodes up to 6 mm long or more at the 3-leaf stage, pubescent.

Fig. 6

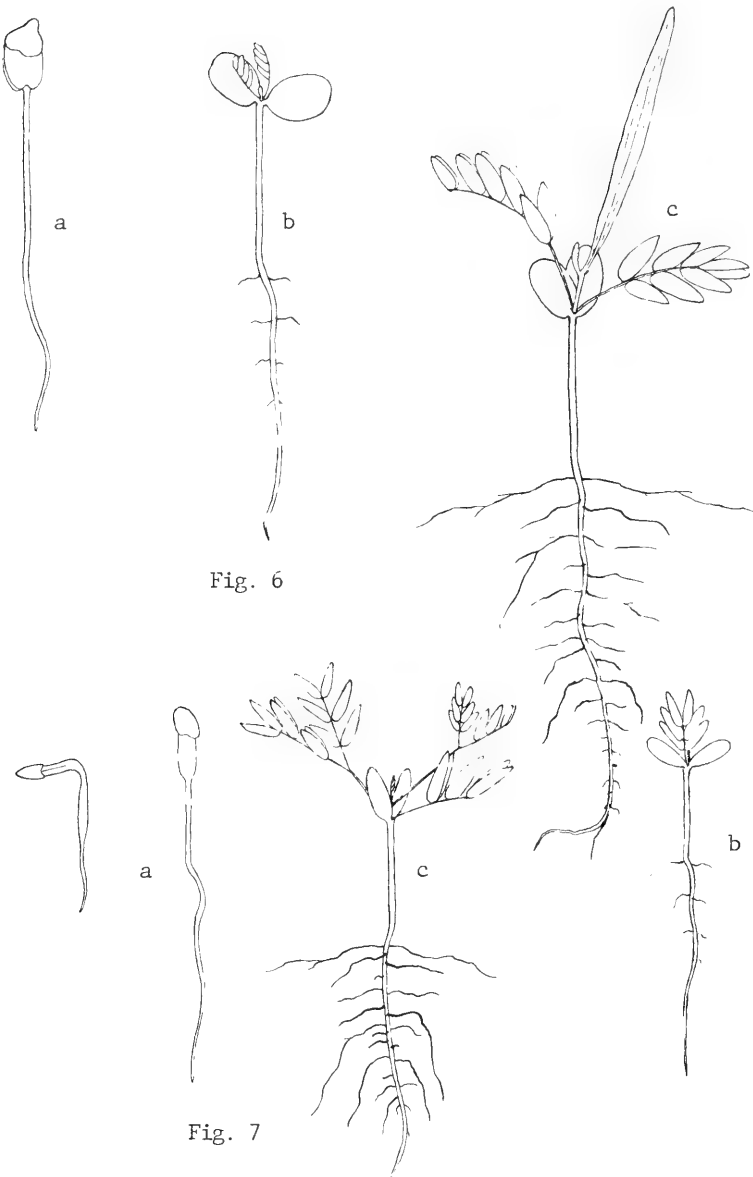


Fig. 7

Fig. 8. Seedling stages of Acacia dealbata: a) germinating seedling; b) 4 days old; c) 17 days old. Source: Seedlot No. 8874. Locality: Lake George, New South Wales, Australia. Germination time: 14 days.

9. Acacia elata A. Cunn. ex Benth.

Root system with numerous laterals; taproot white. Hypocotyl purple, glabrous, 15-20 mm long. Cotyledons foliaceous, 4x7 mm, oblong, glabrous, reflex and deciduous at the 3-leaf stage; apex rounded; base somewhat auriculate; upper surface purplish-green; under surface purple. First leaf pinnate with 4 or 5 pairs of leaflets; petiole about 5 mm long, purple, pubescent. Second leaf bipinnate with 1 pair of pinnae; pinna with 4 or 5 leaflets; petiole up to 20 mm long, purple, pubescent. Third leaf same as the second. Seventh to nineth leaves bipinnate with 2 pairs of pinnae; petiole rounded, not flattened. Stipules small, subulate, brown. Leaflets 3x5 mm-4.5-10 mm, oblong, glabrous; apex minutely apiculate; base rounded, oblique; upper surface purplish-green, becoming green when dry; under surface purple. Epicotyl not evident. Internode up to 7 mm long at 4-leaf stage, purple, pubescent.

Fig. 9. Seedling stages of Acacia elata: a) germinating seedling; b) 4 days old; c) 16 days old. Source: Seedlot No. 9972. Locality: Balmoral, New South Wales, Australia. Germination time: 15 days.

10. Acacia excelsa Benth.

Root system with few laterals; taproot with the outer layer soon eroded and brownish. Hypocotyl glabrous, somewhat purplish, ca 30 mm long. Cotyledons foliaceous, 3x7 mm, oblong, green but becoming yellowish at 3-leaf stage, sessile; apex rounded; base somewhat auriculate. First leaf pinnate with 2 pairs of leaflets; petiole slender, 4 mm long, glabrous, pale green. Second leaf bipinnate with 1 pair of pinnae; pinna with 2 pairs of leaflets. Third leaf (and subsequent leaves) reduced to phyllodes, occasionally with a few leaflets on the top of the third phyllode at the 3-leaf stage. Stipules small, ovate-oblong, pale green. Leaflets 2.5x5 mm-3.5x10 mm, oblong or obovate-oblong, green, glabrous; apex minutely apiculate; base obtuse, oblique. Phyllodes 4x20 mm-4x25 mm, oblanceolate, green and shining, with an apiculate apex and an attenuated base, 3-nerved. Epicotyl not evident. Internode less than 5 mm long at 5-leaf stage, purple, glabrous.

Fig. 10. Seedling stages of Acacia excelsa: a) germinating seedling; b) 3 days old; c) 10 days old. Source: Seedlot No. 13270. Locality: 40 km south of Charleville, Queensland, Australia. Germination time: 14 days.

11. Acacia farnesiana Willd.

Root system with numerous laterals; taproot yellowish. Hypocotyl pale green, glabrous, 20-30 mm long. Cotyledons foliaceous, somewhat fleshy, 8x14 mm, elliptic, glabrous; apex rounded; base auriculate; upper surface green; under surface green; petiole 2 mm long. First leaf pinnate with 6 pairs of leaflets; petiole 8 mm long, glabrous, green. Second leaf same as the first one only the leaflets larger and the petiole longer. Third leaf bipinnate with 1 or 2 pinnae; pinna with 5 or 6 pairs of leaflets; petiole 10 mm long. Forth and

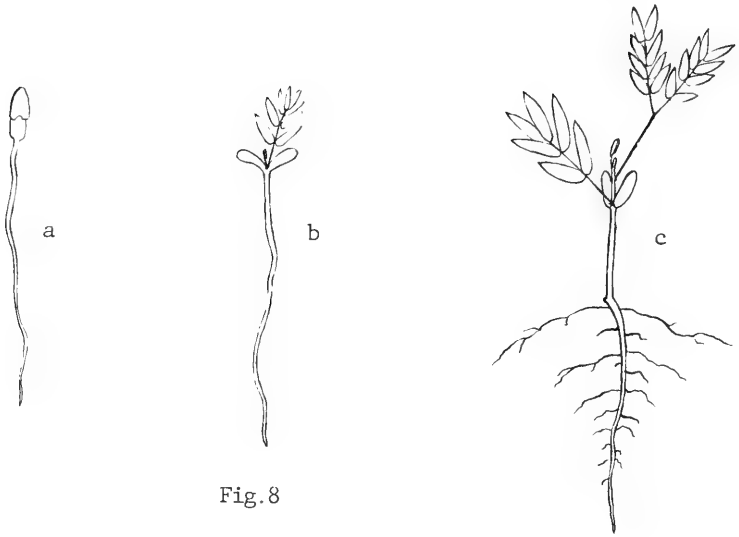


Fig.8

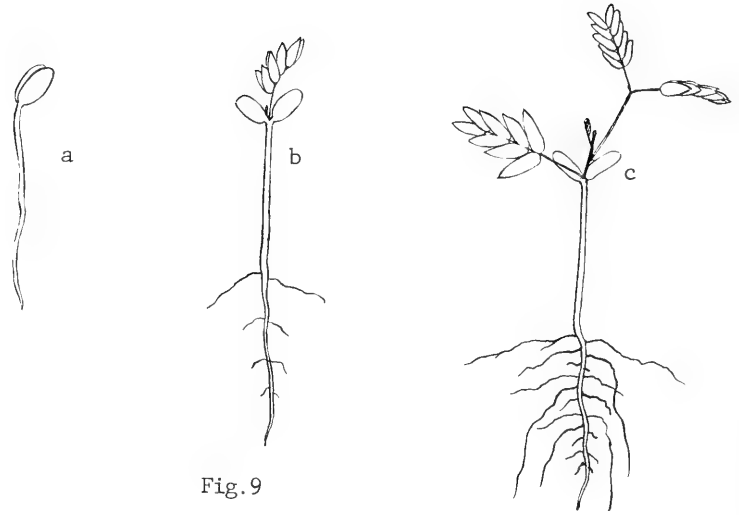


Fig.9

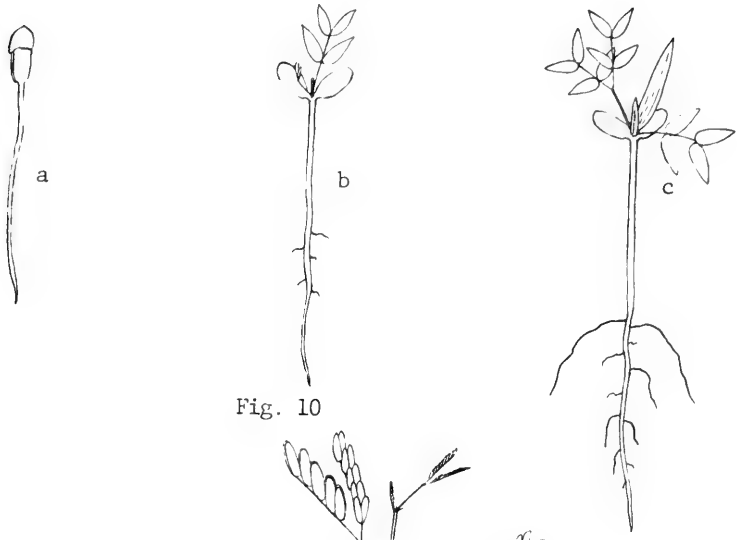


Fig. 10

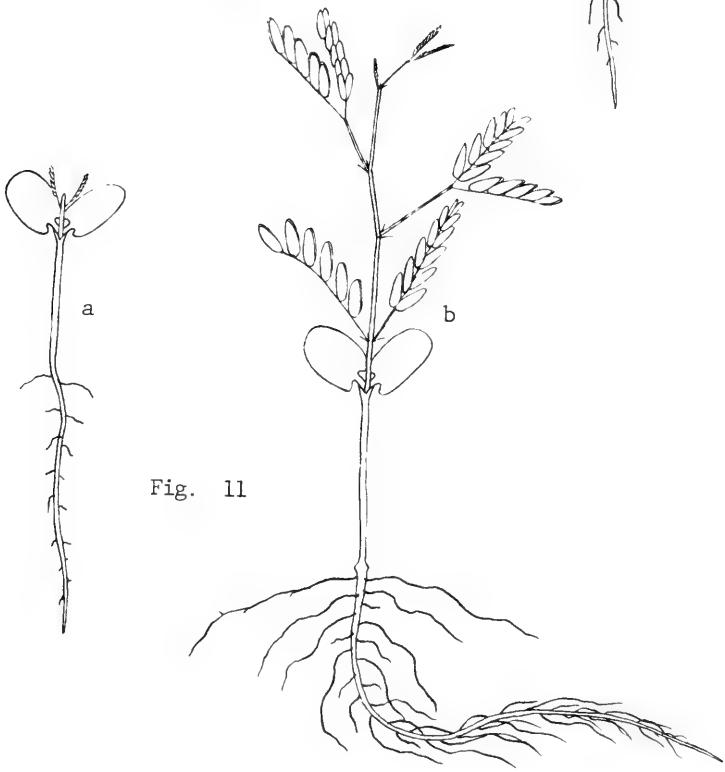


Fig. 11

fifth leaves similar to the third leaf. Stipules becoming spinous, stiffened, 5 mm long, ascending, purple. Leaflets 2x4 mm or 1.5x6 mm, elliptic or oblong, green, glabrous; apex rounded or obtuse; base rounded or obtuse, oblique; upper surface green; under surface pale green. Epicotyl 8 mm long. First internode ca 18 mm long at the 6-leaf stage, purplish-green, glabrous.

Fig. 11. Seedling stages of Acacia farnesiana: a) 3 days old; b) 14 days old. Source: CSIRO 11457. Locality: Australia. Germination time: 8 days.

12. Acacia holosericea A. Cunn. ex G. Don

Root system with many laterals; taproot white with the outer layer soon eroded. Hypocotyl glabrous, pale green and somewhat purplish, up to 35 mm long, terete. Cotyledons foliaceous, 2.5x7 mm, oblong, glabrous, sessile, soon reflexed and deciduous at the 3-leaf stage; apex rounded; base somewhat auriculate; upper leaf surface green; under surface pale green and somewhat purplish. First leaf pinnate with 2 pairs of leaflets; petiole ca 4 mm long, pale green. Second leaf bipinnate with 1 pair of pinnae; pinna with 4 pairs of leaflets; petiole ca 5 mm long, pubescent. Third and fourth leaves similar to the second one. Fifth to ninth leaf with flattened petioles. Tenth leaf reduced to a phyllode. Stipules small, scale-like, pale green. Leaflets ca 2x8 mm, oblong, obovate-oblong or obovate, green, glabrous; apex minutely apiculate; base obtuse, oblique; petiole flattened. Phyllodes linear or lanceolate, attenuated at both ends, green and shining, pubescent, 3- or 4-nerved. Epicotyl not evident. Internodes less than 5 mm long at 5-leaf stage, pubescent.

Fig. 12. Seedling stages of Acacia holosericea: a) 4 days old; b) 20 days old. Source: Seedlot No. 11502. Locality: Sandfire Roadhouse, Great/N. Hwy., Western Australia. Germination time: 10 days.

13. Acacia implexa Benth.

Root system with abundant laterals; taproot white. Hypocotyl glabrous, pale purple, up to 40 mm long, terete. Cotyledons foliaceous, 2.5x10 mm, oblong, soon reflexed and deciduous by 3- or 4-leaf stage; apex rounded; base weakly auriculate; upper surface green; under surface pale green or somewhat purplish. First leaf pinnate with 6 or 7 pairs of leaflets; petiole ca 8 mm long, glabrous, pale green; rachis ca 25 mm long, subulate at the apex. Second leaf bipinnate with 1 pair of pinnae; pinna with 6 pairs of leaflets; petiole ca 10 mm long, glabrous. Third through fifth leaves similar to the second one, only the petiole gradually elongating. Sixth leaf with a flattened petiole. Seventh leaf becoming a phyllode. Stipules subulate, ca 1.5 mm long. Leaflets up to 2.5x8 mm, oblong to oblong-obovate, glabrous; apex rounded or minutely apiculate; base obtuse, oblique; upper surface green; under surface pale green or somewhat purplish. Epicotyl not evident. Internodes less than 5 mm long at the 4-leaf stage, glabrous.

Fig. 13. Seedling stages of Acacia implexa: a) 3 days old; b) 15 days old. Source: Seedlot No. 9738. Locality: Spicers Creek, New South Wales, Australia. Germination time: 10 days.

14. Acacia mangium Willd.

Root system with numerous

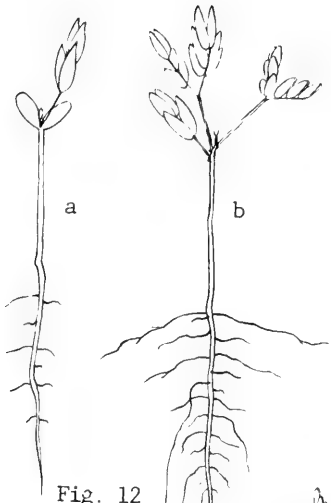


Fig. 12

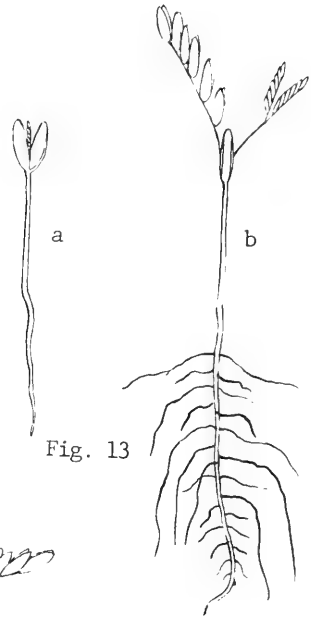


Fig. 13

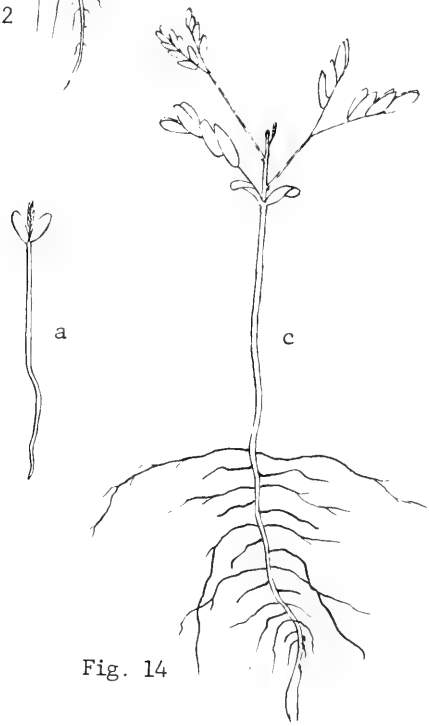


Fig. 14

delicate laterals. Hypocotyl glabrous, pale green and somewhat purplish, up to 30 mm long. Cotyledons foliaceous, ca 2.5x7 mm, oblong, glabrous; apex rounded; base weakly auriculate; upper surface green; under surface pale green and somewhat purplish. First leaf pinnate with 3-5 pairs of leaflets; petiole ca 5 mm long, pale green, pubescent; rachis ca 10 mm long. Second leaf bipinnate with 1 pair of pinnae; pinna with 3 or 4 pairs of leaflets; petiole ca 10 mm long. Third and fourth leaves similar to the second one but each pinna with more than 5 pairs of leaflets and the petiole longer. Stipules small, scale-like, pale green, pubescent. Leaflets up to 2.5x7 mm, oblong; apex minutely apiculate; base oblique; upper surface green; under surface pale green and somewhat purplish; margin pubescent. Epicotyl not evident. Internodes less than 5 mm long at the 4-leaf stage, pubescent.

Fig. 14. Seedling stages of Acacia mangium: a) 3 days old; b) 9 days old; c) 31 days old. Source: Seedlot No. 13534. Locality: Cassowary Range, Queensland, Australia. Germination time: 11 days.

15. Acacia melanoxylon R. Br.

Root system with numerous laterals. Hypocotyl glabrous, purple, ca 15 mm long. Cotyledons foliaceous, ca 2.5-7 mm long, oblong, glabrous; apex rounded; base minutely auriculate; upper surface green; under surface pale green and somewhat purplish. First leaf pinnate with 4-6 pairs of leaflets; petiole 5 mm long, pubescent; rachis ca 8 mm long. Second leaf bipinnate with 1 pair of pinnae; pinna with ca 5 pairs of leaflets; petiole ca 10 mm long, pubescent. Third through sixth leaves similar to the second one only each pinna with more than 5 pairs of leaflets and the petiole becoming longer; fifth leaf with 10 pairs of leaflets and a petiole up to 14 mm long. Stipules small, 2 mm long, pubescent. Leaflets up to 2.5x8 mm, oblong, glabrous; apex rounded to minutely apiculate; base obtuse, oblique; upper surface green; under surface green or somewhat purplish. Epicotyl 2 mm long, pubescent. Internodes 10-18 mm long, pale green or somewhat purplish, pubescent.

Fig. 15. Seedling stages of Acacia melanoxylon: a) 1 day old; 2) 12 days old; c) 30 days old. Source: Seedlot No. 13157. Locality: Smithton, Tasmania. Germination time: 12 days.

16. Acacia nilotica L. var. adansonii

Root system with scattered laterals; taproot pale with the outer layer soon eroded and brownish. Hypocotyl pale green, glabrous, up to 25 mm long and more than 5 mm thick, swollen at its base. Cotyledons foliaceous, somewhat fleshy, ca 10x13 mm, ovate, pale green, glabrous; apex rounded; base auriculate; petiole 2 mm long, glabrous. First leaf pinnate with 8-10 pairs of leaflets; petiole ca 4 mm long; rachis ca 20 mm long. Second leaf similar to the first or bipinnate with 1 pair of pinnae; pinna with ca 10 pairs of leaflets; petiole ca 5 mm long, subulate at the apex. Third, fourth and fifth leaves bipinnate and similar to the bipinnate second leaf. Stipules spinous, ca 4 mm long. Leaflets ca 2x6 mm, oblong-obovate, green; apex rounded or minutely apiculate; base obtuse, oblique. Epicotyl not evident. Internode 3-10 mm long, green. Seedling ill-scented.

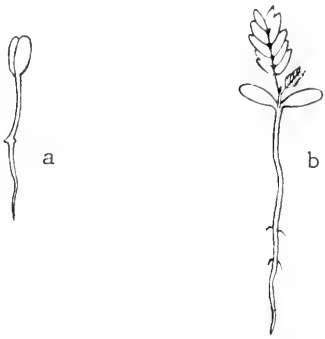
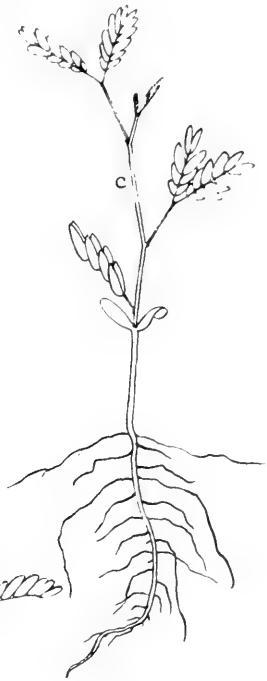


Fig. 15



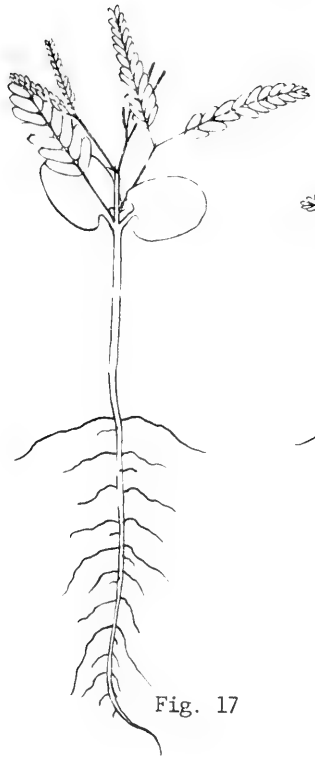
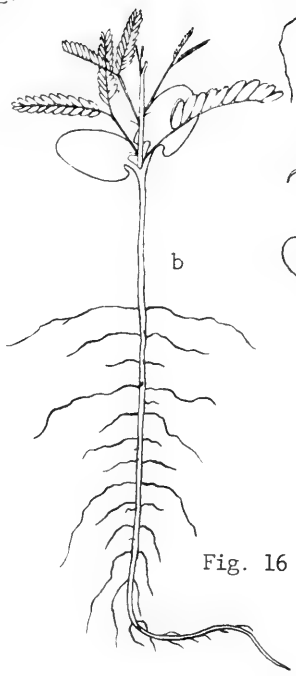


Fig. 17



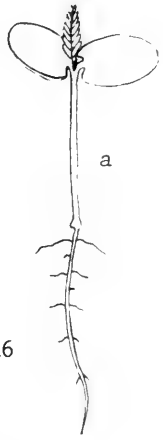


Fig. 16

Fig. 16. Seedling stages of Acacia nilotica var. adansonii: a) 5 days old; b) 17 days old. Source: ISRA/CNRF (81/443). Locality: Senegal. Germination time: 8 days.

17. Acacia nilotica L. var. tomentosa

Root system with only a few laterals; taproot pale yellow, its outer layer soon eroded, dark brown. Hypocotyl pale green, glabrate to glabrous, ca 30 mm long and ca 1 mm thick. Cotyledons foliaceous, somewhat fleshy, ca 10x13 mm, ovate to orbicular, green, glabrate to glabrous; apex rounded; base auriculate; petiole ca 3 mm long. First leaf pinnate with 9-11 pairs of leaflets; petiole ca 5 mm long; rachis ca 20 mm long. Second leaf bipinnate with 1 pair of leaflets; pinna with 10 pairs of leaflets; petiole ca 10 mm long, pale green, with a subulate apex between the two pinnae. Third leaf similar to the second one. Fourth leaf bipinnate with 2 pairs of pinnae. Stipules spinous, up to 5 mm long. Leaflets ca 2x6 mm, oblong, green, glabrescent; apex rounded and minutely apiculate; base obtuse, oblique. Epicotyl not evident at the 4-leaf stage. First internode only 2 mm long; second and third internodes ca 7 mm long each, green.

Fig. 17. Seedling of Acacia nilotica var. tomentosa: 16 days old. Source: ISRA/CNRF (82/597). Locality: Senegal. Germination time: 9 days.

18. Acacia pendula A. Cunn. ex G. Don

Root system with few laterals; taproot brown. Hypocotyl pale green, glabrous, 20-45 mm long. Cotyledons foliaceous, ca 7x9 mm, elliptic, glabrous; apex rounded; base minutely auriculate, upper surface deep green; under surface pale green. First leaf pinnate with 3 or 4 pairs of leaflets; petiole ca 5 mm long; rachis ca 15 mm long, glabrous. Second leaf bipinnate with 1 pair of pinnae; pinna with 3 or 4 pairs of leaflets; petiole up to 20 mm long, glabrous. Third and fourth leaves similar to the second one only the petioles longer (exceedingly 30 mm) and becoming somewhat flattened, 1.5 mm wide. Stipules small, scale-like, pale green. Leaflets up to 2.5x9 mm, oblong to oblong-obovate, green, glabrous; apex rounded and minutely apiculate; base obtuse, oblique. Epicotyl not evident. Internodes less than 5 mm long, pale green, glabrous.

Fig. 18. Seedling stages of Acacia pendula: a) 1 day old; b) 4 days old; 11 days old. Source: Seedlot No. 13482. Locality: North of Charleville, Queensland, Australia. Germination time: 5 days.

19. Acacia peuce F. Muell.

Root system with many laterals; taproot white, its outer layer soon eroded, becoming pale yellow. Hypocotyl glabrous, pale green, up to 40 mm long, terete. Cotyledons foliaceous, somewhat fleshy, 9x12 mm-10x16 mm, elliptic or ovate, glabrous, sessile; apex rounded; base auriculate; upper surface deep green; under surface pale green. First leaf pinnate with 4 or 5 pairs of leaflets; petiole ca 8 mm long; rachis ca 12 mm long, glabrous. Second leaf similar to the first one and almost opposite to it. Third leaf with the petiole flattened to a phyllode, occasionally with a few leaflets at the top. Fourth leaf always reduced to a phyllode. Stipules scale-like, caducous. Leaflets ca 2x8 mm, oblong-lanceolate,

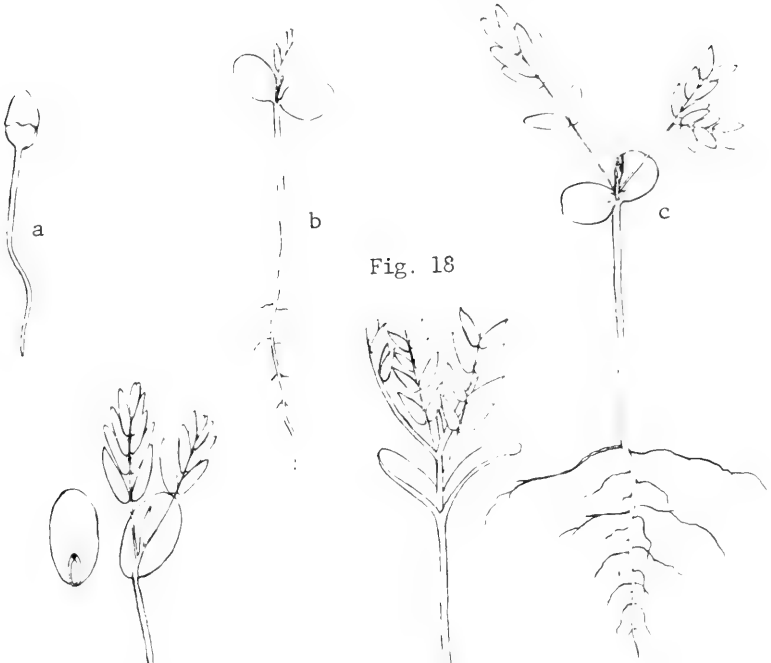


Fig. 18

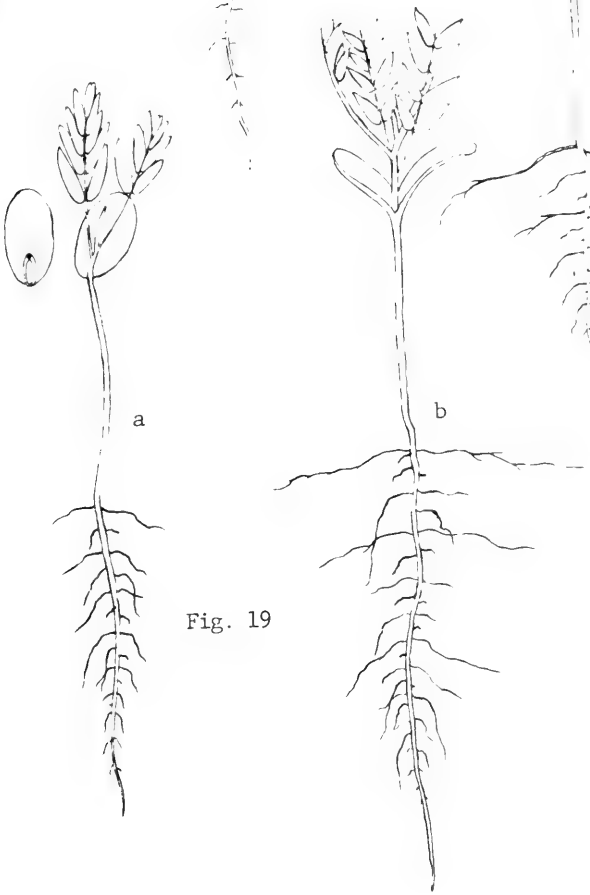


Fig. 19

somewhat purplish when immature, soon green, glabrous; apex acute; base attenuate, oblique. Phyllodes linear, up to 70 mm long and 2 mm wide, green, pubescent when immature, becoming glabrous with age. Epicotyl not evident. Internode short, less than 5 mm long at the 4-leaf stage, pubescent.

Fig. 19. Seedling stages of Acacia peuce: a) 15 days old; b) 23 days old. Source: Seedlot No. 13424. Locality: Montogu Downs, Bonlia, Queensland, Aus tralia. Germination time: 9 days.

20. Acacia polystachya A. Cunn. ex Benth.

Root system with only a few laterals; taproot pale yellow. Hypocotyl purple, glabrous, 20-30 mm long. Cotyledons foliaceous, 4x7 mm, elliptic, glabrous, soon reflexed, sessile; apex rounded; base somewhat auriculate; upper surface green and suffused with purple; under surface purple. First leaf pinnate with 4 or 5 pairs of leaflets; petiole 4 mm long; rachis ca 12 mm long, glabrous. Second leaf bipinnate with 1 pair of pinnae; pinna with 3-5 pairs of leaflets; petiole ca 10 mm long. Third leaf still bipinnate but the pinnae not as well developed as the second leaf; petiole flattened to a phyllode. Fourth leaf and on all reduced to a phyllode. Stipules scale-like. Leaflets 2x5 mm-4x10 mm, lanceolate to obovate, glabrous; apex apiculate; base obtuse, oblique; upper surface green; under surface purple. Phyllodes somewhat curved and sickle-like, 4x40 mm or more, at first purple but soon becoming green and shining; nerve and margin purplish. Epicotyl not evident. Internodes less than 5 mm long at the 4-leaf stage, purple, glabrous.

Fig. 20. Seedling stages of Acacia polystachya: a) 1 day old; b) 11 days old; c) 23 days old. Source: Seedlot No. 13500. Locality: Meilwraith Range, Queensland, Australia. Germination time: 9 days.

21. Acacia pruinocarpa Tindale

Root system with numerous laterals; taproot white, its outer layer soon eroded, becoming whitish-yellow. Hypocotyl glabrous, green or somewhat purplish, up to 30 mm long. Cotyledons foliaceous, ca 3x7 mm, elliptic, glabrous; apex rounded; base weakly auriculate; upper surface green; under surface pale green. First leaf pinnate with 5 pairs of leaflets; petiole ca 8 mm long; rachis ca 20 mm long, pubescent. Second leaf bipinnate with 1 pair of pinnae; pinna with 4 or 5 pairs of leaflets; petiole up to 25 mm long. Third leaf and on all reduced to phyllodes, occasionally with some leaflets on top of the phyllode at the 3-leaf stage. Stipules small, scale-like. Leaflets mostly 2x9 mm, oblong or lanceolate, glabrous, green; apex rounded and minutely apiculate; base obtuse, oblique. Phyllodes and flattened petioles linear, 30-50 mm long, up to 3 mm wide, attenuated at both ends, green and shining, 2- or 3-nerved. Epicotyl short. Internode may exceed 5 mm long by the 2-leaf stage, pubescent.

Fig. 21. Seedling stages of Acacia pruinocarpa: a) 1 day old; b) 11 days old; c) 35 days old. Source: Seedlot No. 7859. Locality: Wiluna, Western Australia. Germination time: 9 days.

22. Acacia saligna Wendl.

Root system with numerous laterals; taproot pale yellow. Hypocotyl at first pale green

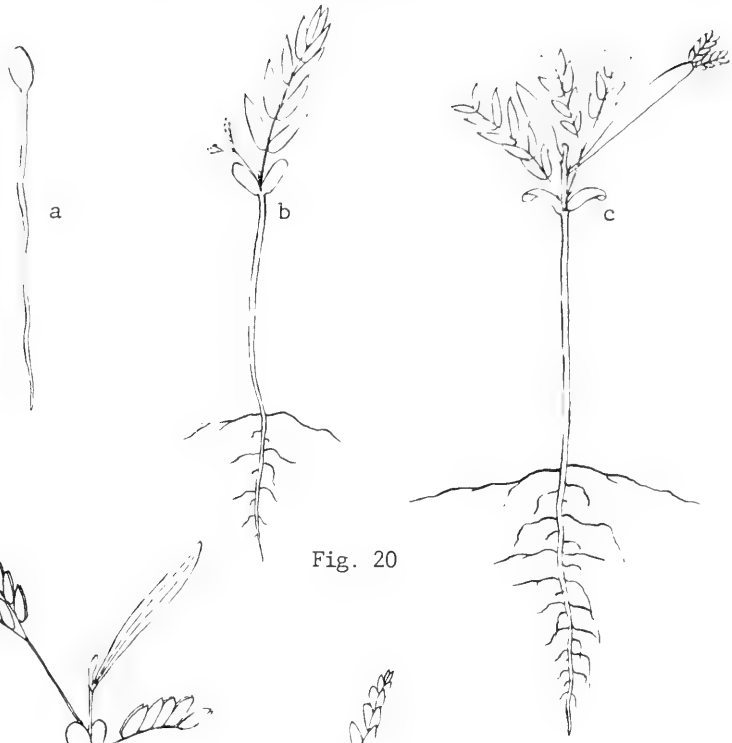


Fig. 20

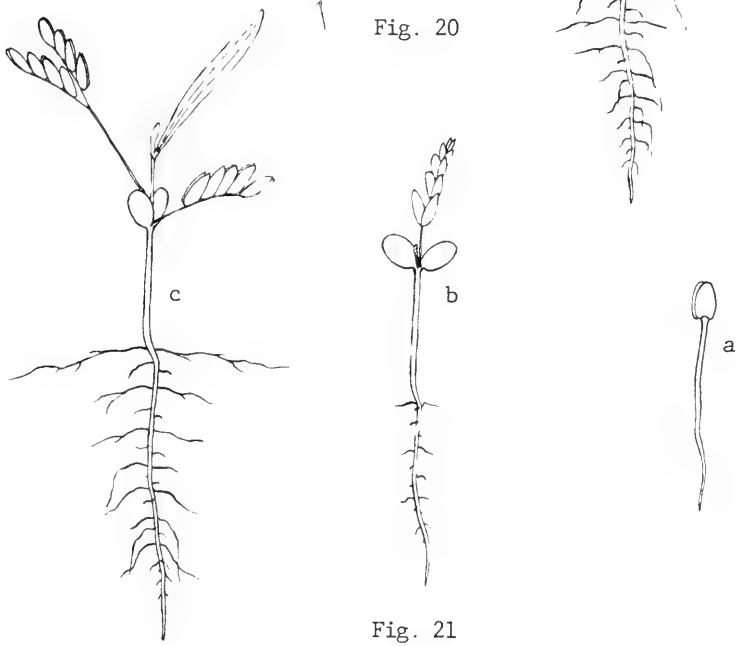


Fig. 21

and somewhat purplish, soon becoming green, glabrous, ca 20 mm long. Cotyledons foliaceous, 3x7 mm, oblong, glabrous, purple, caducous, usually dropped at the 3- or 4-leaf stage; apex rounded; base somewhat auriculate. First leaf pinnate with 3 pairs of leaflets; petiole delicate, ca 10 mm long, glabrous; rachis 5 mm long, subulate apically. Second leaf same as first one and almost opposite with it. Third leaf bipinnate with 1 pair of pinnae; pinna with 3 pairs of leaflets; petiole ca 15 mm long, apically subulate. Fourth through sixth leaves similar to the third one, but gradually changing into phyllodes. Stipules small, scale-like. Leaflets oblong, up to ca 3x7 mm, green, glabrous; apex rounded and minutely apiculate; based obtuse, oblique; margin with scattered hairs at early leaf stages. Epicotyl not evident. Internodes up to 3 mm long at 6-leaf stage, glabrous.

Fig. 22. Seedling stages of Acacia saligna: a) 1 day old; b) 2 days old; c) 5 days old; d) 23 days old. Source: Seedlot No. 11929. Locality: Weir, Western Australia. Germination time: 9 days.

23. Acacia sophorae R. Br.

Root system with only a few laterals; taproot pale yellow. Hypocotyl pale green or somewhat purplish, glabrous, up to 30 mm long. Cotyledons foliaceous, 2.5x6 mm, oblong, glabrous; apex rounded; base weakly auriculate; upper surface green; under surface pale green and somewhat yellowish. First leaf pinnate with 3 pairs of leaflets, glabrous; petiole ca 8 mm long; rachis 5 mm long, apically subulate. Second leaf bipinnate with 1 pair of pinnae; pinna with 3 or 4 leaflets; petiole sometimes flattened, ca 20 mm long. Third leaf and above all reduced to phyllodes. Stipules small, scale-like, green. Leaflets ca 2.5x6 mm, oblong or obovate-oblong, green, glabrous; apex rounded and minutely apiculate; base obtuse, oblique. Phyllodes linear, mostly 40 mm long and 6 mm wide, attenuated at both ends, green, scattered with depressed hairs, 3-nerved. Epicotyl not evident. First internode less than 5 mm long; second internode ca 8 mm long at the 4-leaf stage, pubescent.

Fig. 23. Seedling stages of Acacia sophora: a) 3 days old; b) 8 days old; c) 18 days old. Source: Seedlot No. 11689. Locality: North of Woolgoolga, New South Wales, Australia. Germination time: 26 days.

24. Acacia tortilis Hayne

Root system with a few laterals; taproot brown. Hypocotyl pale green, glabrous, ca 20 mm long. Cotyledons foliaceous, somewhat fleshy, ca 5x10 mm, ovate, green, glabrous; apex rounded; base auriculate; petiole 3 mm long, pale green, glabrous. First leaf pinnate with 6 pairs of leaflets; petiole 3 mm long, pale green, pubescent; rachis ca 10 mm long, apically subulate. Second leaf bipinnate with 1 pair of pinnae; pinna with 6 or 7 pairs of leaflets; petiole ca 8 mm long, pale green, pubescent, apically subulate. Third, fourth and fifth leaves similar to the second one. Stipules spinose, somewhat reflexed. Leaflets 2x5 mm, oblanceolate to oblong, green, glabrous; apex rounded; base attenuate, oblique. Epicotyl not evident. Internode less than 5 mm long at the 5-leaf stage, pubescent.

Fig. 24. Seedling of Acacia tortilis: 11 days old. Source: ISRA/CNRF (82/599). Locality: Senegal. Germination time: 6

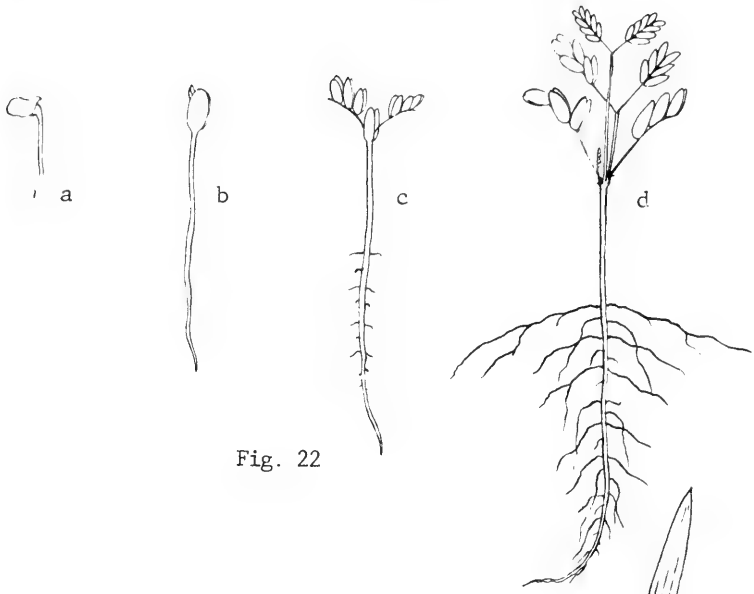


Fig. 22

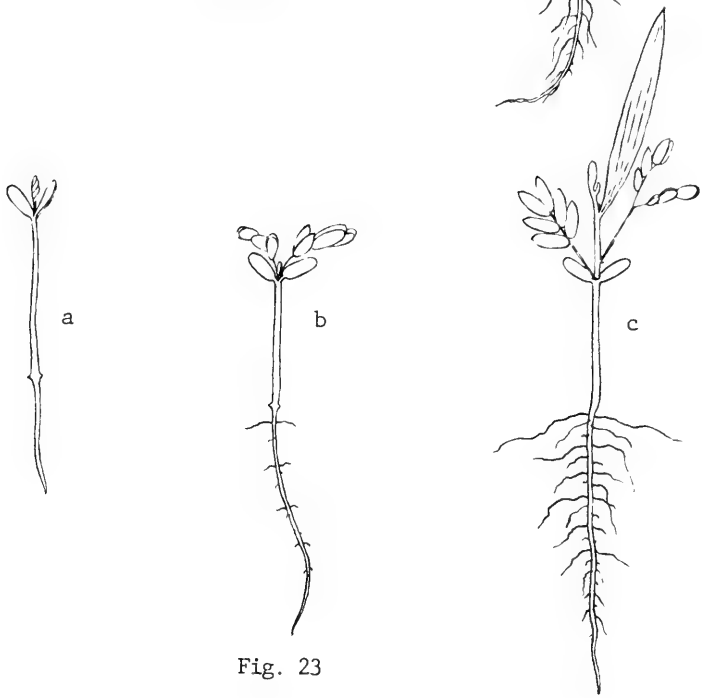


Fig. 23

days.

25. Acacia victoriae Benth.

Root system with a few laterals; taproot white. Hypocotyl pale green, glabrous, ca 20 mm long. Cotyledons foliaceous, ca 4x8 mm, elliptic, glabrous, reflexed and deciduous at the 3-leaf stage, sessile; apex rounded; base weakly auriculate; upper surface green; under surface pale green and somewhat purplish. First leaf pinnate with 4 or 5 pairs of leaflets, glabrous; petiole ca 5 mm long; rachis ca 20 mm long, apically subulate. Second leaf bipinnate with 1 pair of pinnae; pinna with 3 or 4 pairs of leaflets; petiole 5-10 mm long, scattered with depressed hairs. Third through twelfth leaves essentially similar to the second one. Stipules subulate, 1-2 mm long, stiffened when the seedling matures. Leaflets 2.5x8 mm, oblong, green, glabrous; apex rounded and minutely apiculate; base rounded or obtuse, oblique. Epicotyl not evident. Internode less than 5 mm long at the 4-leaf stage, pubescent.

Fig. 25. Seedling stages of Acacia victoriae: a) 2 days old; b) 12 days old. Source: Seedlot No. 13271. Locality: 79 km N. of Charleville, Queensland, Australia. Germination time: 8 days.

26. Bauhinia carronii F. Muell.

Root system with numerous laterals; taproot dark brown. Hypocotyl pale green, glabrous, ca 20 mm long. Cotyledons foliaceous, fleshy, ca 9x18 mm, oblong or somewhat reniform, glabrous, sessile; apex rounded; base attenuate; upper surface green; under surface pale green. Leaves pinnate with 1 pair of leaflets, or the first one simple and deeply obcordate; petiole ca 5 mm long, apically subulate. Leaflets ca 8x12 mm, elliptic or suborbicular, green and somewhat purplish especially when young. Stipules small, lanceolate, pale green. Epicotyl conspicuous, more than 10 mm long, pale green. Internodes up to 10 mm long.

Fig. 26. Seedling of Bauhinia carronii: 6 days old. Source: Seedlot No. 11636. Locality: Birdsville, Queensland, Australia. Germination time: 30 days.

27. Bauhinia cunninghamii Benth.

Root system with numerous laterals; taproot brown. Hypocotyl thick, white, usually not growing above the soil level, glabrous, ca 5 mm long and 2 mm thick. Cotyledons foliaceous, fleshy, ca 10x14 mm, elliptic to ovate, yellowish-green, glabrous; apex rounded; base rounded and narrowed to the short petiole; First leaf scale-like or not well developed, broadly obcordate; apex divided almost to the base with each lobe rounded; base rounded. Second leaf apparently pinnate with 2 leaflets; petiole ca 4 mm long, apically subulate, sparsely pubescent; leaflets ca 5x8 mm, obovate, glabrous, green, oblique; apex rounded; base obtuse. Leaves of remaining stages similar to the second one only the leaflets gradually larger, purplish-green when young, becoming green with age. Stipules small, scale-like. Epicotyl conspicous, ca 10 mm long. Internodes ca 10 mm long, green, at first pubescent, then the upper ones glabrous.

Fig. 27. Seedling stages of Bauhinia cunninghamii: a) 3 days old; b) 7 days old. Source: Seedlot No. 11475. Locali-

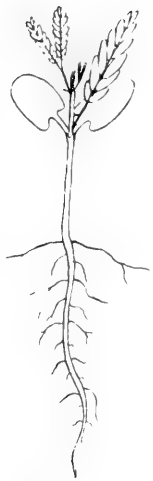


Fig. 24

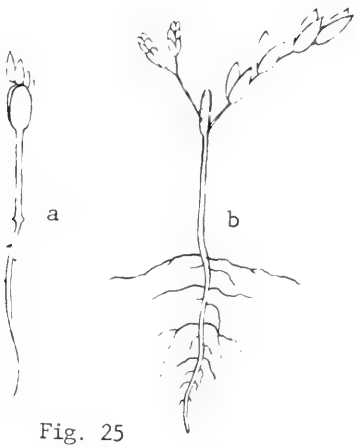


Fig. 25

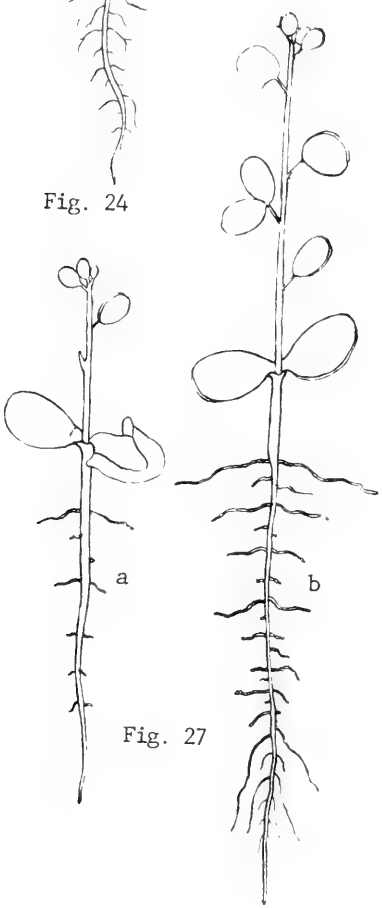


Fig. 27

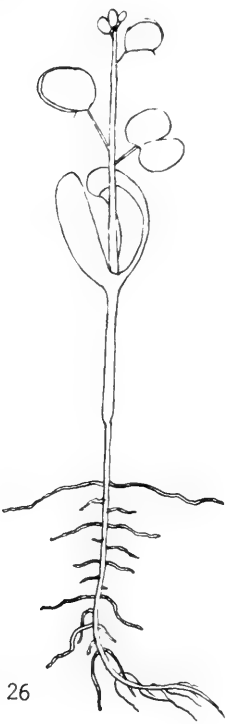


Fig. 26

ty: West of King River, Western Australia. Germination time: 40 days.

28. Cassia eremophila A. Cunn. ex Vog.

Root system with a few laterals; taproot dark brown. Hypocotyl pale green, pubescent, 15-30 mm long. Cotyledons foliaceous, ca 9x11 mm, elliptic or obovate, glabrous, 3-nerved; apex rounded; base weakly auriculate; upper surface green; under surface pale green; petiole 2 mm long. First leaf pinnat with 1 pair of leaflets; petiole 12 mm long, apically subulate; leaflets ca 5x25 mm, oblong, attenuated at both ends. Leaves of the remaining stages similar to the first leaf only the leaflets and petioles becoming longer. Fourth leaf linear and up to 40 mm long; petiole to 28 mm long. Stipules small, scale-like. Epicotyl short, less than 5 mm long. Internodes less than 5 mm long at the 4-leaf stage.

Fig. 28. Seedling stages of Cassia eremophila: a) 23 days old; b) 45 days old. Source: Seedlot No. 8643. Locality: Lightening Ridge, New South Wales, Australia. Germination time: 7 days.

29. Cassia glutinosa DC.

Root system with a few laterals; taproot dark brown. Hypocotyl pale green, glabrous, ca 20 mm long. Cotyledons foliaceous, unequal, the larger ca 9-11 mm, elliptic or orbicular, green, glabrous, rounded on both ends, conspicuously nerved. First leaf pinnate with 1 pair of leaflets; petiole ca 5 mm long, apically subulate Leaflets ca 3x8 mm, oblong, green, glabrous; apex rounded; base obtuse or attenuate. Second to sixth leaves similar to the first leaf, only the leaflets and petiole becoming longer. Sixth leaf pinnate with 2 pairs of leaflets; petiole 20 mm long, glabrous; rachis 15 mm long, glabrous. Stipules subulate, pale green. Epicotyl less than 5 mm long. Internodes less than 5 mm long at the 6-leaf stage, glabrous.

Fig. 29. Seedling stages of Cassia glutinosa: a) 1 day old; b) 23 days old; c) 45 days old. Source: Seedlot No. 11523. Locality: Hammereley Ranges, Western Australia. Germination time: 10 days.

30. Cassia nemophila Walp.

Root system with only a few laterals; taproot dark brown. Hypocotyl pale green, glabrous, 20-40 mm long. Cotyledons foliaceous, ca 8x12 mm, elliptic or obovate, green, glabrous, infrequently unequal or even with 3 cotyledons; apex rounded; base rounded and somewhat auriculate. First leaf pinnate with 1 pair of leaflets; petiole ca 8 mm long, pubescent. Leaflets 3x8 mm, oblong, pubescent. Second through sixth (occasionally eighth) leaves similar to the first only the leaflets and petioles longer, infrequently some with linear leaflets 2x25 mm at the 4-leaf stage; petiole ca 20 mm long. Seventh or nineth leaves pinnate with 2 pairs of leaflets. Stipules minute, scale-like, brown. Epicotyl less than 5 mm long, pubescent. Internodes less than 5 mm long (rarely longer) at the 4-leaf stage.

Fig. 30. Seedling stages of Cassia nemophila: a) 21 days old; b) 43 days old. Source: Seedlot No. 13479. Locality: St. George, Queensland, Australia. Germination time: 12 days.

31. Cassia oligophylla F. Muell.

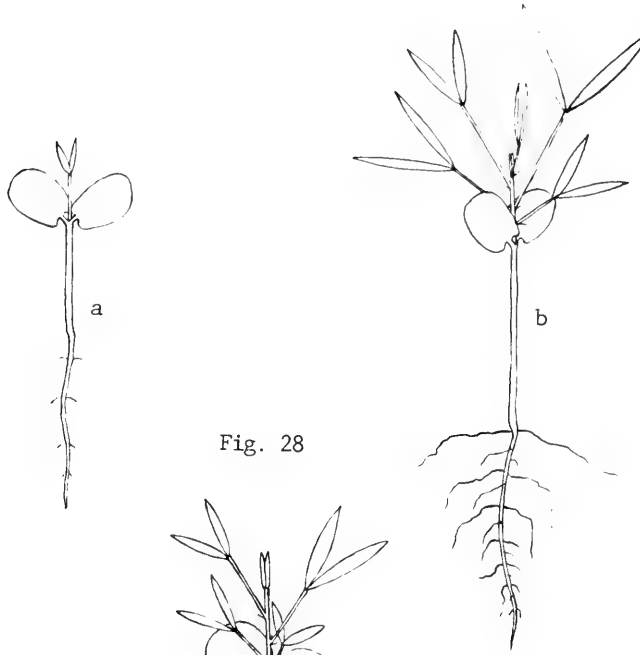


Fig. 28

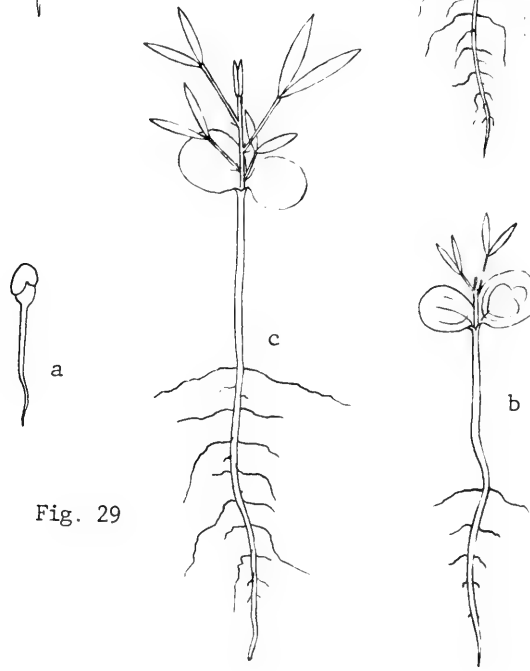


Fig. 29

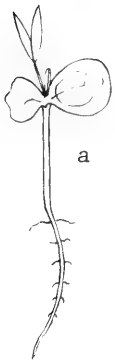
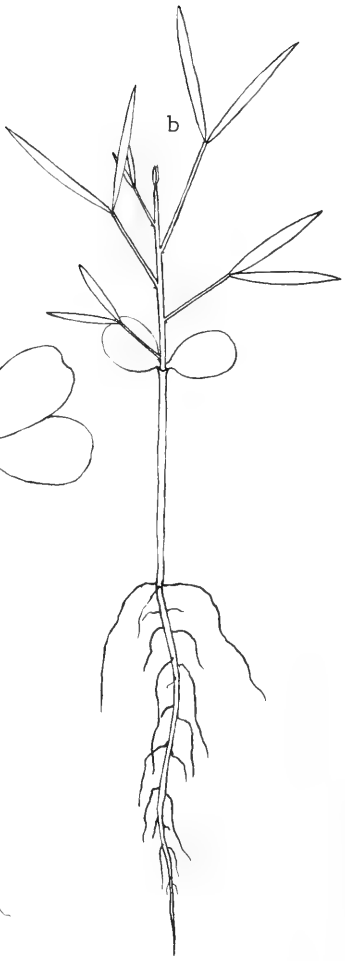
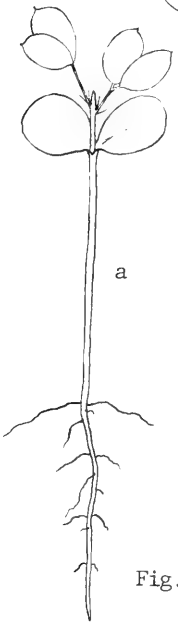


Fig. 30





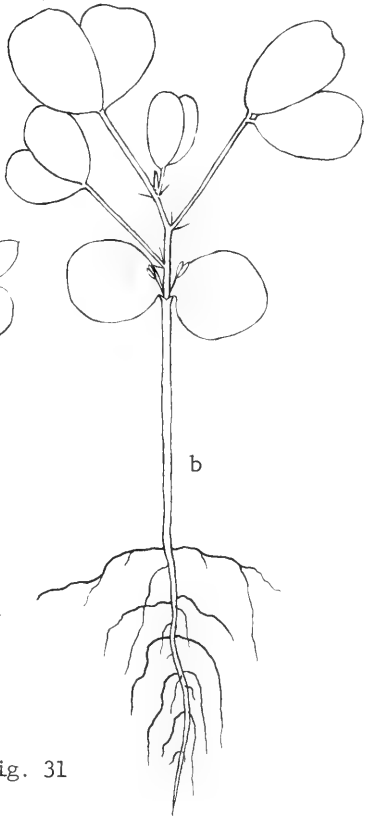


Fig. 31

Root system with some laterals; taproot dark brown. Hypocotyl pale green, glabrous, 20-40 mm long. Cotyledons foliaceous, unequal, the larger 10x12 mm-15x20 mm, green, glabrous, infrequently with 3 cotyledons; apex rounded; base rounded; petiole 1-2 mm long. First leaf pinnate with 1 pair of leaflets; petiole 10-20 mm long, pubescent, apically subulate. Leaflets 6x9 mm-10x15 mm, obovate, green; apex rounded or somewhat emarginate and minutely apiculate; base attenuate, oblique; petiolule ca 3 mm long; Second through sixth leaves similar to the first one only the leaflets larger and the petiole longer. Stipules subulate, 5 mm long, pale green, pubescent. Epicotyl less than 5 mm long. Internodes mostly more than 5 mm long at the 4-leaf stage, green, pubescent.

Fig. 31. Seedling stages of Cassia oligophylla: a) 11 days old; b) 25 days old. Source: Seedlot No. 11528. Locality: Rio Tinto Gorges, Western Australia. Germination time: 10 days.

32. Cassia venusta F. Muell.

Root system with a few laterals; taproot dark brown. Hypocotyl pale green, glabrous, 25-40 mm long. Cotyledons foliaceous, ca. 10x12 mm, obovate, green, glabrous; apex rounded or truncate; base rounded and somewhat auriculate. First leaf pinnate with 1 pair of leaflets. Second or third leaf similar to the first. Third or more frequently the fourth leaf with 2 pairs of leaflets. Leaflets 10x15 mm, obovate, green, pubescent; apex rounded or minutely apiculate; base attenuate; petiole 8-15 mm long, pubescent, apically subulate; rachis (in leaves with 2 pairs of leaflets) ca 10 mm long, pubescent, apically subulate; petiolule short, mostly ca 2 mm long. Stipules subulate, ca 3 mm long. Epicotyl less than 5 mm long, pubescent. Internodes usually more than 5 mm long at the 4-leaf stage, pubescent.

Fig. 32. Seedling stages of Cassia venusta: a) 20 days old; b) 62 days old. Source: Seedlot No. 9701. Locality: Yantabulla and Queensland, New South Wales, Australia. Germination time: 12 days.

33. Erythrina vespertilio Benth.

Root system with numerous laterals; taproot stout, grayish-white, its outer layer soon eroded and becoming yellowish-brown. Hypocotyl stout, ca 5 mm long and 3 mm thick, subterraneous, white. Cotyledons fleshy, remaining in the testa and subterranean, ca 6x20 mm, reniform, yellowish. First through fourth leaves opposite or nearly so, otherwise alternate above, simple. Fifth leaf compound with 3 leaflets. Leaflets mostly 18x30 mm, more or less rhomboid; upper surface green; under surface pale green; petioles slender, ca 20 mm long. Stipules small, lanceolate, ca 2 mm long, green. Epicotyl conspicuous, 30 mm or more long, up to 2 mm thick, pale green. Internodes up to 20 mm or more long, pale green, with scattered minute spine-like hairs on some.

Fig. 33. Seedling stage of Erythrina vespertilio: 10 days old. Source: Seedlot No. 10647. Locality: Anningie, H/Stead Road, Northern Territory, Australia. Germination time: 16 days.

34. Parkinsonia aculeata L.

Root system with numerous laterals; taproot brown. Hypo-

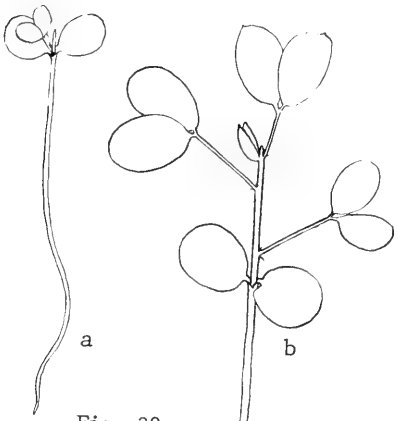


Fig. 32

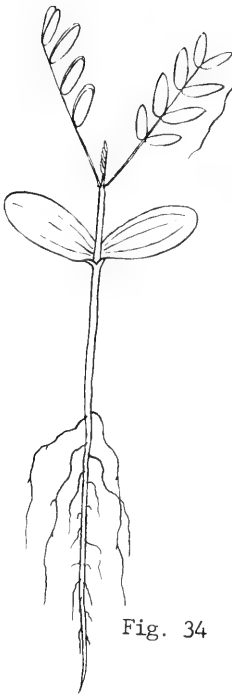


Fig. 34

Fig. 33

cotyl pale green, glabrous, 18-35 mm long, 1-2 mm thick. Cotyledons foliaceous, somewhat fleshy, ca 8x20 mm, oblong to ovate-oblong, glabrous; apex rounded; base rounded and somewhat auriculate; upper surface green; under surface pale green, some becoming yellowish, 3-nerved. First leaf pinnate with 4 or 5 pairs of leaflets; petiole ca 10 mm long; rachis ca 20 mm long, apically subulate. Second and third leaves similar to the first only with more pairs of leaflets. Fourth leaf bipinnate with 1 pair of pinnae; pinna with ca 7 pairs of leaflets. Leaflets ca 2.5x8 mm, oblong, glabrous; apex rounded and minutely apiculate; base obtuse, oblique; upper surface green; under surface pale green. Stipules small, scale-like, glabrous. Epicotyl conspicuous, ca 10 mm long, green. First internode only up to 2 mm long; second and third internode ca 10 mm long, green, glabrous.

Fig. 34. Seedling stage of Parkinsonia aculeata: a) 16 days old. Source: ISRA/CNRF, Senegal (80/258). Locality: Senegal. Germination time: 8 days.

35. Prosopis alba Griseb.

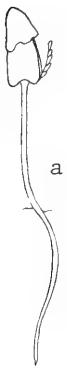
Root systems with several laterals; taproot whitish-yellow, the outer layer soon eroded, becoming yellowish-brown. Hypocotyl pale green, ca 30 mm long. Cotyledons foliaceous, ca 8x12 mm, elliptic to elliptic-ovate, glabrous; apex rounded; base auriculate; upper surface green; under surface pale green, 3-nerved; petiole ca 2 mm long. First leaf pinnate with 5-7 pairs of leaflets; petiole ca 5 mm long; rachis ca 15 mm long, apically subulate. Second leaf bipinnate with 1 pair of pinnae; pinna with 9-11 pairs of leaflets. Third and fourth leaves similar to the second one. Leaflets ca 1.5x6 mm, oblong, green, glabrous, sessile; apex rounded and minutely apiculate; base truncate, oblique. Stipules small, scale-like, pale green. Epicotyl conspicuous, ca 10 mm long, green. Internode ca 10 mm long at the 3-leaf stage, green, glabrous.

Fig. 35. Seedling stages of Prosopis alba: a) 2 days old; b) 12 days old. Source: Texas A. & I. (0166). Locality: Not given. Germination time: 8 days.

36. Prosopis glandulosa Torr.

Root system with numerous laterals; taproot white, its outer layer soon eroded, becoming brown. Hypocotyl white, 15-20 mm long. Cotyledons foliaceous, somewhat fleshy, ca 10x12 mm, elliptic, green, glabrous; apex rounded or emarginate; base auriculate, 5- or 7-nerved; petiole ca 2 mm long. First leaf pinnate with 5 or 6 pairs of leaflets; petiole ca 5 mm long; rachis ca 20 mm long, apically subulate, glabrous. Second leaf bipinnate with 1 pair of pinnae; pinna with 4-7 pairs of leaflets; petiole ca 10 mm long. Third, fourth and fifth leaves similar to the second one. Leaflets ca 2.5x8 mm, elliptic to oblong, green, glabrous; apex rounded and minutely apiculate; base rounded, oblique. Stipules spinous, ca 4 mm long, ascendent. Epicotyl ca 10 mm long, green. Internodes ca 10 mm long at the 5-leaf stage, somewhat zigzag, glabrous.

Fig. 36. Seedling stages of Prosopis glandulosa: a) 5 days old; b) 13 days old. Source: Texas Department of Health. Locality: No given. Germination time: 10 days.



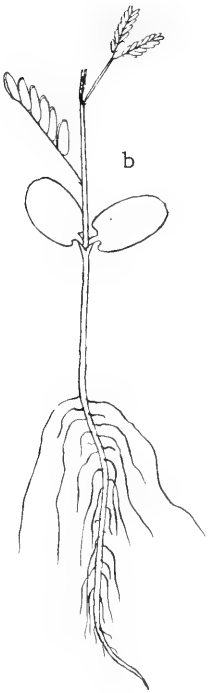
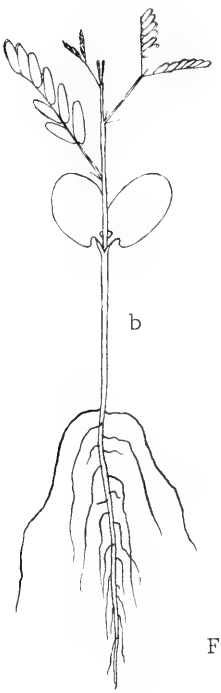


Fig. 35



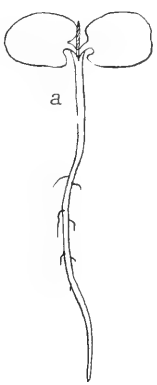


Fig. 36

ADDITIONAL NOTES ON THE *ERIOCAULACEAE*. XCI

Harold N. Moldenke

PAEPALANTHUS ARMERIA Mart.
Additional bibliography: Mold., Phytologia 54: 151. 1983.
Recent collectors encountered this plant in wet places, in both flower and fruit in September and describe the flowers as whitish and the "folhas acinzentadas".
Additional citations: BRAZIL: Distrito Federal: *Héringer, Figueiras, Mendonça, Pereira, Salles, & Silva 5419*(N).

PAEPALANTHUS ASCENDENS Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 30. 1976; Mold., Phytol. Mem. 2: 150 & 610. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 237--238. 1928 (N, W) & pl. 158 (Ld, N).

PAEPALANTHUS ASPER Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 30. 1976; Mold., Phytol. Mem. 2: 150 & 610. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 176. 1928 (Ld)

PAEPALANTHUS ATER Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 297. 1974; Mold., Phytol. Mem. 2: 150 & 610. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 247--249. 1928 (N, W) & pl. 165. 1928 (Ld, N).

PAEPALANTHUS ATROVAGINATUS Ruhl.
Additional bibliography: Mold., Phytologia 33: 30. 1976; Mold., Phytol. Mem. 2: 150 & 610. 1980.
Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Serr. Min. 45. 1908 (W).

PAEPALANTHUS AUREUS Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 30. 1976; Mold., Phytol. Mem. 2: 150 & 610. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 180 & 181. 1928 (Ld, Ld, N, N).

PAEPALANTHUS AUYANTEPUIENSIS Mold.
Additional bibliography: Mold., Phytologia 33: 30. 1976; Mold., Pjuyol. Mem. 2: 117, 610, & 627. 1980; Mold., Phytologia 50: 245 & 246. 1982.
Recent collectors describe this plant as having elongate, brown, procumbent to ascending stems, to 40 cm. long, and shiny, deep grass-green or glossy dark-green, reflexed leaves, yellowish-green

peduncles, and grayish-white white-hairy heads. They have found it growing in wet ground below rocks and in *Bonnettia roraimae* forests, at 1940--2500 m. altitude, in both flower and fruit in February and October. Material has been misidentified and distributed in some herbaria as *P. fraternus* N. E. Br.

Additional citations: VENEZUELA: Amazonas: *Steyermark, Brewer-Carías, & Liesner 124418* (N). Bolívar: *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 116105* (Ld). GUYANA: *Persaud 130* (N).

PAEPALANTHUS BABYLONIENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 33. 1977; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 188--189. 1928 (N, W) & pl. 121 (Ld, N, W).

PAEPALANTHUS BAHIENSIS (Bong.) Kunth

Additional synonymy: *Paepalanthus bahiensis* (Bong.) Ruhl, in herb.

Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St.-Petersb., ser. 6, 1: 622--623 (1831) and 2 (3): [545]--547, pl. 20. 1835; Mold., Phytologia 37: 33. 1977; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 183. 1831 (N, W); Kunth, Enum. Pl. 3: 572. 1841 (N, W).

PAEPALANTHUS BALANSAE Ruhl.

Additional bibliography: Mold., Phytologia 37: 33. 1977; Angely, S. Amer. Bot. Bibl. 2: 675. 1980; Mold., Phytol. Mem. 2: 150, 178, & 610. 1980.

Recent collectors have encountered this plant in periodically flooded areas, in cerrado, and in bosque abierto, in both flower and fruit in June and September.

Additional citations: PARAGUAY: *Casas & Molero FC.3865* (N), *FC.4006* (N); *Krapovickas & Schinini 32553* (Ld).

PAEPALANTHUS BALANSAE var. *DENSIFLORUS* Mold.

Additional bibliography: Mold., Phytologia 25: 151. 1973; Angely, S. Amer. Bot. Bibl. 2: 675. 1980; Mold., Phytol. Mem. 2: 150 & 610. 1980.

PAEPALANTHUS BARAUNENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 30--31. 1976; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Additional citations: BRAZIL: Minas Gerais: *W. R. Anderson 8939* (W--2755484). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 112--113. 1928 (N, W) & pl. 70 (Ld, W).

PAEPALANTHUS BARBIGER Alv. Silv.

Additional bibliography: Mold., Phytologia 41: 475. 1979; Mold., Phytol. Mem. 2: 150 & 610. 1980.

PAEPALANTHUS BARBULATUS Herzog

Synonymy: *Paepalanthus bargulatus* Herzog ex Mold., Phytolo-

gia 52: 128 in syn. 1982.

Additional bibliography: Mold., Phytologia 37: 33. 1977; Mold., Phytol. Mem. 2: 150 & 610. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Mold., Phytologia 52: 128. 1982.

Recent collectors describe this plant as a rosette herb, to 20 cm. tall, the leaves coriaceous, green above, gray-green beneath. They have found it growing in a region of "sandstone rock outcrops with small areas of disturbed marsh as base and nearby river with lush vegetation along the rocky margins, in restinga and natural campo, and in dry places on campos, at 25--1200 m. altitude, in both flower and fruit in March, June, and August.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19906* (Ld, N, W--2936344); *Mori, Carvalho, Mattos Silca, Santos, & Ribeiro 11930* (Ld, N); *Mori, Walther, & Necker 12784* (Ld). Minas Gerais: *Smith, Segadas-Vianna, Egler, Dau, Silva, Ormond, & Machline in L. B. Smith 6836a* (W--2120203).

PAEPALANTHUS BARKLEYI Mold.

Additional bibliography: Mold., Phytologia 25: 152. 1973; Mold., Phytol. Mem. 2: 109, 117, & 610. 1980.

Recent collectors describe this plant as growing in tufts, the leaves a rich grass-green, and have found it growing in woods and pantamo, at 2600--2880 m. altitude, in both flower and fruit in January and October.

Additional citations: COLOMBIA: Antioquia: *F. W. Barkley 18A147* (W--1999317). VENEZUELA: Mérida: *Cuatrecasas, Ruiz-Teran, & López-Figueiras 28150* (W--2585779A). Táchira: *Steyermark, Dunsterville, & Dunsterville 101060* (N).

PAEPALANTHUS BARREIRENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 33. 1977; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. 1: 260--261 (N, W) & pl. 172 [bis]. 1928 (Ld, N, W).

PAEPALANTHUS BATATALENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 136. 1973; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 77--79 (N, W) & pl. 45. 1928 (Ld, N, W).

PAEPALANTHUS BATOCEPHALUS Ruhl.

Additional bibliography: Mold., Phytologia 35: 20. 1976; Mold., Phytol. Mem. 2: 150 & 610. 1980.

PAEPALANTHUS BELIZENSIS Mold.

Additional bibliography: Mold., Phytologia 41: 475. 1979; Mold., Phytol. Mem. 2: 74 & 610. 1980.

PAEPALANTHUS BELLUS Mold.

Additional bibliography: Mold., Phytologia 25: 152. 1973; Angely, S. Amer. Bot. Bibl. 2: 675. 1980; Mold., Phytol. Mem. 2:

150 & 610. 1980.

Hatschbach encountered this plant in wet places on campo, in flower and fruit in October.

Additional citations: BRAZIL: Paraná: *Hatschbach 43246* (Ld, W--2931953).

PAEPALANTHUS BENEDICTI Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 136. 1973; Mold., Phytol. Mem. 2: 150 & 610. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1:]28--240. 1928 (N, W) & pl. 159. 1928 (Ld, N, W).

PAEPALANTHUS BIFIDUS (Schrad.) Kunth

Additional synonymy: *Paepacantus bifudus* (Schara) Kunth ex Mold., Phytol. Mem. 2: 424 in syn. 1980.

Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St.-Pětersb., ser. 6, 1: 624 & 637. 1831; Arekal & Ramaswamy, Proc. 63rd Ind. Cong. 3 (6): 85. 1976; Thanikaimoni, Trav. Sect. Scient. Techn. Inst. Franç. Pond. 13: 332. 1976; Mold., Phytologia 41: 475--476 (1979) and 42: 36. 1979; Mold., Phytol. Mem. 2: 96, 109, 117, 122, 124, 126, 134, 150, 401, 424, & 610. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Hocking, Excerpt. Bot. A.36: 23. 1981; Reis & Lipp, New Pl. Sources Drugs 22. 1982; Mold., Phytologia 50: 245 (1982) and 53: 348. 1983.

Recent collectors have encountered this plant "in white sand in full sun of secondary forest and weedy regrowth at margin of oil-palm plantation", at 60 m. altitude,, in flower and fruit in June. Carvalho & Gatti describe the leaves as concolorous and the "erva crescendo na areia". Reis & Lipp (1982) cite *A. Silva 210* and record the name "capim mortinha".

Other recent collectors describe the plant as an herb. 8--15 cm. tall, the leaves light-green, the involucral bractlets stramineous, and the flowers white. They have found it growing in open areas of peaty marshes, the wetter areas predominantly sedge, grass, and other monocots on white sand and peat, with small shrubs, with scattered rocky bluffs with scrab and small trees, on sandy campina and on "campina de areia branca", in swamps among dunes, as a "common herb on white sand savannas", and "along brushy roadsides and in clearings with many species of *Solanum*, including *S. rugosum*, *S. asperum*, and *S. subinerme*". They have found it at altitudes up to 1000 m., in flower and fruit in February, May, and July.

The *Prance & Lleras 23719*, previously cited and distributed as typical *P. bifidus*, is now the type collection of its f. *parvicapitulatus* Mold.

Additional citations: GUYANA: *De la Cruz 1700* (Ba), *1750* (Ba), *1849* (Ba--384517); *Jenman 5287* (Ld); *Maas & Westra 3489* (Ld, N). SURINAM: *Nee & Mori 4202* (Ws). FRENCH GUIANA: *Granville B.5325* (Ld). BRAZIL: Amapa: *Murça Pires & Cavalcante 52143* (W--2514662). Amazonas: *Lasseign 21169* in part (W--2780463).

Bahia: *Carvalho & Gatti 833* (Ld); *Hage, Mattos Silva, & Ribeiro 270* (Ld); *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18781* (Ld, N, W--2936337). Espiritu Santo: *Sucre 8315* (W--2940690). Minas Gerais: *Hatschbach 41294* (N). Pará: *Cid, Ramos, Mota, & Rosas 1872* [Herb. Inst. Nac. Pesq. Amaz. 96040] (Ld, N); *Davidson & Martinelli CD.10276* (Ld); *Martinelli 6948* [RB Herb. 203541] (Ld); *Plowman, Rosa, & Rosario 9559* (Ld, N, W--2967825); *Prance 21155* in part (N); *Silva & Santos 4684* (N, N).

PAEPALANTHUS BIFIDUS f. *BREVIPES* Mold.

Additional bibliography: Mold., Phytologia 41: 476. 1979; Mold., Phytol. Mem. 2: 117, 122, 124, 151, & 610. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Mold., Phytologia 50: 245. 1982.

Recent collectors describe this plant as a small, slender, tufted herb, to 10 cm. tall, the leaves rather bright-green or mid-green, the heads "off-white" or pale whitish-brown. They have encountered it in sandy soil at the base of hills, in "open scrub on white sand with damp areas and extensive sedge meadows (brejo)", in mixed restinga, mainly high restinga on drier ground with areas of normally wet sedge meadow", and in sandy soil of disturbed woods, from sealevel to 950 m. altitude, flowering and fruiting in January, February, April, and September.

The *Prance, Ramos, Farias, & Philcox 4835,* distributed as and previously cited by me as this form, is now regarded as representing f. *parvicapitulatus* Mold.

Additional citations: VENEZUELA: Amazonas: *Steyermark, Maas, Field, & Redmond 123644* (Lc). FRENCH GUIANA: *Raynal-Roques AR. 20208* (Cy). BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18049* (Ld, N), *18845* (N); *Mattos Silva & Hage 604* (Ld); *Mori, Mattos Silva, & Santos 10469* (N). Minas Gerais: *Hatschbach 41294* (W--2840084). Pará: *Prance 21155* in part (W--2935278).

PAEPALANTBUS BIFIDUS f. *FRUSTUS* Mold.

Additional bibliography: Mold., Phytologia 37: 34. 1977; Mold., Phytol. Mem. 2: 151, 403, 404, 425, & 610. 1980.

PAEPALANTHUS BIFIDUS f. PARVICAPITULATUS Mold., Phytologia 43: 355. 1979.

Bibliography: Mold., Phytologia 43: 355. 1979; Mold., Phytol. Mem. 2: 151 & 610. 1980; Hocking, Excerpt. Bot. A.36: 23. 1981.

The collections cited below were previously cited by me as typical *P. bifidus* (Schrad.) Kunth and/or its f. *brevipes* Mold. before the present taxon was recognized.

Citations: BRAZIL: Amazonas: *Prance & Lleras 23719* (Ld--type, Ld--isotype, N--isotype, W--2838244--isotype); *Prance, Ramos, Farias, & Philcox 4835* (Ld, N, S, W--257308A).

PAEPALANTHUS BIFRONS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 34. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 206--207. 1928 (N, W) & pl. 136. 1928 (Ld, N, W).

PAEPALANTHUS BIFRONS var. *FUSCIOR* Alv. Silv.
Additional bibliography: Mold., Phytologia 25: 153. 1973; Mold., Phytol. Mem. 2: 151 & 610. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 207--208. 1928 (N, W).

PAEPALANTHUS BLEPHAROPHORUS (Bong.) Kunth
Additional bibliography: Mold., Phytologia 37: 34. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS BOMBACINUS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 34. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 82--83. 1928 (N, W) & pl. 49. 1928 (Ld, N, W); Kunth, Enum. Pl. 3: 574. 1841 (W).

PAEPALANTHUS BONGARDI Kunth
Additional bibliography: Mold., Phytologia 41: 476. 1979; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS BRACHYPHYLLUS Ruhl.
Additional bibliography: Mold., Phytologia 37: 34. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.
Poole describes this plant as an infrequent annual, to 20 cm. tall, with whitish flower-heads, and found in both in flower and fruit in June.
Additional citations: BRAZIL: Amazonas: *Poole 1794* (N).

PAEPALANTHUS BRACHYPUS (Bong.) Kunth
Additional bibliography: Mold., Phytologia 37: 34 (1977), 40: 26 (1978), and 41: 476. 1979; Hocking, Excerpt. Bot. A.33: 89. 1979; Mold., Phytol. Mem. 2: 151 & 610. 1980.
Additional citations: BRAZIL: Minas Gerais: *Maguire, Maguire, & Murça Pires 44773* (Ld, Ld, N). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 572. 1841 (W).

PAEPALANTHUS BRACHYPUS f. *BREVIPILOSUS* Mold.
Additional bibliography: Hocking, Excerpt. Bot. A.33: 89. 1979; Mold., Phytologia 41: 476. 1979; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS BRADEI Mold.
Additional bibliography: Mold., Phytologia 25: 154. 1973; Angely, S. Amer. Bot. Bibl. 2: 674. 1980; Mold., Phytol. Mem. 2: 151 & 610. 1980.

[to be continued]

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FIFTIETH JUBILEE YEAR

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A NEW SPECIES OF BIDENS (HELIANTHEAE-ASTERACEAE) FROM GUATEMALA

Michael O. Dillon
Botany Department
Field Museum of Natural History
Chicago, Illinois 60605

Recently, while intercalating members of the Asteraceae into the herbarium, the following new species, *Bidens nana* Dillon, was encountered. It was originally distributed under the name *Bahia depauperata* S.F. Blake, a species that it superficially resembles.

Bidens nana Dillon, *sp. nov.*, fig. 1.

TYPE: Guatemala, Huehuetenango, Chiantla, Aldea San Nicolás, pasto natural de la Estación Ovino, 3150 m, 12 Oct 1976, *D. N. Smith 490* (holotype, F; isotype, ISC).

Herbae annuae 2-5 cm altae. Folia bipinnata 5-11 mm longa inclusis petiolis, 5-10 mm lata segmentis oblanceolatis vel ellipticis 1-5 mm longis, 0.5-1.0 mm latis. Capitula solitaria discoidea flosculis 7-10. Achaenia linearia-attenuata 3-5 mm longa, pappi aristae 2, 0.5-1.0 mm longi hamulosi.

Annual herbs, 2-5 cm tall; stems to 6 cm long, erect to procumbent, sparsely pilose. Leaves opposite, bipinnatifid, ovate in outline, 5-11 mm long, including petiole, 5-10 mm wide, the segments oblanceolate to elliptic, 1-5 mm long, 0.5-1.0 mm wide, sparsely pilose. Capitulescence solitary, terminal and axillary, peduncles 1-6 mm long. Capitula discoid, 3.0-5.5 mm high, 2-3 mm wide, often subtended by foliaceous calycerate bracts, 2-3-fid, 4-5 mm long; receptacle plane; involucres campanulate, 2-seriate; outer phyllaries oblanceolate, subfoliaceous, green, sparsely pilose, 2.5-5.0 mm long, 0.7-1.0 mm wide, apically acute, the inner phyllaries lanceolate to narrowly ovate, membranaceous, sparsely pilose, yellowish, striate, dark striped, 3.0-3.5 mm long, 1.0-1.4 mm wide, the margins hyaline, apically acute to rounded, ciliate; paleae linear-lanceolate, membranaceous, yellow striped, 4.0-4.5 mm long, apically obtuse to truncate, mucronate; florets 7-10, the corollas (4-) 5-lobed, yellow, narrowly cylindrical, 2.0-2.5 mm long, sparsely glandular; anthers black, ca. 0.8 mm long, the terminal appendages ovate, the style branches ca. 0.5 mm long, the appendages lanceolate, hispidulous. Achenes black, linear-attenuate, flattened, ribbed, 3-5 mm long, 0.3-0.6 mm wide, antrorsely setose apically; pappus of 2 awns, erect, slender, 0.5-1.0 mm long, retorsely barbellate.

This small annual is unique among the *Bidens* taxa thusfar described from Guatemala, and does not appear closely related to any of the species currently known from that country. It resembles forms of *Bidens anthemoides* (DC.) Sherff occurring in alpine habitats (above 3000 m) in central Mexico. Those individuals have a smaller habit and bipinnatifid leaves; however, their larger leaf segments and radiate capitula on peduncles over 1 cm long clearly distinguish them from *Bidens nana*.

Additional material examined: GUATEMALA: Huehuetenango. Todo Santos, Yac, Valle de la Ventura, 3550 m, 4 Oct 1977, *D. N. Smith 846* (F, ISC); Huehuetenango. Chiantla, Llano de San Nicolás, 3080 m, 5 Oct 1977, *D. N. Smith 849* (F, ISC); San Marcos. Ixchiguan, Cerro Cotzic, 3550 m, *D. N. Smith et al. 919* (F, ISC).

ACKNOWLEDGEMENTS. I wish to thank David N. Smith for supplying additional material of this species for investigation, Benjamin Taylor for preparing the illustration, and Dr. Rolf Singer for helping with the Latin description.

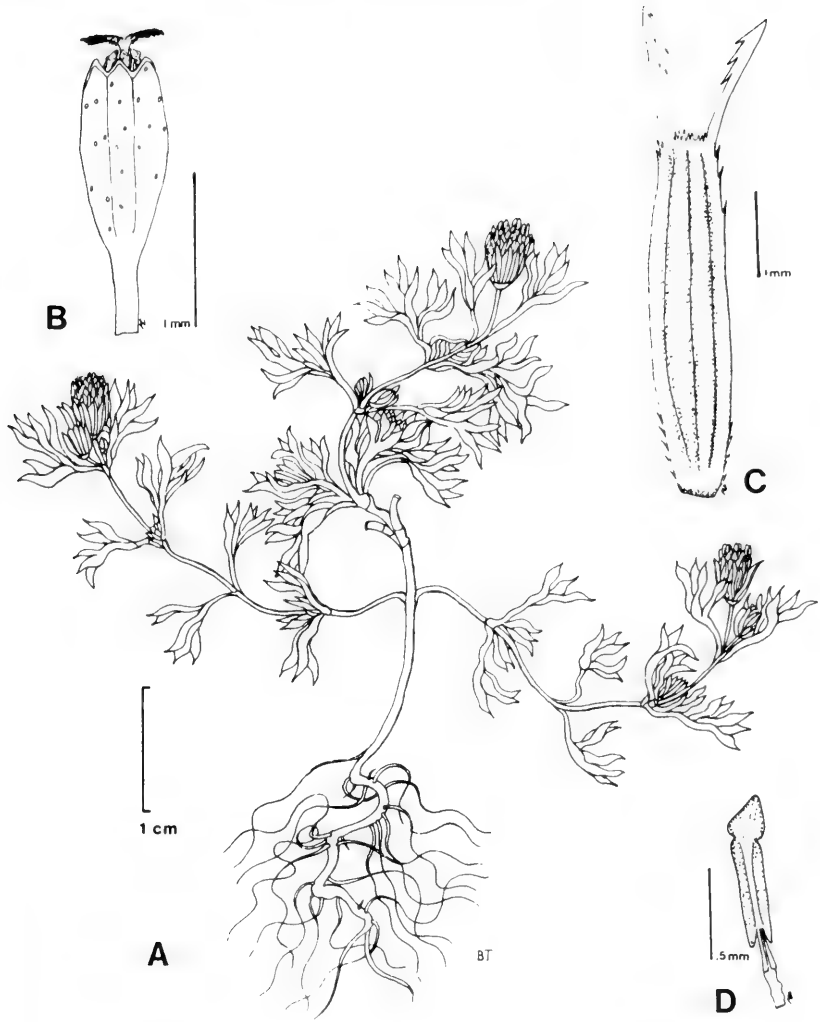

Fig. 1. *Bidens nana*. A, habit; B, floret; C, achene; D, anther. (From *Smith 490*, F).

A SIXTH SUMMARY OF THE *VERBENACEAE, AVICENNIACEAE, STILBACEAE, CHLOANTHACEAE, SYMPHOREMACEAE, NYCTANTHACEAE,* AND *ERIOCAULACEAE* OF THE WORLD AS TO VALID TAXA, GEOGRAPHIC DISTRIBUTION AND SYNONYMY. SUPPLEMENT 3

Harold N. Moldenke

The original of this work (629 pp.) was published by me as PHYTOLOGIA MEMOIRS II in 1980 and was based, in part, on the examination of 246,814 herbarium specimens of these groups preserved in 320 private and institutional herbaria. A first supplement was issued on February 24, 1982, in PHYTOLOGIA 50: 233--270, based, in part, on 7,310 additional specimens examined. A second supplement was issued on October 13, 1982, in PHYTOLOGIA 52: 110--129, after the examination of 5,692 additional specimens from 5 additional herbaria. Since then no less than 5,901 additional specimens have come to hand from botanical collectors and museum curators all over the world, and representing another additional herbarium. These have brought to light so many new geographic records and even new taxa, and concomitant literature study by my wife, Alma L. Moldenke, and myself has shown the necessity for so many changes in nomenclature and/or specific delimitations that it seems appropriate to publish this third supplement at this time. For substantiating data please consult my various papers on individual genera in this (and some other) journals.

I. Geographic distribution additions and emendations:

CANADA:

Ontario:

Verbena stricta Vent. [Essex County]

UNITED STATES OF AMERICA:

Massachusetts:

Eriocaulon pellucidum Michx. [Grand Menan Island]

New York:

Verbena urticifolia L. [Sullivan County]

Verbena urticifolia var. *leiocarpa* Perry & Fernald [Delaware County]

Maryland:

Verbena urticifolia var. *leiocarpa* Perry & Fernald [Calvert . County]

North Carolina:

Eriocaulon decangulare f. *parviceps* Mold. [Macon County]

Georgia:

Eriocaulon decangulare L. [Meriwether County]

Florida:

Citharexylum fruticosum var. *villosum* (Jacq.) O. E. Schulz [Big Pine Key]

Lantana camara f. *mista* (L.) Mold. [Stock Island]

Lantana ovatifolia Britton [Point Losman's Key]

Lantana ovatifolia f. *parvifolia* Mold. [Broward & Lee Counties; Anna Maria, Palma Vista, & Paradise Keys]
Verbena brasiliensis Vell. [Volusia County]
Vitex trifolia var. *variegata* Mold. [Stock Island]
Alabama:
Eriocaulon decangulare f. *parviceps* Mold. [Mobile County]
Mississippi:
Verbena bonariensis L. [Washington County]
Verbena bracteata Lag. & Rodr. [Washington County]
Verbena halei Small [Washington County]
Verbena urticifolia L. [Monroe & Washington Counties]
Verbena xutha Lehm. [Washington County]
Ohio:
Verbena stricta Vent. [Miami County]
Michigan:
Verbena hastata L. [Kalamazoo County]
South Dakota:
Verbena bipinnatifida Nutt. [Charles Mix County]
Arkansas:
Eriocaulon decangulare L. [Calhoun County]
Eriocaulon kȍrnickianum Van Heurck & Muell.-Arg. [Madison County]
Texas:
Aloysia gratissima (Gill. & Hook.) Troncoso [Caldwell County]
Eriocaulon texense Kȍrn. [Houston County]
Vitex agnus-castus L. [Jasper County]
MEXICO:
Aegiphila odontophylla Donn. Sm. [Veracruz]
Citharexylum hirtellum Standl. [Quintana Roo]
Citharexylum mexicanum Mold. [Jalisco]
Citharexylum tetramerum T. S. Brandeg. [San Luis Potosí]
Cornutia lilacina var. *velutina* Mold. [Veracruz]
Duranta repens f. *serrata* (Mold.) Mold. [Quintana Roo]
Eriocaulon schippii Standl. [Tabasco]
Eriocaulon tepicanum Mold. [Chiapas]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Guerrero, Hidalgo, Nayarit, Sinaloa, Veracruz, & Yucatán]
Lantana camara f. *parvifolia* Mold. [Yucatán]
Lantana chiapasensis Mold. [Jalisco]
Lantana dwyeriana Mold. [Campeche]*
Lantana frutilla Mold. [Durango & Oaxaca]
Lantana frutilla var. *velutina* Mold. [México]
Lantana glandulosissima f. *parvifolia* Mold. [Durango, Guerrero, Michoacán, Nayarit, & Oaxaca]
Lantana hintoni Mold. [Jalisco]
Lantana hirta var. *pubescens* Mold. [Yucatán]
Lantana hispida H.B.K. [Guerrero]
Lantana hispida f. *parvifolia* Mold. [Baja California, Chiapas, Michoacán, Oaxaca, & Veracruz]

Lantana hispida var. *ternata* Mold. [Oaxaca]
Lantana horrida H.B.K. [Baja California]
Lantana horrida f. *bracteosa* Mold. [Puebla]*
Lantana horrida f. *inermis* Mold. [Chiapas, Chihuahua, Guanajuato, Jalisco, Puebla, & Veracruz]
Lantana involucrata var. *odorata* (L.) Mold. [Yucatán]
Lantana macropoda f. *parvula* Mold. [Tamaulipas]
Lantana mollis Grah. [Sinaloa]
Lantana montevidensis (Spreng.) Briq. [Puebla]
Lantana notha Mold. [Chiapas & Nayarit]
Lantana urticoides f. *macrophylla* Mold. [Sinaloa]
Lantana velutina f. *albifructa* Mold. -- delete the asterisk
Lantana velutina f. *violacea* Mold. [Baja California & Yucatán]
Lippia graveolens f. *microphylla* Mold. [Baja California]
Lippia mcvaughi Mold. [Oaxaca]
Vitex mollis f. *iltisii* Mold. [Guerrero, Jalisco, & Oaxaca]*

YUCATÁN ISLANDS:
Lantana camara var. *aculeata* (L.) Mold. [Cozumel]
Lantana involucrata var. *odorata* (L.) Mold. [Holbox]

GULF OF CALIFORNIA ISLANDS:
Lantana hispida f. *parvifolia* Mold. [Piedra]
Lippia palmeri S. Wats. [Partida]

GUATEMALA:
Aegiphila deppeana Steud. [Puntarenas]
Ghinia curassavica (L.) Oken [Huehuetenango]
Lantana costaricensis Hayek [Alta Verapaz]
Lantana hispida f. *parvifolia* Mold. [Sacatepéquez]
Lantana trifolia f. *oppositifolia* Mold. [Alta Verapaz]
Lantana velutina Mart. & Gal. [El Progreso]
Lantana velutina f. *violacea* Mold. [Amatitlan & Izabal]
Phyla nodiflora var. *longifolia* Mold. [Amatitlan]

BELIZE:
Citharexylum caudatum f. *parvifolium* Mold.
Lantana camara L.
Phyla nodiflora var. *texensis* Mold.

HONDURAS:
Avicennia germinans (L.) L. [Colón]
Citharexylum caudatum L. [Colón]
Citharexylum hirtellum Standl. [San Marcos]
Lantana camara f. *flava* (Medic.) Mold. [Atlántida & Colón]
Lantana trifolia L. [Colón]
Lantana trifolia f. *oppositifolia* Mold. [Colón]
Lantana velutina f. *violacea* Mold. [Comayagua]
Petrea volubilis L. [Colón]

EL SALVADOR:
Lantana camara f. *mista* (L.) Mold. [San Miguel]
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Sonsonate]
Lantana camara f. *parvifolia* Mold. [San Miguel]
Lantana glandulosissima Hayek [San Vicente]

Lantana glandulosissima f. *parvifolia* Mold. [La Unión & San Salvador]
Lantana hispida H.B.K. [San Vicente]
Lantana notha Mold. [Ahuachapán & San Salvador]

NICARAGUA:
Aegiphila elata Sw. [Jinoteca]
Aegiphila magnifica Mold. [Boaca]
Aegiphila monstrosa Mold. [Zelaya]
Aegiphila panamensis Mold. [Esteli & Granada]
Bouchea prismatica var. *longirostra* Grenz. [Estelí]
Citharexylum caudatum L. [Palmeta Key]
Citharexylum mocinni f. *williamsii* Mold. [Jinotega]
Cornutia lilacina var. *velutina* Mold. [Granada]
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios [Chinandega, Estelí, & Granada]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [León & Matagalpa]
Lantana glandulosissima f. *albiflora* Mold. [Madriz]
Lantana glandulosissima f. *parvifolia* Mold. [Boaco, Estelí, Madriz, & Managua]
Lantana hirta f. *caerulea* Mold. [Estelí]
Lantana notha Mold. [Managua]
Lantana trifolia L. [Estelí & Madriz]
Lantana trifolia f. *albiflora* Mold. [Jinotega]
Lantana trifolia f. *hirsuta* Mold. [Nueva Segovia]
Lantana velutina Mart. & Gal. [Madriz]
Lantana velutina f. *albifructa* Mold. [Estelí]
Lantana velutina f. *macrophylla* Mold. [Matagalpa]
Lantana velutina f. *violacea* Mold. [Madriz & Masaya]
Lippia cardiostegia Benth. [León]
Lippia chiapasensis Loes. [Madriz]
Lippia myriocephala var. *hypoleia* (Briq.) Mold. [Estelí & Jinotega]
Phyla nodiflora (L.) Greene [Zelaya]
Phyla scaberrima (A. L. Juss.) Mold. [Nueva Segovia]
Phyla stoechadifolia (L.) Small [Chontales & Matagalpa]
Phyla strigulosa var. *sericea* (Kuntze) Mold. [Estelí]
Priva lappulacea (L.) Pers. [Managua, Nueva Segovia, & Zelaya]
Priva lappulacea f. *albiflora* Mold. [Nueva Segovia]
Rehdera trinervis (Blake) Mold. [Estelí]
Rehdera trinervis f. *mollicella* (Standl. & Mold.) Mold. [Estelí & León]
Verbena litoralis H.B.K. [Madriz & Nueva Segovia]

COSTA RICA:
Clerodendrum epiphyticum Standl. -- to be deleted
Eriocaulon schippii Standl. [Puntarenas]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Cartago & San José]
Lantana hirta f. *caerulea* Mold. [San José]
Lantana hirta var. *pubescens* Mold. [San José]
Lantana trifolia f. *hirsuta* Mold. [Cartago]

Lippia liberiensis Mold. -- delete the asterisk
Priva lappulacea f. *albiflora* Mold. [Puntarenas]
PANAMA:
Aegiphila anomala Pittier [Veraguas]
Aegiphila hoehnei var. *spectabilis* Mold. [Colón]
Aegiphila laevis (Aubl.) Gmel. [Panamá]
Avicennia bicolor Standl. [Los Santos; Poao Island]
Avicennia germinans (L.) L. [Poai Island]
Citharexylum hirtellum var. *guatemalense* Mold. [Chiriquí]
Citharexylum spinosum L. [Colón]
Clerodendrum epiphyticum Standl. -- to be deleted
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Canal Zone & San Blas]
Lantana glandulosissima var. *grandis* Mold. [Canal Zone & Colón]
Lantana hirta var. *pubescens* Mold. [Chiriquí]
Lantana hispida f. *parvifolia* Mold. [Coclé, Panamá, & Veraguas]
Lantana trifolia f. *oppositifolia* Mold. [Colón]
Lippia liberiensis Mold. [Veraguas]
Phyla nodiflora var. *longifolia* Mold. [Veraguas; Colón Island]
Stachytarpheta cayennensis (L. C. Rich.) Vahl [Chiriquí]
Stachytarpheta jamaicensis (L.) Vahl [Veraguas]
TABOGA ISLAND:
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios
PEARL ISLANDS:
Stachytarpheta cayennensis f. *purpurea* Mold. [Ray]*
Stachytarpheta guatemalensis Mold. [Salaga]
CUBA:
Citharexylum caudatum f. *parvifolium* Mold. [Pinar del Río]
Phyla strigulosa var. *sericea* (Kuntze) Mold. [Las Villas]
Syngonanthus insularis Mold. [Pinar del Río]
Syngonanthus lagopodioides f. *minor* Mold. [Pinar del Río]
ISLA DE PINOS:
Lantana arida Britton
Syngonanthus lagopodioides f. *minor* Mold.
CAYMAN ISLANDS:
Clerodendrum aculeatum (L.) Schlecht. [Grand Cayman]
JAMAICA:
Citharexylum fruticosum var. *smallii* Mold.
HISPANIOLA:
Lantana ciferriana Ekm. & Mold. -- delete the asterisk
Lantana involucrata f. *rubella* Mold. [Haiti]
Petrea volubilis L. [Dominican Republic]
Priva lappulacea f. *albiflora* Mold. [Dominican Republic]
HISPANIOLAN OFFSHORE ISLANDS:
Lantana ciferriana Ekm. & Mold. [Cabritos]
PUERTO RICO:
Clerodendrum wallichii Merr.
Priva lappulacea f. *albiflora* Mold.
PUERTO RICAN OFFSHORE ISLANDS:
Citharexylum fruticosum L. [Cabras]

Lantana involucrata L. [Icacos]
VIRGIN ISLANDS:
Duranta repens f. *integrifolia* (Tod.) Mold. [St. Croix]
Holmskioldia sanguinea Retz. [St. John]
LEEWARD ISLANDS:
Citharexylum fruticosum L. [Désirade]
Citharexylum spinosum L. [Désirade & Marie Galante]
Lantana involucrata f. *kuhnholtziana* Stehlé [Petite Terre]*
Lantana involucrata f. *nivea* Stehlé -- to be deleted
Priva lappulacea f. *albiflora* Mold. [Guadeloupe]
Stachytarpheta jamaicensis (L.) Vahl [Saba]
WINDWARD ISLANDS:
Phyla nodiflora var. *antillana* Mold. [Barbados]
TRINIDAD & TOBAGO:
Lantana lockhartii (Griseb.) D. Don [Charcachacare]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Trinidad]
SOUTHERN NETHERLANDS ANTILLES:
Lantana arida Britton [Curaçao]
Lantana arubensis Mold. [Bonaire]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) Mold. [Aruba]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Bonaire]
NORTHERN SOUTH AMERICAN ISLANDS:
Citharexylum caudatum f. *parvifolium* Mold. [Providencia]
Lantana involucrata var. *odorata* (L.) Mold. [San Andres]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Margarita & San Andres]
SWAN ISLANDS:
Lantana involucrata L. [Great Swan]
COLOMBIA:
Aegiphila mollis var. *longifolia* (Turcz.) López-Palacios [Valle]
Aegiphila novogranatensis Mold. [Nariño]
Aegiphila novogranatensis f. *grandifolia* Mold. [Cundinamarca]
Aegiphila peruviana Turcz. -- to be deleted
Aegiphila peruviana var. *oblongifolia* (Rusby) Mold. [Bolívar]
Citharexylum karsteni var. *lanceolatum* Mold. [Boyacá]
Citharexylum sulcatum Mold. [Boyacá]
Eriocaulon microcephalum H.B.K. -- delete "Magdalena"
Eriocaulon spruceanum Körn. [Meta]
Lantana colombiana López-Palacios [Antioquia]
Lantana trifolia L. [Caquetá]
Lantana trifolia f. *hirsuta* Mold. [Nariño]
Lippia alba f. *intermedia* Mold. [Amazonas]
Lippia americana L. [Boyacá]
Paepalanthus andicola Körn. [Santander & Valle]
Paepalanthus fasciculatus f. *içanensis* Herzog [Vaupés]
Paepalanthus fasciculatus f. *tenellus* Herzog [Vaupés]
Paepalanthus meridensis Klotzsch [Norte de Santander]
Paepalanthus pauperrimus Herzog [Vaupés]
Petrea algentryi Mold. [Chocó]*

Petrea colombiana Mold. [Amazonas]
Priva lappulacea f. *albiflora* Mold. [Atlántico]
Stachytarpheta canescens H.B.K. [Antioquia]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Cundinamarca]
Syngonanthus caulescens var. *hatschbachii* Mold. [Meta]
Syngonanthus xeranthemoides (Bong.) Ruhl. [Meta]
Tonina fluviatilis f. *parvifolia* Mold. [Chocó]

VENEZUELA:
Aegiphila glandulifera var. *paraënsis* Mold. [Amazonas]
Aegiphila lewisiana Mold. [Guárico, Portuguesa, & Táchira]
Aegiphila macrantha Ducke [Delta Amacuro]
Aegiphila mollis var. *intermedia* Mold. [Zulia]
Aegiphila novogranatensis Mold. [Trujillo]
Aegiphila perplexa Mold. [Sucre]
Citharexylum karsteni Mold. [Mérida]
Eriocaulon klotzschii f. *proliferum* (Mold.) Mold. --to be deleted
Eriocaulon spruceanum Körn. [Amazonas]
Lantana armata Schau. [Anzoátegui]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Apure]
Lantana trifolia f. *hirsuta* Mold. [Trujillo]
Leiothrix amazonica Mold. [Bolívar]
Leiothrix flavescens var. *chimantensis* Mold. [Bolívar]*
Leiothrix marahuacensis Mold. [Amazonas]*
Leiothrix mucronata var. *glabra* Mold. [Bolívar]*
Lippia micromera Schau. [Anzoátegui]
Paepalanthus andicola var. *villosus* Mold. [Mérida]
Paepalanthus apacarensis var. *humilis* Mold. [Bolívar]*
Paepalanthus barkleyi Mold. [Mérida]
Paepalanthus convexus var. *major* Mold. [Bolívar]
Paepalanthus duidae var. *parvifolius* Mold. [Amazonas]*
Paepalanthus fasciculatus f. *içanensis* Herzog [Amazonas & Bolívar]
Paepalanthus fraternus var. *chimantensis* Mold. [Bolívar]*
Paepalanthus fulgidus var. *zuloagensis* Mold. [Bolívar]
Paepalanthus kunhardtii Mold. [Bolívar]
Paepalanthus meridensis Klotzsch [Trujillo]
Petrea pubescens f. *albicalyx* Mold. [Táchira & Trujillo]*
Phyla betulaefolia (H.B.K.) Greene [Portuguesa]
Stachytarpheta angustissima Mold. [Bolívar]
Stachytarpheta dichotoma (Ruiz & Pav.) Vahl [Monagas]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Delta Amacuro & Sucre]
Stachytarpheta roraimensis var. *pubescens* Mold. [Bolívar]
Syngonanthus caulescens var. *bellohorizontinus* Alv. Silv. [Amazonas]
Syngonanthus caulescens var. *hirsutus* Mold. [Bolívar]*
Syngonanthus caulescens f. *longifolius* Mold. [Guárico]
Syngonanthus caulescens var. *proliferus* Mold. [Bolívar]
Syngonanthus densus (Körn.) Ruhl. [Bolívar]
Syngonanthus drouetii var. *parviceps* Mold. [Amazonas]*
Syngonanthus fertilis (Körn.) Ruhl. [Bolívar]

Syngonanthus fertilis var. *glandulosus* (Gleason) Mold. [Amazonas]
Syngonanthus gracilis var. *aureus* Ruhl. [Bolívar & Guárico]
Syngonanthus gracilis var. *hirtellus* (Steud.) Ruhl. [Guárico]
Syngonanthus gracilis var. *tenuissimus* Ruhl. [Anzoátegui]
Syngonanthus heteropeploides Herzog [Bolivar]
Syngonanthus humboldtii (Kunth) Ruhl. [Bolivar]
Syngonanthus macrocaulon Ruhl. [Amazonas]
Syngonanthus nitens (Bong.) Ruhl. [Amazonas]
Syngonanthus simplex (Miq.) Ruhl. [Guárico]
Syngonanthus xeranthemoides var. *alpinus* Mold. [Bolivar]*
Vitex capitata f. *albiflora* Mold. [Apure]

GUYANA:
Aegiphila amazonica Mold. -- to be deleted
Clerodendrum rusbyi Mold.
Syngonanthus macrocaulon Ruhl.

SURINAM:
Paepalanthus fasciculatus f. *sphaerocephalus* Herzog
Paepalanthus polytrichoides var. *glaber* Mold.
Stachytarpheta jamaicensis f. *atrocoerulea* Mold.
Vitex triflora var. *coriacea* Huber

ECUADOR:
Aegiphila novogranatensis Mold. [Esmeraldas]
Aegiphila novogranatensis f. *grandifolia* Mold. [Esmeraldas]
Aloysia scorodonioides var. *detonsa* (Briq.) Mold. [Imbabura]
Aloysia scorodonioides var. *orbicularis* Mold. [Loja]
Citharexylum gentryi Mold. [Guayas]
Lantana fiebrigii Hayek [Tungurana]
Lippia lojensis Mold. [Loja]*
Verbena litoralis H.B.K. [Moreno-Santiago]

PERU:
Aegiphila amazonica Mold. -- to be deleted
Aegiphila glabrata f. *macrophylla* Mold. [Loreto]*
Duranta coriacea Hayek [Piura]
Duranta pseudorepens Mold. [Cajamarca]
Duranta rupestris Hayek [Puno]
Duranta sprucei Briq. [Cajamarca]
Lantana cujabensis Schau. [Cajamarca & Pasco]
Lantana maxima Hayek [Cajamarca]
Lantana scabiosaeflora H.B.K. [Moquegua]
Lantana svensonii f. *albiflora* Mold. [Cajamarca]
Lippia alba (Mill.) N. E. Br. [Pasco]
Lippia americana f. *hyptoides* (Benth.) Mold. [Lambayeque]
Paepalanthus stuebelianus Ruhl. [Piura]
Petrea rivularis Mold. [Loreto]
Stachytarpheta cayennensis (L. C. Rich.) Vahl [Cajamarca & Madre de Díos]
Verbena weberbaueri Hayek [Cajamarca]
Vitex klugii Mold. [Pasco]
Vitex triflora Vahl [Madre de Díos]

BRAZIL:
Aegiphila amazonica Mold. -- to be deleted
Aegiphila crenata Mold. [Goiás]

Aegiphila paraguariensis Briq. [Roraima]
Aegiphila salticola Mold. [Amazonas]
Aloysia virgata (Ruiz & Pav.) A. L. Juss. [Maranhão]
Aloysia virgata var. *elliptica* (Briq.) Mold. [Rio de Janeiro]
Avicennia schaueriana f. *candicans* Mold. [Alagoas]
Bouchea chascanoides Mold. [Bahia]
Casselia chamaedryfolia Cham. [Maranhão]
Citharexylum myrianthum var. *bahiense* Mold. [Bahia]*
Clerodendrum rusbyi Mold. -- delete the asterisk
Duranta vestita var. *glabrescens* Mold. [Paraná]
Eriocaulon guyanense Körn. [Amazônas]
Eriocaulon palludicola Alv. Silv. [Minas Gerais]* orig. spell.
Eriocaulon spruceanum f. *fluitans* Herzog [Amapá]
Eriocaulon tenuifolium f. *viviparum* Mold. -- delete the asterisk
Ghinia spicata (Aubl.) Mold. [Alagoas]
Lantana achyranthifolia Desf. [Minas Gerais]
Lantana aristata var. *angustifolia* (Kuntze) Mold. [Distrito Federal]
Lantana bahiensis Turcz. [Redonda Island]
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios [Distrito Federal]
Lantana camara f. *parvifolia* Mold. [Santa Catarina]
Lantana canescens f. *parvifolia* Mold. [Pará]*
Lantana canescens f. *pluripedunculata* Mold. [Rio de Janeiro]
Lantana hypoleuca Schau. [Distrito Federal]
Lantana lundiana Schau. [Distrito Federal & Goiás]
Lantana maxima Hayek [Pará]
Lantana pohliana Schau. [Rio Grande do Norte]
Lantana punctulata Mold. [Alagoas]
Lantana tiliaefolia Cham. [Distrito Federal]
Lantana triplinervia Turcz. [Distrito Federal]
Lantana triplinervia f. *armata* Mold. [Rio de Janeiro]
Lantana undulata Schrank [João da Cunha Island]
Lantana viscosa Pohl [Espirito Santo]
Leiothrix amazonica Mold. -- delete the asterisk
Leiothrix flavescens (Bong.) Ruhl. [Distrito Federal]
Lippia alba f. *intermedia* Mold. [Amazônas & Rio de Janeiro]
Lippia elegans Cham. [Distrito Federal]
Lippia glandulosa Schau. [Goiás]
Lippia gracilis Schau. [Distrito Federal]
Lippia lasiocalycina Cham. [Distrito Federal]
Lippia origanoides H.B.K. [Minas Gerais]
Lippia rotundifolia var. *cordata* Mold. [Distrito Federal]*
Paepalanthus argenteus var. *viridis* Mold. [Minas Gerais]*
Paepalanthus capanemae Alv. Silv. [Rio de Janeiro]
Paepalanthus capillaris (Bong.) Körn. [Distrito Federal]
Paepalanthus elongatus var. *glabrescens* Mold. [Distrito Federal]
Paepalanthus formosus Mold. [Amazônas]
Paepalanthus fulgidus var. *zuloagensis* Mold. --delete the "*"
Paepalanthus glaziovii Ruhl. [Goiás]
Paepalanthus longicaulis var. *glaber* Mold. -- to be deleted

Paepalanthus macropodus var. *glaber* (Mold.) Mold. [Bahia & Minas Gerais]
Paepalanthus polytrichoides var. *glaber* Mold. [Roraima]
Paepalanthus pullus Körn. [Pará]
Paepalanthus saxicola Körn. [Mato Grosso]
Paepalanthus speciosus var. *goyazensis* Mold. [Distrito Federal & Goiás]*
Stachytarpheta chamissonis var. *longipetiolata* Mold. [Goiás]*
Stachytarpheta dichotoma (Ruiz & Pav.) Vahl [Mato Grosso]
Stachytarpheta gesnerioides var. *simplex* (Hayek) Mold. [Distrito Federal]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Espirito Santo & Matto Grosso]
Stachytarpheta laevis Mold. [Rio de Janeiro]
Stachytarpheta maximiliani var. *glabrata* Schau. [Alagoas]
Stachytarpheta schottiana var. *angustifolia* Mold. [Rio de Janeiro]*
Syngonanthus arenarius var. *heterophyllus* (Körn.) Ruhl. [Amazônas]
Syngonanthus aurifibratus Alv. Silv. [Rio de Janeiro]
Syngonanthus caulescens var. *bellohorizontinus* Alv. Silv. -- delete the asterisk
Syngonanthus caulescens var. *gardnerianus* Mold.*
Syngonanthus caulescens var. *hatschbachii* Mold. [Distrito Federal, Paraná, Rio Grande do Sul, Santa Catarina, & São Paulo] -- delete the asterisk
Syngonanthus caulescens var. *proliferus* Mold. -- delete the asterisk
Syngonanthus elegans (Bong.) Ruhl. [Amazônas]
Syngonanthus elegantulus var. *glabrifolius* Mold. [Amazônas]*
Syngonanthus glandulosus f. *epapillosus* (Mold.) Mold. [Roraima]
Syngonanthus gracilis var. *tenuissimus* Ruhl. [Rio de Janeiro]
Syngonanthus heterophyllus Alv. Silv. [Rio de Janeiro]
Syngonanthus leprieuri (Körn.) Ruhl. [Amazônas]
Syngonanthus longipes Gleason [Distrito Federal]
Syngonanthus nitens f. *pilosus* Mold. [Amazônas]
Syngonanthus xeranthemoides (Bong.) Ruhl.[Amazônas & Rondónia]
Syngonanthus xeranthemoides f. *brevifolius* Mold. [Rio de Janeiro]
Syngonanthus xeranthemoides var. *confusus* (Körn.) Mold. [Goiás]
Tonina fluviatilis f. *parvifolia* Mold. -- delete the asterisk
Verbena tenuisecta f. *rubella* Mold. [Mato Grosso]
Vitex polygama var. *warmingii* Mold. [Rondónia]

BOLIVIA:
Aegiphila buchtienii Mold. [El Beni]
Aegiphila peruviana Turcz. -- to be deleted
Aegiphila peruviana var. *oblongifolia* (Rusby) Mold. [El Beni]
Aloysia boliviensis Mold. [La Paz]*
Aloysia virgata (Ruiz & Pav.) A. L. Juss. [El Beni]
Lantana cujabensis f. *scabrifolia* Mold. [El Beni]
Priva boliviana Mold. [El Beni]

Vitex pseudolea Rusby [El Beni]
PARAGUAY:
Syngonanthus caulescens var. *hatschbachii* Mold.
URUGUAY:
Lippia coarctata Troncoso*
LIBERIA:
Clerodendrum umbellatum f. *scandens* (P. Beauv.) Mold.
BURUNDI:
Eriocaulon strictum Milne-Redhead
Lantana camara f. *mutabilis* (Hook.) Mold.
SOUTH AFRICA:
Vitex trifolia var. *subtrisecta* (Kuntze) Mold. [Natal]
COMORO ISLANDS:
Premna obtusifolia R. Br. [Cosmoledo]
IRAN:
Verbena rigida Spreng.
PAKISTAN:
Caryopteris foetida (D. Don) Thellung [Northwestern States]
Caryopteris grata Benth. -- to be deleted
Caryopteris odorata (Hamilt.) B. L. Robinson [Baluchistan, Hazara, Lahore, Rawalpindi, Swat. & West Punjab]
Caryopteris paniculata C. B. Clarke [Northwestern States]
Verbena tenuisecta f. *rubella* Mold. [Rawalpindi]
NEPAL:
Caryopteris foetida (D. Don) Thellung
Caryopteris grata Benth. -- to be deleted
Clerodendrum lasiocephalum C. B. Clarke
Eriocaulon xeranthemum Heyne -- not "Mart."
INDIA:
Caryopteris foetida (D. Don) Thellung [Assam, East Kashmir, Sikkim, & Uttar Pradesh]
Caryopteris grata Benth. -- to be deleted
Caryopteris odorata f. *albiflora* (Voigt) Mold. [East Punjab & Uttar Pradesh]
Eriocaulon collinum var. *nanum* Mold. [Maharashtra]
Eriocaulon minutum Lam. [Gujarat]
Eriocaulon xeranthemum Heyne -- not "Mart."
Gmelina arborea Rox. [Bombay Island]
Gmelina arborea f. juv. *dentata* Mold. [Siwalik & Jaunsar]
BANGLADESH:
Eriocaulon xeranthemum Heyne -- not "Mart."
BURMA:
Clerodendrum colebrokianum var. *henryanum* Mold. [Upper Burma]
Eriocaulon xeranthemum Heyne -- not "Mart."
Petrea volubilis L. [Tenasserim]
Vitex urceolata C. B. Clarke [Karenni]
CHINA:
Caryopteris parvifolia Batalin -- to be deleted
Clerodendrum colebrokianum Walp. -- to be deleted
Clerodendrum colebrokianum var. *henryanum* Mold. [Anhwei & Yünnan]
Eriocaulon alpestre Hook. f. & Thoms. [Hupeh]

Eriocaulon robustius (Maxim.) Mak. [Hupeh]
CHINESE COASTAL ISLANDS:
Caryopteris incana (Thunb.) Miq. [Amoy]
THAILAND:
Clerodendrum colebrokianum var. *henryanum* Mold.
Eriocaulon xeranthemum Heyne -- not "Mart."
LAOS:
Eriocaulon nanellum var. *laosense* Satake -- to be deleted
Eriocaulon nepalense var. *laosense* Satake*
MALAYA:
Clerodendrum fastigiatum (Hunter) H. J. Lam [Prince of Wales Island]
Clerodendrum inerme (L.) Gaertn. [Prince of Wales Island]
Gmelina asiatica L. [Malacca, Negri Sembilan, Perak, Prince of Wales Island, & Trengganu]
Premna cordifolia Roxb. [Prince of Wales Island]
Vitex gamosepala W. Griff. [Johore]
PHILIPPINE ISLANDS:
Vitex glabrata var. *bombacifolia* (Wall.) Mold. [Mindanao]
Vitex trifolia var. *simplicifolia* Cham. [Camiguin]
GREATER SUNDA ISLANDS:
Eriocaulon australe R. Br. [Sumatra]
Eriocaulon xeranthemum Heyne -- not "Mart."
Teijsmanniodendron bogoriense var. *pentaphyllum* Mold. [Sumatra]
Vitex velutina (Koord. & Val.) Koord. [Kambangan]
MOLUCCA ISLANDS:
Avicennia alba Blume -- to be deleted
Avicennia alba var. *latifolia* Mold. [Ceram]
GILBERT ISLANDS:
Premna obtusifolia R. Br. [Aonteuma]
AUSTRALIA:
Dicrastylis exsuccosa var. *tomentosa* f. *lachnophylla* Munir [Western Australia]
Eriocaulon hooperae Mold. [Western Australia]*
CULTIVATED:
Aloysia looseri Mold. [Brazil]
Aloysia polystachya (Griseb.) Mold. [Costa Rica]
Aloysia triphylla (L'Hér.) Britton [Turkey]
Aloysia virgata var. *elliptica* (Briq.) Mold. [Thailand]
Avicennia alba Blume [Texas]
Avicennia alba var. *latifolia* Mold. [Texas]
Avicennia bicolor Standl. [Texas]
Avicennia eucalyptifolia Zipp. [Texas]
Avicennia germinans (L.) L. [Texas]
Avicennia germinans var. *guayaquilensis* (H.B.K.) Mold. [Texas]
Avicennia marina var. *resinifera* (Forst. f.) Bakh. [Texas]
Avicennia marina var. *rumphiana* (H. Hallier) Bakh. [Texas]
Avicennia tonduzii Mold. [Texas]
Callicarpa longifolia Lam. [Michigan]
Caryopteris Xclandonensis Simmonds [California, District of Columbia, Netherlands, & Washington]
Caryopteris foetida (D. Don) Thellung [Burma & England]

Caryopteris grata Benth. -- to be deleted
Caryopteris incana (Thunb.) Miq. [Bulgaria & Hungary]
Caryopteris incana f. *nana* (Dreer) Mold. [Japan & Pennsylvania]
Caryopteris incana f. *superba* (Dreer) Mold. [Netherlands]
Caryopteris mongholica Bunge [France & Ireland]
Caryopteris odorata f. *albiflora* (Voigt) Mold. -- delete the asterisk
Citharexylum oleinum (Benth.) Mold. [California]
Clerodendrum colebrokianum Walp. [Mexico]
Clerodendrum indicum (L.) Kuntze [Trinidad]
Clerodendrum trichotomum Thunb. [Oregon]
Duranta repens L. [Turkey]
Gmelina arborea Roxb. [Cuba, Dominican Republic, Fiji Islands, Kenya, Malaya, Nicaragua, Puerto Rico, Sabah, Solomon Islands, South Africa, & Tanganyika]
Gmelina elliptica J. E. Sm. [China]
Gmelina leichhardtii (F. Muell.) F. Muell. [Kenya & South Africa]
Gmelina philippensis Cham. [Trinidad & Zimbabwe]
Holmskioldia tettensis (Klotzsch) Vatke [Puerto Rico & St. Croix]
Lantana camara L. [Turkey]
Lantana camara f. *flava* (Medic.) Mold. [Maryland]
Lantana camara f. *mista* (L.) Mold. [Maryland]
Lantana fiebrigii Hayek [Peru]
Lantana glutinosa Poepp. [Peru]
Lantana hispida H.B.K. [El Salvador]
Lantana montevidensis (Spreng.) Briq. [Arizona]
Lantana velutina f. *violacea* Mold. [Arizona]
Lippia alba (Mill.) N. E. Br. [Nicaragua]
Lippia alba f. *intermedia* Mold. [Austria]
Premna pyramidata Wall. [India]
Premna tomentosa Willd. [India]
Tectona grandis f. *canescens* Mold. [Venezuela]
Verbena canadensis (L.) Britton [Florida & Ohio]
Vitex agnus-castus L. [Malawi]
Vitex agnus-castus f. *latifolia* (Mill.) Rehd. [District of Columbia, Florida, & Maryland]
Vitex glabrata R. Br. [India]
Vitex negundo var. *heterophylla* (Franch.) Rehd. [Maryland]
Vitex trifolia var. *subtrisecta* (Kuntze) Mold. [Kwajalein & Rita Islands]

II. Additional and emended rejected names, including misspellings and variations in accredition

Acrocephalus Benth. -- in the *Lamiaceae*
Aeghyphyla Héringer = *Aegiphila* Jacq.
Aegifila Angely = *Aegiphila* Jacq.
Aegiphila amazonica Mold. = *A. integrifolia* var. *guyanensis* (Mold.) López-Palacios

Aegiphila lhotskijana Cham. = *A. lhotzkiana* Cham.
Aegiphila martinicensis var. *martinicensis* [Jacq.] = *A. martinicensis* Jacq.
Aegiphila martiniquensis Jacq. = *A. martinicensis* Jacq.
Aegiphila oblongifolia Rusby = *A. peruviana* var. *oblongifolia* (Rusby) Mold.*
Aegipohylla Heringer = *Aegiphila* Jacq.
Apata Ad. = *Avicennia* L.
Armeniastrum Lem. -- in the *Goetziaceae*
Avicennia africans Rollet = *A. africana* P. Beauv.
Avicennia tomentosa β *campechiensis* H.B.K. = *A. germinans* (L.) L.
Avicennia tomentosa ξ *owarensis* Walp. = *A. africana* P. Beauv.
Barbula sinensis Lour. = *Caryopteris incana* f. *candida* (Schneid.) Hara*
Basistemon brasiliense Mold. = *Citharexylum brachyanthum* (A. Gray) A. Gray
Callicarpa petitandra Roxb. = *Geunsia furfuracea* (Bakh.) Mold.
Caropteria Grindal = *Caryopteris* Bunge
Caropteria P'ei = *Caryopteris* Bunge
Caropteria glutinosa Rehd. = *Caryopteris glutinosa* Rehd.
Caryopteris foetida (D. Don) Thell. -- to be deleted
Caryopteris foetida Thell. = *C. foetida* (D. Don) Thellung
Caryopteris grata Benth. = *C. foetida* (D. Don) Thellung
Caryopteris grata Benth. & Hook. = *C. foetida* (D. Don) Thellung
Caryopteris grata Kurz = *C. paniculata* C. B. Clarke
Caryopteris incana f. *candicans* (Schneid.) Hara = *C. incana* f. *candida* (Schneid.) Hara
Carypoteris incana candida Cy. = *C. incana* f. *candida* (Schneid.) Hara
Caryopteris incana var. *nana* (Dreer) Mold. = *C. incana* f. *nana* (Dreer) Mold.
Caryopteris incania Miq. = *C. incana* (Thunb.) Miq.
Caryopteris mastacanthus var. *alba* Bean = *C. incana* f. *candida* (Schneid.) Hara
Caryopteris mastacanthus var. *candicans* Bean = *C. incana* f. *candida* (Schneid.) Hara
Caryopteris mastac. candida Hort. = *C. incana* f. *candida* (Schneid.) Hara
Caryopteris odorata (D. Don) B. L. Robinson = *C. odorata* (Hamilt.) B. L. Robinson
Caryopteris paniculatas P'ei = *C. paniculata* C. B. Clarke
Caryopteris parvifolia Batalin = *Plectranthus parvifolia* (Batalin) W. A. Talbot, *Lamiaceae*
Caryopteris rangutica [Bean] = *C. incana* (Thunb.) Miq.
Caryopteris wallichiana Bunge = *C. odorata* (Hamilt.) B. L. Robinson
Caryoptueris P'ei = *Caryopteris* Bunge
Chastanum Mold. = *Chascanum* E. Mey.
Chastanum latifolium Mold. = *Chascanum latifolium* (Harv.) Mold.
Chastanum latifolium var. *transvaalense* Mold. = *Chascanum latifolium* var. *transvaalense* Mold.
Chloanthes steochadis R. Br. = *C. stoechadis* R. Br.

Citharexylum subserratum Auct. = *C. spinosum* L.
Clerodendron foetidum D. Don = *Caryopteris foetida* (D. Don) Thellung*
Clerodendron foetidum Hamilt. = *Caryopteris foetida* (D. Don) Thellung
Clerodendron granum Jameson = *Caryopteris foetida* (D. Don) Thellung*
Clerodendron gratum Benth. = *Caryopteris foetida* (D. Don) Thellung*
Clerodendron gratum Wall. = *Caryopteris foetida* (D. Don) Thellung
Clerodendron odoratum Buch.-Ham. = *Caryopteris odorata* (Hamilt.) B. L. Robinson
Clerodendron odoratum Ham. = *Caryopteris odorata* (Hamilt.) B. L. Robinson
Clerodendron pithecobium Standl. & Steyerm. =*Gibsoniothamnus cornutus* (Donn. Sm.) A. Gentry, *Scrophulariaceae*
Clerodendrum epiphyticum Standl. = *Gibsoniothamnus epiphyticum* (Standl.) L. Wms., *Scrophulariaceae*
Clerodendrum foetidum D. Don = *Caryopteris foetida* (D. Don) Thellung*
Clerodendrum granum Jameson = *Caryopteris foetida* (D. Don) Thellung*
Clerodendrum odoratum (Ham.) D. Don = *Caryopteris odorata* (Hamilt.) B. L. Robinson
Clerodendrum umbellalum Angely = *C. umbellatum* Poir.
Clerodendrum umbellalum var. *speciosum* Angely = *C. thomsonae* f. *speciosum* (Teijsm. & Binn.) Voss
Congea tuberosa Roxb. = *C. tomentosa* Roxb.
Cornutia piramidata Mold. = *C. pyramidata* L.
Cornutia piramidata var. *isthmica* Mold. = *C. pyramidata* var. *isthmica* Mold.
Cytharexyllum macrophyllum Poir. = *Citharexylum macrophyllum* Poir.
Dematha P. Herm. = *Gmelina* L.
Eriocaulon beyrichianum Sporleder = *Lachnocaulon beyrichianum* Sporleder
Eriocaulon cabraliense Alv. Silv. = *E. cabralense* Alv. Silv.
Eriocaulon diaguissence R. Bourdou = *E. sessile* Meikle
Eriocaulon elionorum Shah = *E. minimum* Lam.
Eriocaulon fuligineum C. Wright = *E. fuliginosum* C. Wright
Eriocaulon manfeense Meikle = *E. mamfeense* Meikle
Eriocaulon melaleucum Heyne = *E. leucomelas* Steud.
Eriocaulon nanellum var. *laosense* Satake = *E. nepalense* var. *laosense* Satake
Eriocaulon palludicola Alv. Silv. -- to be deleted
Eriocaulon paludicola Alv. Silv. = *E. palludicola* Alv. Silv.
Eriocaulon pubigerum Kunth = *E. pubigerum* Bong.
Eriocaulon puzulaefolium Mart. = *E. luzulaefolium* Mart.
Eriocaulon pygmaeum Soland. ex Smith = *E. pygmaeum* Soland.
Eriocaulon sericans sensu Hooker = *E. infirmum* Steud.
Eriocaulon sieboldianum sensu Hook. = *E. redactum* Ruhl.

Eriocaulon xeranthemim Mart. = *E. xeranthemum* Heyne*
Eriocaulon xeranthemum Mart. = *E. xeranthemum* Heyne*
Eriocaulon xeranthemum Mart. & Wall. = *E. xeranthemum* Heyne*
Gmelia arborea Qureshi = *Gmelina arborea* Roxb.
Gmelina arborea var. *arborea* [Roxb.] = *G. arborea* Roxb.
Gmelina parvifolia Sch. = *G. asiatica* L.
Gmelina rheedi Hook. = *G. arborea* f. juv. *dentata* Mold.*
Gmelina rheedii Hook. = *G. arborea* f. juv. *dentata* Mold.*
Gmeline philippense Cham. = *Gmelina philippensis* Cham.
Gramen junceum chamaemeli capitulis, aphyllis Herm. = *Eriocaulon quinquangulare* L.
Lantana balansae f. *albiflora* Mold. = *L. balansae* f. *albiflora* Osten & Mold.
Lantana fiebriquii Hayek = *L. fiebrigii* Hayek
Lantana hispida var. *hispida* [H.B.K.] = *L. hispida* H.B.K.
Lantana involucrata f. *alba* Stehlé = *L. involucrata* f. *kuhnholtziana* Stehlé
Lantana involucrata f. *nivea* Stehlé = *L. involucrata* f. *kuhnholtziana* Stehlé
Lantana languinosa Mill. = *L. involucrata* var. *odorata* (L.) Mold.
Lantana lanuginosa Mill. = *L. involucrata* var. *odorata* (L.) Mold.
Lantana peduncularis var. *peduncularis* [Anderss.] = *L. peduncularis* Anderss.
Lantana rubela Mold. = *L. rubella* Mold.
Leiothrix rufula L. C. Rich. in Walp. = *L. rufula* (A. St.-Hil.) Ruhl.
Lippia macromera Reis & Lipp = *L. micromera* Schau.
Lippia micromelum Meijer & Sm. = *L. micromera* Schau.
Lippia nutan Rob. & Greenm. = *L. bracteosa* (Mart. & Gal.) Mold.
Lippia stoechadiifolia H.B.K. = *Phyla stoechadifolia* (L.) Small
Lycium maderaspatanum indici alpino putati aemulum, foliis minoribus (& majoribus) bijugis & grandioribus aculeis horridum Pluk. = *Gmelina asiatica* L.
Paepalanthus bahiensis (Bong.) Ruhl. = *P. bahiensis* (Bong.) Kunth
Paepalanthus fastigiatus (Bong.) Ruhl. = *P. fastigiatus* (Bong.) Kunth
Paepalanthus lingicaulis var. *glaber* Mold. = *P. macropodus* var. *glaber* (Mold.) Mold.
Paepalanthus longicaulis var. *glaber* Mold. = *P. macropodus* var. *glaber* (Mold.) Mold.
Paepalanthus plumosus (Bong.) Ruhl. = *P. plumosus* (Bong.) Körn.
Paepalanthus polytrichoides Benth. = *P. polytrichoides* Kunth
Paepalanthus polytrichoides var. *glabra* Mold. = *P. polytrichoides* var. *glaber* Mold.
Paepalanthus potyanthus Angely = *P. polyanthus* (Bong.) Kunth
Paepalanthus potyanthus var. *villosus* Angely = *P. polyanthus* f. *villosus* (Beauverd) Mold.
Paepalanthus pubigerus Kunth = *Eriocaulon pubigerum* Bong.
Paepalanthus riedelianus (Bong.) Ruhl. = *P. riedelianus* (Bong.) Körn.
Paepalanthus rigidus (Bong.) Ruhl. = *P. rigidus* (Bong.) Kunth
Paepalanthus saxatilis (Bong.) Ruhl. = *P. saxatilis* (Bong.) Körn.

Paepalanthus tortilis (Bong.) Ruhl. = *P. tortilis* (Bong.) Mart.
Paepalanthus tuberosus (Bong.) Ruhl. = *P. tuberosus* (Bong.) Kunth
Paepalanthus viliipes Mold. = *P. villipes* Mold.
Petraeovitex philippinensis Merr. = *P. trifoliata* Merr.
Petraeovitex temata Hall. f. = *P. trifoliata* Merr.
Petrea pubescens klugii Mold. = *P. pubescens* var. *klugii* Mold.
Petrea volubilis Auct. = *P. racemosa* Nees
Petrea volubilis var. *kohautiana* (Presl) Stehlé = *P. kohautiana* Presl
Philodice cuyabensis (Bong.) Ruhl. = *P. cuyabensis* (Bong.) Körn.
Pipalanthus Kunth = *Paepalanthus* Mart.
Pipalanthus pilosus Kunth = *Paepalanthus pilosus* (H.B.K.) Kunth
Pityrodia quadrangularis Munir = *P. quadrangulata* Munir
Premma parvifolia Roth = *Gmelina asiatica* L.
Premna anthopotamia Hand.-Mazz. = *P. anthopotamica* Hand.-Mazz.
Prunus indica sylvestris fructu flavo, pyriforme Burm. = *Gmelina asiatica* L.
Prunus indica sylvestris, fructu flavo pyriformi Burm. = *Gmelina asiatica* L.
Recodia Mold. = *Recordia* Mold.
Rhedera Seymour = *Rehdera* Mold.
Stachytarpheta hibrida Mold. = *S. hybrida* Mold.
Syngonanthus fischerianum (Bong.) Ruhl. = *S. fischerianus* (Bong.) Ruhl.
Syngonanthus nitens var. *hirtelus* Ruhl. = *S. nitens* var. *hirtulus* Ruhl.
Taligalia Robledo = *Amasonia* L. f.
Verbena chacoensis Mold. = *V. chacensis* Mold.
Verbena diffusa var. *tenuifolia* Barratt = *V. Xengelmannii* Mold.
Verbena incarnata Raf. = *V. urticifolia* f. *incarnata* (Raf.) Mold.
Verbena officinalis var. *halei* (Small) Barber = *V. halei* Small
Verbena urticifolia β *floribus rubicundis* Willd. = *V. urticifolia* f. *incarnata* (Raf.) Mold.*
Verbena urticifolia var. *incarnata* (Raf.) Mold. = *V. urticifolia* f. *incarnata* (Raf.) Mold.
Vitex altissima Moon = *V. altissima* L. f.
Vitex kurkovii Mold. = *V. krukovii* Mold.
Vitex litoralis Reis & Lipp = *Verbena litoralis* H.B.K.
Vitex pentaphylla Merr. = *V. glabrata* f. *bombacifolia* (Wall.) Mold.*
Vitex philippinensis Merr. = *Teijsmanniodendron pteropodum* f. *cristatum* Mold.*
Vitex poara Corbishley = *V. pooara* Corbishley
Vitex quinquefoliata Merr. = *V. glabrata* f. *bombacifolia* (Wall.) Mold.
Vitex rotundifolia var. *heterophylla* (Roxb.) Mak. = *V. quinata* (Lour.) F. N. Will.
Vitex rotundifolia var. *heterophylla* [Roxb.] Mak. = *V. trifolia* var. *subtrisecta* (Kuntze) Mold.
Vitex sansibarensis Vatke = *V. zanzibarensis* Vatke
Vitex sexdentata Wall. = *Caryopteris foetida* (D. Don) Thellung*

Vitex sex-dentata Wall. = *Caryopteris foetida* (D. Don) Thellung
Vitex trifolia Vahl = *V. triflora* Vahl
Vitex trifolia sensu Clarke = *V. trifolia* var. *simplicifolia* Cham.
Vitex trifolia var. *trifolia* [L.] = *V. trifolia* L.
Volkameria foetida Buch.-Ham. = *Caryopteris foetida* (D. Don) Thellung*
Volkameria foetida Hamilt. = *Caryopteris foetida* (D. Don) Thellung*

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ADDITIONAL NOTES ON THE *ERIOCAULACEAE*. XCII

Harold N. Moldenke

PAEPALANTHUS BRASILIENSIS (Mart.) Mart.
Additional bibliography: Mold., Phytologia 41: 476. 1979; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS BREVICAULIS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 137. 1973; Mold., Phytol. Mem. 2: 151 & 610. 1980.
Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 28--29, pl. 12. 1928 (Ld, N, S).

PAEPALANTHUS BRITTONI Mold.
Additional bibliography: Mold., Phytologia 37: 34. 1977; Mold., Phytol. Mem. 2: 90 & 610. 1980.

PAEPALANTHUS BROMELIOIDES Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 476 & 484. 1979; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43], 45, 46, 52, & 57, fig. 51--56. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 141, fig. 49. 1979; Mold., Phytol. Mem. 2: 151 & 610. 1980.
Additional illustrations: Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: 57, fig. 51--56. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 141, fig. 49. 1979.
Additional citations: BRAZIL: Minas Gerais: *Eiten & Eiten 10922* (E--2386544, Ut--3551138); *Irwin, Maxwell, & Wasshausen 20031* in part (W--2861846).

PAEPALANTHUS BRUNNESCENS Ruhl.
Additional bibliography: Mold., Phytologia 37: 35. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS BRUNNEUS Mold.
Additional bibliography: Mold., Phytologia 37: 35. 1977; Mold., Phytol. Mem. 2: 117, 122, & 610. 1980.

Recent collectors have encountered this plant in forested areas and on igneous outcrops, at 150 m. altitude, in both flower and fruit in May.

Additional citations: VENEZUELA: Amazonas: *Steyermark, Davidse, & Guanchez 122533* (E--2901604). GUYANA: *Maguire & Fanshawe 23020* (W--1907817--isotype).

PAEPALANTHUS BRYOIDES (Riedel) Kunth

Additional bibliography: Mold., Phytologia 41: 476. 1979; Mold., Phytol. Mem. 2: 151, 424, & 610. 1980.

Additional citations: BRAZIL: Minas Gerais: *Brade 13604* [Herb. Jard. Bot. Ric Jan. 25382] (W--2928659). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 572. 1841 (W); Mold. & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 55. 1976 (Ld).

PAEPALANTHUS BULBOSUS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 35. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

Additional citations: BRAZIL: Minas Gerais: *Mendes Magalhaes 6* (Ld--photo). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 184--186, pl. 119. 1928 (Ld, N, W).

PAEPALANTHUS CABRALENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 35. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 220--222, pl. 146. 1928 (Ld, N, W).

PAEPALANTHUS CACHAMBUENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 35. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980; Mold., Phytologia 54: 146. 1983.

Material of this species has been misidentified as and distributed in some herbaria as *P. blepharocnemis* Mart. and the two collections cited below were previously regarded by me and cited by me as *P. aequalis* (Vell.) J. F. Macbr., a very closely related taxon.

Additional citations: BRAZIL: Minas Gerais: *Widgren s.n.* [1845] (Mu, N). São Paulo: *Brade 6584* (Mu, N). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 50--52, pl. 27. 1928 (Ld, N, W).

PAEPALANTHUS CACUMINIS Ruhl.

Additional bibliography: Mold., Phytologia 37: 36. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS CAESPITITIUS Mart.

Additional bibliography: Mold., Phytologia 37: 36. 1977; Mold., Phytol. Mem. 2: 151 & 610. 1980.

PAEPALANTHUS CALDENSIS Malme

Additional bibliography: Mold., Phytologia 37: 36. 1977; Klein,

Sellowia 31: 132. 1979; Mold., Phytol. Mem. 2: 151, 424, 425, 428, & 610. 1980.

Additional & emended citations: BRAZIL: Minas Gerais: *Regnell III.1268* [16/11/1864] (W--200760--cotype). Paraná: *Dusén s.n.* [21.10.1908] (N). Santa Catarina: *Klein 3406* (N), *3494* (N); *Reitz & Klein 7903* (N). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 74. 1928 (Ld); Mold. & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 44, pl. 6, fig. 21--25. 1976 (Ld).

PAEPALANTHUS CALLOCEPHALUS Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 21. 1976; Mold., Phytol. Mem. 2: 151, 610, & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 29--31, pl. 13. 1928 (Ld, N, W).

PAEPALANTHUS CALLOCEPHALUS var. *CILIATUS* Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 21. 1976; Mold., Phytol. Mem. 2: 151 & 610. 1980.

Additional citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 31--32. 1928 (W).

PAEPALANTHUS CALLOCEPHALUS var. *GLABER* Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 139. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Additional citations: Alv. Silv., Fl. Mont. 1: 31. 1928 (N, W).

PAEPALANTHUS CALLOCEPHALUS var. *VILLOSUS* Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 21--22. 1976; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 31, pl. 13. 1928 (Ld, N, W).

PAEPALANTHUS CALLOPHYLLUS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 140. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 217--218, pl. 144. 1928 (Ld, N, W).

PAEPALANTHUS CALVOÏDES Ruhl.

Additional bibliography: Mold., Phytologia 26: 140--141. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

PAEPALANTHUS CALVUS Körn.

Additional bibliography: Mold., Phytologia 37: 36. 1977; Mold., Phytol. Mem. 2: 151 & 611. 1980.

PAEPALANTHUS CAMPTOPHYLLUS Ruhl.

Additional bibliography: Mold., Phytologia 37: 36. 1977; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Hatschbach encountered this plant along shaded sandy roadsides and on campo rupestre in sandy soil among rocks, at 1100 m. altitude, in both flower and fruit in March and July.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 41530* (Ld), *42866* (Ld, W--2931778).

PAEPALANTHUS CAMPTOPHYLLUS var. *GRACILIS* Ruhl.
Additional bibliography: Mold., Phytologia 26: 142--143. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.
Additional citations: BRAZIL: Minas Gerais: *Schwacke 9440* [Herb. Jard. Bot. Rio Jan. 63706] (W--2928660--isotype).

PAEPALANTHUS CANASTRENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 143. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 228--229, pl. 151. 1928 (Ld, N, W).

PAEPALANTHUS CANDIDUS Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 33. 1976; Mold., Phytol. Mem. 2: 151 & 611. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Serr. Min. pl. 13. 1908 (Ld).

PAEPALANTHUS CANESCENS (Bong.) Körn.
Additional bibliography: Mold., Phytologia 35: 22. 1976; Mold., Phytol. Mem. 2: 151 & 611. 1980.
Additional citations: BRAZIL: Minas Gerais: *Gibbs, Abbott, & Andrade 5176* (Ld).

PAEPALANTHUS CANESCENS f. *ANGUSTIFOLIUS* Ruhl.
Additional bibliography: Mold., Phytologia 26: 145--146. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

PAEPALANTHUS CANESCENS var. *ATRATUS* Mold.
Additional bibliography: Mold., Phytologia 35: 22. 1976; Mold., Phytol. Mem. 2: 151 & 611. 1980.
Additional citations: BRAZIL: Goias: *W. R. Anderson 6636* (W--2755385--isotype).

PAEPALANTHUS CAPANEMAE Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 476--477. 1979; Mold., Phytol. Mem. 2: 151 & 611. 1980.
Additional citations: BRAZIL: Rio de Janeiro: *Araujo & Maciel 4479* [Herb. FEEMA 19832] (N), *5006* [Herb. FEEMA 22259] (N). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. pl. 68. 1928 (Ld); E. Y. Dawson, Los Angeles Co. Mus. Contrib. Sci. 7: 5, fig. 1 [left]. 1957 (Ld).

PAEPALANTHUS CAPAROËNSIS Ruhl.
Additional bibliography: Mold., Phytologia 41: 477. 1979; Mold., Phytol. Mem. 2: 151 & 611. 1980.

PAEPALANTHUS CAPILLACEUS Klotzsch
Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih.

43: [Init. Fl. Venez.] 179. 1927; Mold., Phytologia 37: 36--37 (1977) and 41: 384. 1979; Mold., Phytol. Mem. 2: 117, 122, 151, 424, 426, 428, & 611. 1980.

Recent collectors describe this plant as an abundant aquatic herb, submerged but with emergent inflorescences, in running water in streams and streamlets on savannas and attached to soil at the base of rocks in shallow running water, and as "predominante em todo curso de corredeiras, infloresc. marrom claro", at 1210 m. altitude, in both flower and fruit in January, February, August, October, and November. Collectors in Guyana report it locally common, attached to and rooting on rocks in rapids, submerged in 30 cm. of water and locally abundant in the shallow lower portions of streams, describing the rhizome as brown, the leaves glossy-green or "translucent blackish-green", the peduncles white, the bracts black or blackish, the flowers white, and the fruiting-heads brown. They found it growing at 550--1140 m. altitude, in flower in July and October and in fruit in July and November.

Knuth (1927) cites the following collections from Venezuela: Bolívar: *Schomburgk 1222*. Roraima: *Connell & Quelch 314*. State undetermined: *Appun 1217*.

Additional citations: VENEZUELA: Amazonas: *Maguire & Maguire 29153* in part (N); *Steyermark 58138* in part (N); *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 126129* (Ld). Bolívar: *Luteyn, Lebrón-Luteyn, & Steyermark 6323* (N, W--2929413); *Moore, Ambrose, Dietz, & Pfister 9836* (Ba, Mi, N); *W. W. Thomas 2529* (N). GUYANA: *Maas, Mennaga, Welle, & Green 5731* (Ld); *Persaud 186* (N); *Tillett & Tillett 45793* (N); *Tillett, Tillett, & Boyan 43980* (N). BRAZIL: Amazônas: *Froes 25383* in part (N); *Rosa & Lira 2280* (N). MOUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 29: 208. 1931 (W).

PAEPALANTHUS CAPILLACEUS f. *PROLIFERUS* (Gleason) Mold.

Synonymy: *Paepalanthus capillaceus* var. *proliferus* Gleason, Bull. Torrey Bot. Club 58: 328. 1931. *Paepalanthus capillaceus proliferus* Gleason, in herb.

Additional bibliography: Mold., Phytologia 37: 37 (1977) and 44: 384. 1979; Mold., Phytol. Mem. 2: 117, 122, 151, 424, & 611. 1980.

Additional & emended citations: VENEZUELA: Amazonas: *Maguire & Maguire 29153* in part (Bm, Bo, E, G, Ja, N, Ut, Ve, W); *Steyermark 58138* in part (N); *G. H. H. Tate 552* (W--1497494--isotype). BRAZIL: Amazonas: *Froes 25383* in part (N).

PAEPALANTHUS CAPILLACEUS var. *SPIRALIS* Mold.

Additional bibliography: Mold., Phytologia 29: 303. 1974; Mold., Phytol. Mem. 2: 122 & 611. 1980.

Additional citations: GUYANA: *Maguire & Fanshawe 32292* (W--2168879--isotype).

PAEPALANTHUS CAPILLARIS (Bong.) Körn.

Additional bibliography: Mold., Phytologia 37: 37. 1977; Mold.,

Phytol. Mem. 2: 151 & 611. 1980.

Héringer and his associates describe this plant as having pilose leaves and white inflorescences and have found it growing in brejo, flowering in April. Their collection, cited below, is a mixture with a species of *Cyperus*.

Additional citations: BRAZIL: Distrito Federal: *Héringer, Figueiras, Mendonça, Pereira, Salles, & Silva 4420* in part (N).

PAEPALANTHUS CAPILLATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 191. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 79--80, pl. 46 & 47. 1928 (Ld, N, W).

PAEPALANTHUS CAPILLIFOLIUS Mold.

Additional bibliography: Mold., Phytologia 37: 37. 1977; Mold., Phytol. Mem. 2: 151, 425, 443, & 611. 1980.

Additional synonymy: *Paepalanthus filifolius* Mold., Phytol. Mem. 2: 425, in syn. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach, Anderson, Barneby, & Gates 36456* (W--2849694--isotype). MOUNTED ILLUSTRATIONS: Original drawings of type (Ld).

PAEPALANTHUS CAPITATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 192. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 164--165, pl. 104. 1928 (Ld, N, W).

PAEPALANTHUS CAPITO Körn.

Additional bibliography: Mold., Phytologia 37: 37. 1977; Mold., Phytol. Mem. 2: 151, 427, & 611. 1980.

PAEPALANTHUS CARACENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 193. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

PAEPALANTHUS CARDONAE Mold.

Additional bibliography: Mold., Phytologia 37: 37. 1977; Mold., Phytol. Mem. 2: 117 & 611. 1980.

Davidse found this plant growing "in distinct grassy zones betweel morichal and savannas, the morichal being a palm swamp with *Mauritia flexuosa* surrounded by *Trachypogon* savanna with very widely spaced *Cuartella* and *Bowdichia*", at 100 m. altitude, both in flower and fruit in November. He speaks of the "spikelets" being white.

Additional citations: VENEZUELA: Guárico: *Davidse 4324* (E--2773096).

PAEPALANTHUS CASTANEUS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 193. 1973; Mold., Phytol. Mem. 2: 151 & 611. 1980.

Additional citations: MOUNTED ILLUSTRATIONS & CLIPPINGS: Alv. Silv., Fl. Mont. 1: 249--251, pl. 166. 1928 (Ld, N, W).

PAEPALANTHUS CATHARINAE Ruhl.

Additional bibliography: Klein, Sellowia 31: 132. 1979; Mold., Phytologia 41: 477. 1979; Mold., Phytol. Mem. 2: 152, 424--426, & 611. 1980.

Recent collectors have encountered this plant at 700 m. altitude, in flower in October.

Additional & emended citations: BRAZIL: Paraná: *Dusén 15783* (Mi, N, Ws); *Hatschbach 40448* (N); *Jönsson 1143a* (Ws).

PAEPALANTHUS CATHARINAE var. *HATSCHBACHI* (Mold.) Mold. & Sm.

Additional bibliography: Mold., Phytologia 41: 477. 1978; Mold., Phytol. Mem. 2: 152, 424--426, & 611. 1980.

PAEPALANTHUS CEARAENSIS Ruhl.

Additional bibliography: Mold., Phytologia 37: 38. 1977; Mold., Phytol. Mem. 2: 152 & 611. 1980.

The *Lisboa 4* [Herb. Jard. Bot. Rio Jan. 4764], distributed as *P. cearaensis*, actually is *P. lamarckii* Kunth.

PAEPALANTHUS CEPHALOTRICHUS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 34. 1976; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 39 [prim.]. 1928 (Ld).

PAEPALANTHUS CHAPADENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 29: 304--305. 1974; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 232--233, pl. 154. 1928 (Ld, N, W).

PAEPALANTHUS CHASEAE Mold.

Additional bibliography: Mold., Phytologia 26: 197. 1973; Angely, S. Amer. Bot. Bibl. 2: 675. 1980; Mold., Phytol. Mem. 2: 152 & 611. 1980.

PAEPALANTHUS CHIAPENSIS Mold.

Additional bibliography: Mold., Phytologia 26: 197. 1973; Mold., Phytol. Mem. 2: 65 & 611. 1980.

PAEPALANTHUS CHIQUITENSIS Herzog

Additional bibliography: Hocking, Excerpt. Bot. A.25: 379. 1975; Mold., Phytologia 37: 38. 1977; Mold., Phytol. Mem. 2: 175, 428, & 611. 1980.

Anderson describes this plant as an herb about 0.8 m. tall, with white flower-heads, and encountered it in brushy swamps with standing or gently flowing water, probably seasonally dry (pampa) and in adjacent open drainage ditches, in flower in February.

Additional citations: BOLIVIA: El Beni: *W. R. Anderson 11992* (N).

PAEPALANTHUS CHLOROBLEPHARUS Ruhl.

Additional bibliography: Mold., Phytologia 26: 198. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980; Mold., Phytologia 50: 247. 1982.

Recent collectors have found this plant growing at the "mergens de corrego encachoeirado" and in large cracks in rocks on campo rupestre, at 1000 m. altitude, in flower in June, and both in flower and fruit in July.

Additional citations: BRAZIL: Bahia: *Mori & Boom 14458* (Ld, N). Minas Gerais: *Hatschbach 41521* (Ld).

PAEPALANTHUS CHLOROCEPHALUS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 35. 1976; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 178. 1928 (Ld, N).

PAEPALANTHUS CHLORONEMA Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 198--199. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 121--123, pl. 76. 1928 (Ld, N, W).

PAEPALANTHUS CHLOROPHYLLUS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 199 & 200. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 80--82, pl. 9 & 48. 1928 (Ld, N, W).

PAEPALANTHUS CHLOROPUS Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 199--200. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 24--25. 1928 (Ld, N, W).

PAEPALANTHUS CHRYSOLEPIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 38. 1977; Mold., Phytol. Mem. 2: 152, 425, & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 256--258, pl. 170 [prim.]. 1928 (Ld, N, W).

PAEPALANTHUS CHRYSOPHORUS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 38. 1977; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: BRAZIL: Goiás: *Hatschbach 36733* (W--2850701). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1:176--178, pl. 114. 1928 (Ld, N, W).

PAEPALANTHUS CILIATUS (Bong.) Kunth

Additional bibliography: Mold., Phytologia 37: 38. 1977; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 572. 1841 (W).

PAEPALANTHUS CILIATUS var. *GLABRESCENS* Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 202. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 213. 1928 (N, W).

PAEPALANTHUS CILIOLATUS Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 33: 35. 1976; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 29. 1928 (Ld, N).

PAEPALANTHUS CIPOENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 38. 1977; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 218--220, pl. 145. 1928 (Ld, N, W).

PAEPALANTHUS CLAUSSENIANUS Körn.

Additional bibliography: Mold., Phytologia 41: 477. 1979; Mold., Phytol. Mem. 2: 152, 369, 424, & 611. 1980.

Recent collectors have encountered this plant in fog-covered cerrado and "common on open campos"; Heringer and his associates refer to it as "very ornamental", growing in wet cerrado.

Additional citations: BRAZIL: Amazonas: *Calderón, Monteiro, & Guedes 2770* (Ld). Distrito Federal: *Héringer 16198* (N); *Héringer, Figueiras, Mendonça, Pereira, Salles, & Silva 4716* (W--2926752). Minas Gerais: *Irwin, Maxwell, & Wasshausen 19645* (W--2861725).

PAEPALANTHUS COLOIDES Ruhl.

Additional bibliography: Mold., Phytologia 41: 477. 1979; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 41366* (W--2840073).

PAEPALANTHUS COLUMBIENSIS Ruhl.

Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 179. 1927; Mold., Phytologia 41: 477. 1979; Mold., Phytol. Mem. 2: 109, 117, 425, & 611. 1980; Mold., Phytologia 54: 148 & 149. 1983.

Recent collectors describe this plant as a rosulate herb, 50 cm. tall, growing from thick underground stems, forming dense rosettes to 20 cm. in diameter, the inflorescences white or whitish, the bracts light-brown or brown with white margins, the florets

white, and have found it growing on paramo and subparamo, in rocky subparamo grassland, and in woodland bogs, at 1900--3450 m. altitude, in flower in March and May, and in both flower and fruit in February and August.

Knuth (1927) cites *Jahn 975* from Mérida, Venezuela. The *Castellano-Monasterio 120*, distributed as *P. columbiensis*, actually is *P. diffisus* Mold. The *Bernardi 6066*, *Burbidge 75/408*, *Core 997*, *Cuatrecasas 9514*, *11969*, & *17841*, *Cuatrecasas & Bariga 9878*, *Fosberg & Schultes 19217*, *Killip 34047*, *Køie 5101*, *Luteyn & al. 7685*, *Pennell 6910*, and *Schultes 4058*, previously cited by me as *P. columbiensis*, seem better regarded as *P. andicola* Körn., while *Garcia-Barriga 18034* and *Luteyn, Dumont, & Lebrón-Luteyn 4720* are *P. andicola* var. *villosus* Mold.

Additional citations: COLOMBIA: Boyacá: *Cleef 9741* (W--2851299); *Cuatrecasas 10328* (W--2819497); *Luteyn, Labrón-Luteyn, & Pabón E. 7685* (Au, N). Cauca: *Cuatrecasas & Lehmann 27389* (W--2615101). Cundinamarca: *Barkley & Saldarriaga C. 43036* (E--2190233); *Core 16* (W--2105124); *Cuatrecasas 9528* (W--1850815); *Dwyer & Idrobo 8180* (E--2773082); *García-Barriga 17691* (W--2725828); *Luteyn, Lebrón-Luteyn, Espina Z., & Palacios 7743* (N); *R. E. Schultes 11547* (W--2198860, W--2198861), *18792* (W--2198910). Norte de Santander: *García-Barriga & Jaramillo Mejía 19969* (W--2957946). Santander: *Cleef, García-Barriga, & Jaramillo Mejía 3526* (W--2850653, W--2850654).

PAEPALANTHUS COMANS Alv. Silv.

Additional bibliography: Mold., Phytologia 41: 478. 1979; Mold., Phytol. Mem. 2: 152 & 611. 1980.

The Eitens encountered this plant on a natural open rocky campo, at 1250 m. altitude, in both flower and fruit in March.

Additional citations: BRAZIL: Minas Gerais: *Eiten & Eiten 11027* (E--2773095); *Hatschbach 40862* (W--2850728). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 174. 1928 (Ld, N).

PAEPALANTHUS COMOSUS Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 22--23. 1976; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 35885* (W--2709582). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 129--130, pl. 80. 1928 (Ld, N, W).

PAEPALANTHUS COMPACTUS G. Gardn.

Additional bibliography: Mold., Phytologia 35: 23. 1976; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: BRAZIL: Minas Gerais: *G. Gardner 5247* (W--1067047--isotype).

PAEPALANTHUS COMPLANATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 23. 1976; Mold., Phytol. Mem. 2: 152 & 611. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv.

Silv., Fl. Mont. 1: 244--246, pl. 163. 1928 (Ld, N, W).

PAEPALANTHUS CONDUPLICATUS Körn.
Additional bibliography: Mold., Phytologia 37: 39. 1977; Mold., Phytol. Mem. 2: 152, 426, & 611. 1980.

PAEPALANTHUS CONDUPLICATUS var. *PUBESCENS* Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 236. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 241. 1928 (Ld, N, W).

PAEPALANTHUS CONICUS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 236. 1973; Mold., Phytol. Mem. 2: 152 & 611. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 136--137, pl. 85. 1928 (Ld, N, W).

PAEPALANTHUS CONTASENSIS Mold., Phytologia 45: 472--473, pl. 2. 1980.
Bibliography: Mold., Phytologia 45: 472--473, pl. 2. 1980; Mold., Phytol. Mem. 2: 152 & 611. 1980.
Illustrations: Mold., Phytologia 45: 473, pl. 2. 1980.
Mori and his associates have encountered this plant on campo rupestre, at 1000 m. altitude, in both flower and fruit in July.
Citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19900* (Ld--type, N--isotype, W--2936343--isotype); *Mori, King, Santos, & Hage 12385* (Ld, N, W--2854257).

PAEPALANTHUS CONVEXUS Gleason
Additional bibliography: Mold., Phytologia 41: 478 & 481. 1979; Mold., Phytol. Mem. 2: 117, 152, & 612. 1980; Mold., Phytologia 52: 19. 1982; Tillett & Steyerm., Ernstia 9: 3. 1982.
Recent collectors describe this plant as tufted, 40--45 cm. tall, the stems very short or elongated, the leaves erect-ascending, stiffish to subcoriaceous or coriaceous, brittle, green or deep-green on both surfaces, with white margins, or dull-green above and paler green beneath, sometimes even very lustrous dark-green above and medium-green beneath, glabrous, the sheaths gray-pubescent, the peduncles lustrous, medium gray-tan, the heads white or whitish, the phyllaries (bracts) gray-brown, and the flowers medium-gray. They have found it growing in *Stegolepis-Brocchinia-Heliamphora* bogs, along exposed wet margins of *Bonnetia roraimae* forests, in moist spongy ground in shallow parts and upper slopes on zanjon, in humid caatinga forests, and "frequent on open slopes at base of cliffs", at 1300--3000 m. altitude, in both flower and fruit in January, February, August, October, and December.
Material has been misidentified and distributed in some herbaria as the closely related *P. fraternus* N. E. Br. and as *Leiothrix turbinata* Gleason. On the other hand, the *Silva & Brazão 60926*, previously cited as typical *P. convexus*, actually is the

type collection of *P. convexus* var. *major* Mold.

Additional citations: VENEZUELA: Amazonas: *Steyermark 58041* (W--1987372), *103892* (Ld, N), *103948* (N); *Steyermark, Brewer-Carías, & Liesner 124533* (E--2901865); *G. H. H. Tate 658* (W--1497558--isotype); *Tillett, Colvée, & al. 752-199* (Ve). Bolívar: *Moore, Ambrose, Dietz, & Pfister 9793* (Ba); *Steyermark 58778* (W--1901785), *58876* (W--1987398), *93683* (W--2584107), *93958* (W--2584306); *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115778* (Ld), *115991* (Ld), *116119* (Ld), *116134* (Ac). BRAZIL: Amazônas: *Maguire, Murça Pires, & Maguire 60487* (N); *Rosa & Lira 2279* (Ld, N, N).

PAEPALANTHUS CONVEXUS var. *MAJOR* Mold.

Additional bibliography: Mold., Phytologia 26: 237. 1973; Mold., Phytol. Mem. 2: 117, 152, & 612. 1980.

Recent collectors describe this plant as having stems elongated to 50 cm., the leaves gray-green, pubescent with white hairs, soft, broader, and the heads dull-white. They have found it growing in *Heliamphora* swamps, on semi-level savanna-like areas with bushes, on the shaded slopes of wooded grottos, along the edge of sandstone rock formations bordering subsavannas of *Mallophyton* and *Chimantaea*, and among rocks in sandy areas near rapids, at 1200--2480 m. altitude, in both flower and fruit in February and October.

The type collection was previously misidentified as typical *P. convexus* Gleason.

Additional citations: VENEZUELA: Amazonas: *Steyermark 103955* (Ld, N); *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 126303* (Ld), *126394* (Ld). Bolívar: *Steyermark, Huber, & Carreño E. 128871* (Ld), *128980* (Ld); *W. W. Thomas 2507* (N). BRAZIL: Amazônas: *Silva & Brazao 60926* (Ld--isotype).

PAEPALANTHUS CONVEXUS var. *PARVICEPHALUS* Mold., Phytologia 52: 19. 1982.

Bibliography: Mold., Phytologia 52: 19. 1982.

Collectors describe this plant as having elongated stems, the leaves grayish-green above or "hojas verdes extendidas", and have found it growing in wet places below rocks, at 2580--2800 m. altitude, in both flower and fruit from February to April.

Citations: VENEZUELA: Amazonas: *Steyermark, Brewer-Carías, & Liesner 124418* (E--2901864); *Steyermark & Delascio 129105* (Ld), *129107* (Ld), *129192* (Ld); *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 125939* (Ld), *126100* (Ld--type).

PAEPALANTHUS CONVEXUS var. *STRIGOSUS* Mold.

Additional bibliography: Mold., Biol. Abstr. 64: 2433. 1977; Mold., Phytologia 37: 39. 1977; Mold., Phytol. Mem. 2: 152 & 612. 1980.

Steyermark and his associates encountered this plant at 2450 m. altitude, in flower in February.

Additional citations: VENEZUELA: Amazonas: *Steyermark, Guaraglia, Holmgren, Luteyn, & Mori 126337* (Ld).

PAEPALANTHUS CORDATUS Ruhl.
Additional bibliography: Mold., Phytologia 37: 39. 1977; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS CORONARIUS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 238. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 63--65, pl. 36. 1928 (Ld, N, W).

PAEPALANTHUS CORONARIUS var. *CILIATUS* Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 238--239. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 65. 1928 (N, W).

PAEPALANTHUS CORYMBOIDES Ruhl.
Additional bibliography: Mold., Phytologia 37: 39. 1977; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS CORYMBOIDES var. *EPILOSUS* Ruhl.
Additional bibliography: Mold., Phytologia 26: 239. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS CORYMBOSUS (Bong.) Kunth
Additional bibliography: Mold., Phytologia 37: 40. 1977; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 575. 1841 (N, W).

PAEPALANTHUS COSTARICENSIS Mold.
Additional bibliography: Mold., Phytologia 37: 40. 1977; Mold., Phytol. Mem. 2: 81, 357, & 612. 1980.
Weston encountered this plant at 2800 m. altitude, in flower in July. Material has been misidentified and distributed in some herbaria as *P. kupperi* Suesseng.
Additional citations: COSTA RICA: Cartago: *Weston 1537* (Lc).

PAEPALANTHUS COUTOËNSIS Mold.
Additional bibliography: Mold., Phytologia 35: 23. 1976; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Recent collectors describe this plant as having the inflorescences cream-color, maroon at the base, and have found it growing on natural campos, flowering in September.
Additional citations: BRAZIL: Bahia: *Santos, Mori, & Mattos Silva 3363* (Ld). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 211--212, pl. 139 & 140. 1928 (Ld, N, W).

PAEPALANTHUS CRASSICAULIS Körn.
Additional bibliography: Mold., Phytologia 41: 478. 1979; Mold., Phytol. Mem. 2: 109, 117, 129, 134, & 612. 1980; Mold.,

Phytologia 50: 245. 1982.

Recent collectors describe the inflorescence of this plant as "grayish-white" and refer to the plant as a "common terrestrial on rocks" in an area of "sandstone outcrops with sterile white sand overlying black sand and with *Ericaceae, Weinmannia,* and melastomes abundant", at 2550--2700 m. altitude, in flower in September and in both flower and fruit in March and June. They have also encountered it in shrub-dominated areas and in páramo areas of low vegetation and scattered large boulders. Callejas & Gaviria note: "Hierba abundante, creciendo en suelos iundados, en suelos secos forma asociaciones con *Espeletia occidentalis* var. *antioquiensis*".

Additional citations: COLOMBIA: Antioquia: *Callejas & Gaviria 864* (N). Boyacá: *Melampy 22* (W--2916211). Cundinamarca: *Cuatrecasas 9424* (W--1797351); *Ewan 16906* (W--2106332); *Fosberg 21353* (W--2109056); *Fosberg & Villareal 20606* (W--2108764); *Haught 5599* (W--1709775), *5732* (W--1709798); *Killip, García Barriga, & Gutierrez Villegas 38039* (W--1855983); *Moore, Ambrose, & Dietz 9863* (Ba). ECUADOR: Loja: *Balslev 1302* (Ld, N); *Fosberg & Giler 23099* (W--2109839); *Luteyn & Clemants 7973* (N); *Steyermark 54409* (W--1901691). PERU: Amazonas: *Hutchison & Wright 5541* (W--2508683); *Luteyn & Lebrón-Luteyn 5532* (N, W--2915258). Cajamarca: *López, Sagastegui, & Aldéve 6707* (W--2848724).

PAEPALANTHUS CRATERIFORMIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 40. 1977; Mold., Phytol. Mem. 2: 152 & 612. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Recent collectors describe this plant as 30 cm. tall, the "stems" [=peduncles?] and leaves erect, pale gray-green, white-hairy, the leaves 1--2 mm. wide, the involucral bractlets stramineous, the heads white when young, gray when older. They have encountered it in sandy poorly drained soil and in open scrub on white sand with damp areas and extensive sedge meadows (brejo) partly burned over, at 950--1000 m. altitude, in both flower and fruit in February and March.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18824* (Ld, N); *Mori & Funch 13399* (Ld, N). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 60--61, pl. 34. 1928 (Ld, N, W).

PAEPALANTHUS CRISTATUS Mold.

Additional bibliography: Mold., Phytologia 37: 40 (1977) and 38: 36. 1977; Mold., Phytol. Mem. 2: 117 & 612. 1980.

Recent collectors have encountered this plant on dry, sandy, rocky plateaus and forming dull-green clumps in sandy openings near streams, at 2140--2200 m. altitude, in both flower and fruit in January and February.

Additional citations: VENEZUELA: Bolívar: *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115986*(Ld); *Steyermark, Huber, & Carreño E. 128259* (Ld).

PAEPALANTHUS CRYOCEPHALUS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 40. 1977; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 116--117, pl. 72. 1928 (Ld, N, W).

PAEPALANTHUS CUMBRICOLA Mold.
Additional bibliography: Mold., Phytologia 37: 40. 1977; Mold., Phytol. Mem. 2: 117 & 612. 1980.
Recent collectors refer to this plant as an herb with gray inflorescences, have encountered it at 1200 m. altitude, and have misidentified and distributed it to herbaria as *Syngonanthus* sp.
Additional citations: VENEZUELA: Bolívar: *Maas & Steyermark 5392* (Ld); *Moore, Ambrose, Dietz, & Pfister 9813* (Mi).

PAEPALANTHUS CURURENSIS Mold.
Additional bibliography: Mold., Phytologia 26: 245. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Calderón and his associates refer to this as a very delicate plant growing with mosses and other eriocauls among rocks on rocky river edges. They found it in both flower and fruit in June.
Additional citations: BRAZIL: Amazônas: *Calderón, Monteiro, & Guedes 2610* (Ld).

PAEPALANTHUS CUSPIDATUS Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 478. 1979; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 26. 1928 (Ld, N).

PAEPALANTHUS CYLINDRACEUS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 245. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 130--131, pl. 81. 1928 (Ld, N, W).

PAEPALANTHUS DAMAZIOI Beauverd
Additional bibliography: Mold., Phytologia 26: 246. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 292. 1908 (N, W).

PAEPALANTHUS DASYNEMA Ruhl.
Additional bibliography: Mold., Phytologia 26: 246--247. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS DECORUS Abbiatti
Additional bibliography: Mold., Phytologia 26: 247. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Citations: MOUNTED ILLUSTRATIONS: Abbiatti, Notas Mus. La Plata Bot. pl. 1. 1948 (Ld).

PAEPALANTHUS DECUSSUS Körn.
Additional bibliography: Mold., Phytologia 26: 247--248. 1973; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS DENNISI Mold.
Additional bibliography: Mold., Phytologia 26: 248. 1973; Mold., Phytol. Mem. 2: 117 & 612. 1980.

PAEPALANTHUS DENSIFOLIUS Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 478. 1979; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Additional citations: BRAZIL: Minas Gerais: *Hatschbach 41299* (N, W--2931642). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 58 & 59 (Ld, N).

PAEPALANTHUS DENUDATUS Körn.
Additional bibliography: Mold., Phytologia 41: 478--479. 1979; Mold., Phytol. Mem. 2: 152 & 612. 1980.
Additional citations: BRAZIL: Minas Gerais: *G. Gardner 5252* (W--1067048--isotype); *Hatschbach 40906* (N, W--2850675); *Maguire, Maguire, & Murça Pires 44749* (N).

PAEPALANTHUS DESPERADO Ruhl.
Additional bibliography: Mold., Phytologia 33: 38. 1976; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: 44. 1979; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS DIAMANTINENSIS Mold.
Additional bibliography: Mold., Phytologia 26: 250--251. 1973; Angely, S. Am. Bot. Bibl. 2: 671. 1980; Mold., Phytol. Mem. 2: 152 & 612. 1980.

PAEPALANTHUS DIANTHOIDES Mart.
Additional synonymy: *Papaelanthus dianthoides* Mart. ex Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247, sphalm. 1911.
Additional bibliography: Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247. 1911; Mold., Phytologia 37: 40. 1977; Mold., Phytol. Mem. 2: 152, 153, 429, & 612. 1980.

PAEPALANTHUS DIANTHOIDES var. *LANGSDORFFI* Mold.
Additional bibliography: Mold., Phytologia 26: 251 & 252. 1973; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS DICHOTOMUS Klotzsch
Additional bibliography: Mold., Phytologia 37: 40--41 (1977), 49: 380 (1981), and 50: 245 & 270. 1982; Mold., Phytol. Mem. 2: 117, 122, 134, 153, & 612. 1980; Hocking, Excerpt. Bot. A.39: 101. 1982.
Recent collectors refer to this plant as an herb or subshrub forming small clumps or dense tufts, the leaves bluish-green, the bracts brown, and the heads "gray-white, inner side grayish-

brown", and have found it growing on sandstone savannas, at 1150 m. altitude, in both flower and fruit in October.

Additional citations: VENEZUELA: Bolívar: *Huber & Alarcon 6677* (Ld); *Steyermark 59209* (W--1901807). GUYANA: *Maas, Mennega, Welle, & Groen 5696* (Ld).

PAEPALANTHUS DICHOTOMUS var. *BRASILIENSIS* Mold.

Additional bibliography: Mold., Phytologia 29: 307. 1974; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS DICHOTOMUS var. *GLABRESCENS* Mold.

Additional bibliography: Mold., Phytologia 26: 253. 1973; Mold., Phytol. Mem. 2: 134 & 612. 1980.

Huber notes regarding this plant: "hierba creciendo en pequeño cojin, poco frecuente sobre banco, cabezuelas blancas" and found it growing at 100 m. altitude, in both flower and fruit in March.

Additional citations: VENEZUELA: Amazonas: *O. Huber 4916* (Ld).

PAEPALANTHUS DICHOTOMUS var. *PUMILUS* Mold., Phytologia 49: 385. 1981.

Bibliography: Mold., Phytologia 49: 385 (1981) and 50: 245 & 270. 1982; Hocking, Excerpt. Bot. A.39: 101. 1982.

Citations: VENEZUELA: Bolívar: *Moore, Ambrose, Dietz, & Pfister 9632* (Ba--isotype, Ld--type).

PAEPALANTHUS DICHROMOLEPIS Alv. Silv.

Synonymy: *Paepalanthus duchromolepis* Alv. Silv. ex Mold., Phytologia 50: 262, in syn. 1982.

Additional bibliography: Mold., Phytologia 33: 38. 1976; Mold., Phytol. Mem. 2: 153 & 612. 1980; Mold., Phytologia 50: 262. 1982.

Recent collectors have found this plant growing in wet sandy soil, in flower in October.

Additional citations: BRAZIL: Goiás: *Hatschbach & Kasper 41684* (Ld, N). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 33. 1928 (Ld).

PAEPALANTHUS DIFFISUS Mold.

Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2: 117 & 612. 1980.

Recent collectors describe this plant as a bright-green rosette herb, one-stemmed, the leaves with white hairs on their margins, the peduncles dorsiventrally much compressed, bearing sparse white hairs, the involucral bractlets dark-brown, the florets with white hairs. They have found it abundant at 2200--2380 m. altitude, sometimes ascending to 3050 m., in flower in June, September, and October, and in fruit in June.

Material of this species has been misidentified and distributed in some herbaria as *P. columbiensis* Ruhl.

Additional citations: VENEZUELA: Mérida: *Castellano-Monasterio 120* (N); *Jeffrey, Trujillo, & Condon 2147* (Eu--59493). Táchira: *Steyermark & Rabe 96953* (W--2585479); *Trujillo 8389* (Eu--48004).

PAEPALANTHUS DIFFUSUS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2:153 & 612. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 208--209, pl. 137. 1928 (Ld, N, W).

PAEPALANTHUS DIPLOBETOR Ruhl.
Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS DISTICHOPHYLLUS Mart.
Additional bibliography: Mold., Phytologia 41: 479. 1979; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Additional citations: BRAZIL: Minas Gerais: *Hatschbach 27372* (W--2705862).

PAEPALANTHUS DISTICHOPHYLLUS var. *GARDNERI* Mold.
Additional bibliography: Mold., Phytologia 26: 257 & 258. 1973; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS DIVARICATUS (Bong.) Kunth
Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 621, 622, & 641. 1831; Mold., Phytologia 41: 479. 1979; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 35454* (W--2709583); *Hatschbach 41276* (W--2840102); *Maguire, Mendes MagalhÃes, & Maguire 49246*(W--2435301). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 572. 1841 (W).

PAEPALANTHUS DIVARICATUS var. *LATIFOLIUS* Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 260. 1973; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 209. 1928 (N, W).

PAEPALANTHUS DIVERSIFOLIUS Alv. Silv.
Additional bibliography: Mold., Phytologia 26: 260. 1973; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 47--48, pl. 25. 1928 (Ld, N, W).

PAEPALANTHUS DUBIUS Körn.
Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS DUIDAE Gleason
Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 41: 479. 1979; Mold., Phytol. Mem. 2: 117, 153, 425, & 612. 1980; Tillett & Steyerm., Ernstia 9: 3. 1982; Mold., Phytologia 54: 121. 1983.
Recent collectors describe this plant as forming dense mats or

dense light-green tufts, the leaves spreading, grass-green, erect, subfleshy, *Isoëtes*-like, forming dense green rosettes, and the heads white-woolly. They have encountered it at the edges of forests and canyons, in wet places along streams, and on sandstone ledges of forested rocky prominences above swampy savannas, at 2300--2800 m. altitude, in flower in October, and both in flower and fruit from January to April.

Maguire & al. 65637 & *65638* are said by the collectors to represent the "long-leaved, fertile" form, with blackish bracts and white heads, while their *no. 65639* is a "sterile form, caudex elongated, leaves thinner". *Steyermark & Delascio 129247* is said by the collectors to be "like *129191* but the leaves much larger".

Material of *P. duidae* has been misidentified and distributed in some herbaria as *Rondonanthus roraimae* (Oliv.) Herzog with the comment "very close to *Paepalanthus duidae* and *P. jauensis*" and also as *Syngonanthus acopanensis* Mold. On the other hand, the *Tillett, Colvée, & al. 752-349* distributed as typical *P. duidae*, actually is the type collection of its var. *parvifolius* Mold. and *Maguire, Steyermark, Brewer-Carías, Maguire, & Espinosa 65639* is *P. jauensis* var. *caulescens* Mold.

Additional citations: VENEZUELA: Amazonas: *Maguire, Steyermark, Brewer-Carias, Maguire, & Espinosa 65637* (N), *65638* (N), *65639* (N); *Maguire, Wurdack, & Bunting 36930* (W--2168986), *37123* (W--2168988); *Maguire, Wurdack, & Maguire 42279* (W); *Steyermark 58319* (W--1987379), *103920* (Ld, N); *Steyermark, Brewer-Carías, & Liesner 124366* (N); *Steyermark & Delascio 129109* (Ld), *129247* (Ld); *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 126099* (Ld); *G. H. H. Tate 456* (W--1498522--isotype), *691* (W--1497456). Bolívar: *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115885* (Ld).

PAEPALANTHUS DUIDAE var. *PARVIFOLIUS* Mold., Phytologia 54: 121. 1983.

Bibliography: Mold., Phytologia 54: 121. 1983.

Collectors describe this plant as forming dense mats, the leaves narrow and green, and have encountered it at 2580--2600 m. altitude, in both flower and fruit in April.

Citations: VENEZUELA: Amazonas: *Steyermark & Delascio 129108* (Ve), *129191* (Ld); *Tillett, Colvée, & al. 752-349* (N--type).

PAEPALANTHUS DUPATYA Mart.

Additional bibliography: Mold., Phytologia 33: 38--39. 1976; Mold., Phytol. Mem. 2: 153 & 612. 1980.

Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 36148* (W--2709302).

PAEPALANTHUS ELATISSIMUS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 39. 1976; Mold., Phytol. Mem. 2: 153, 425, & 612. 1980.

Citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. "VVI" [=16]. 1928 (Ld, N, W).

PAEPALANTHUS ELATUS (Bong.) Körn.
Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 577. 1841 (W).

PAEPALANTHUS ELATUS var. *CALVULUS* Ruhl.
Additional bibliography: Mold., Phytologia 26: 472--473. 1973; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS ELONGATULUS Ruhl.
Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2: 153 & 612. 1980.

PAEPALANTHUS ELONGATUS (Bong.) Körn.
Additional bibliography: Mold., Phytologia 41: 479 (1979) and 43: 196--197. 1979; Mold., Phytol. Mem. 2: 153, 612, & 613. 1980.
Additional citations: BRAZIL: Goiás: *Héringer, Paula, Mendonça, & Salles 2333* (E--2773079); *Irwin, Grear, Souza, & Santos 14564* (W--2755386); *Prance & Silva 58189* (W--2584610A).

PAEPALANTHUS ELONGATUS var. *ANGUSTIFOLIUS* Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 479. 1979; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Recent collectors have encountered this plant at 1100 m. altitude.
The *Hatschbach 43714*, previously cited by me as this taxon, actually represents f. *graminifolius* Herzog instead, while *Hatschbach 36772* and *Hatschbach, Anderson, Barneby, & Gates 36394* are the newly described var. *glabrescens* Mold.
Additional citations: BRAZIL: Goiás: *Hatschbach 43079* (Ld); *Irwin, Grear, Souza, & Santos 12251* (W--2755391).

PAEPALANTHUS ELONGATUS var. *CILIATUS* Körn.
Additional bibliography: Mold., Phytologia 33: 39. 1976; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 512. 1841 (W).

PAEPALANTHUS ELONGATUS var. *GLABRESCENS* Mold., Phytologia 43: 196. 1979.
Bibliography: Mold., Phytologia 43: 196. 1979; Mold., Phytol. Mem. 2: 153 & 612. 1980.
Collectors have found this plant growing on wet sandy and on rocky campos, at 1250 m. altitude, in both flower and fruit in February. It has also been found on campo rupestre and in brejo, flowering and fruiting in March. Héringer and his associates describe it as an "erva semihante a capim". Some of the material cited below was previously regarded by me as var. *angustifolius* Alv. Silv.
Citations: BRAZIL: Distrito Federal: *Héringer, Filgueiras,*

Mendonça, & Pereira 7108 (N, W--2941405). Goiás: *Hatschbach 36772* (Ld--isotype, Ld--isotype, Ld--photo of type, W--2839374--type),*44760* (Ld); *Hatschbach, Anderson, Barneby, & Gates 36394* (Ac, W--2833247).

PAEPALANTHUS ELONGATUS f. *GRAMINIFOLIUS* Herzog

Additional bibliography: Mold., Phytologia 37: 41. 1977; Mold., Phytol. Mem. 2: 153 & 612. 1980.

Recent collectors have found this plant growing in sandy soil of campo rupestre, at 1000 m. altitude, in both flower and fruit in April and July.

Material of this taxon has been misidentified and distributed in some herbaria as var. *angustifolius* Alv. Silv. On the other hand, the *Monteiro S. 230* [Vianna 391; Herb. Dept. Conserv. Ambient. FEEMA 8080], previously cited by me as f. *graminifolius*, is now the type collection of var. *major* Mold.

Additional citations: BRAZIL: Bahia: *Mori, King, Santos, & Hage 12408* (Ld, W--2854252). Goiás: *Hatschbach 43714* (W--2932034); *Irwin, Grear, Souza, & Santos 13298* in part (W--2752350).

PAEPALANTHUS ELONGATUS var. *LONGIBRACTEATUS* Mold.

Additional bibliography: Mold., Phytologia 35: 24. 1976; Mold., Phytol. Mem. 2: 153 & 612. 1980.

Additional citations: BRAZIL: Goias: *Irwin, Grear, Souza, & Santos 12374* (W--2755390--isotype).

PAEPALANTHUS ELONGATUS var. *MAJOR* Mold., Phytologia 43: 196--197. 1979.

Bibliography: Mold., Phytologia 43: 196--197. 1979; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Citations: BRAZIL: Minas Gerais: *Monteiro S. 230* [Vianna 391; Herb. Dept. Conserv. Ambient. FEEMA 8080] (Ld--type).

PAEPALANTHUS ELONGATUS var. *MINOR* Ruhl.

Additional bibliography: Mold., Phytologia 26: 478. 1973; Mold., Phytol. Mem. 2: 153 & 613. 1980.

PAEPALANTHUS ELONGATUS var. *NIGER* Mold.

Additional bibliography: Mold., Phytologia 29: 309. 1974; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Recent collectors refer to this plant as 80 cm. tall, the inflorescence white, and have encountered it in brejo.

Additional citations: BRAZIL: Goiás: *Héringer, Paula, Mendonça, & Salles 2333*(N, W--2927087); *Irwin, Harley, & Smith 32187* (W--2709633--isotype).

PAEPALANTHUS ELONGATUS var. *PUBESCENS* Alv. Silv.

Additional bibliography: Mold., Phytologia 29: 309--310. 1974; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Additional citations: BRAZIL: Goiás: *W. R. Anderson 8044* (W--2755392). Minas Gerais: *Irwin, Harley, & Onishi 29039* (W--2709592); *Maguire, Mendes Magalhães, & Maguire 49298* (W--2435290).

MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 133. 1928 (N, W).

PAEPALANTHUS ENSIFOLIUS (H.B.K.) Kunth

Additional bibliography: Mold., Phytologia 41: 479--480. 1979; Mold., Phytol. Mem. 2: 110, 129, 134, 425, & 613. 1980; Mold., Phytologia 53: 264. 1983.

Recent collectors describe this species as a large, terrestrial, rosette plant, the flower-heads white, "often on long stems" [=peduncles], and have found it growing "among wet herb vegetation between dry scrub vegetation", on wet slopes in areas of "dry grassy slopes, shrubby mountain slopes and elfin forest", on wet slopes in areas of "grass páramo with large sloping bogs toward the lakes and up to 3 m. tall scrub in protected places", in marshes in elfin forests, and "dominant in wet springs in areas of dry scrub 1--3 m. tall", at altitudes of 2650--3450 m., in both flower and fruit from March to May, as well as in July, September, and December.

Tillett describes the plant as locally frequent in and at the edges of bogs, growing singly or in clusters, the roots dark-brown and fibrous, the plants erect, to 3 dm. tall, clothed with the old brown leaves, "the green leaves [issuing] from a knob, narrow-necked, on top of the stem, white within save for the tan vascular tissue, the leaves soft-coriaceous, with a slight bloom, lustrous medium-green above, lustrous light-green beneath, the peduncles medium yellow-green, the bracts brown, those immediately subtending the flowers olive, the flowers gray-white".

The *Callejas & Gaviria 864*, distributed as *P. ensifolius*, appears actually to be *P. crassicaulis* Körn.

Additional citations: ECUADOR: Azuay: *Camp E.402* (W--2056925); *Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 3664* (Ac, E--2773086), *5071* (Ac, E--2773090). Loja: *Balslev 1271* (N), *1410* (Ld, N); *Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 3664* (Ac, E--2773085); *MacBryde 308* (E--2773075); *Madison & Coleman 2437* (N); *Øllgaard & Balslev 9712* (Ac, N). Zamora: *Maguire & Maguire 44350* (N). PERU: Amazonas: *Boeke 2112* (N, N, N); *Tillett 673-339* (W--2853939).

PAEPALANTHUS ERECTIFOLIUS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 42. 1977; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 125 & 126. 1928 (Ld, N, W).

PAEPALANTHUS ERECTIFOLIUS var. *GLABER* Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 481--482. 1973; Mold., Phytol. Mem. 2: 153 & 613. 1980.

PAEPALANTHUS ERECTIFOLIUS var. *GRANDIFOLIUS* Alv. Silv.

Additional bibliography: Mold., Phytologia 26: 482. 1973; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 192. 1928 (N, W).

PAEPALANTHUS ERIGERON Mart.

Additional synonymy: *Paepalanthus erigeron* "Mart. ex Koern." apud Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Additional bibliography: Mold., Phytologia 41: 480. 1979; Mold., Phytol. Mem. 2: 153, 613, & 628. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Mold., Phytologia 50: 263. 1982.

Recent collectors describe this species as a rosette herb, to 30 cm. tall, the leaves rather fleshy and gray-green or dark glossy-green above and paler beneath, soft, the peduncles to 40 cm. long, and the fruiting-heads brown. They have found it growing on high sandstone bluffs along roadsides and in the shade of overhanging rocks, among rocks, and on campo rupestre, at 1000--1200 m. altitude, in flower in July and October, and in fruit in February, July, and October.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18753* (K), *18888* (Ld, N, W--2936339); *Mori 12909* (Ld, N); *Mori, King, Santos, & Hage 12561* (Ld, W--2854284), *12679* (Ld, W--2854285).

PAEPALANTHUS ERIOCAULOIDES Ruhl.

Additional bibliography: Mold., Phytologia 37: 42. 1977; Mold., Phytol. Mem. 2: 153 & 613. 1980.

PAEPALANTHUS ERIOPHAEUS Ruhl.

Additional bibliography: Mold., Phytologia 37: 42. 1977; Mold., Phytol. Mem. 2: 153 & 613. 1980.

PAEPALANTHUS ESPINOSIANUS Mold.

Synonymy: *Paepalanthus espinosoides* Mold., Phytol. Mem. 2: 425 in syn. 1980.

Additional bibliography: Mold., Phytologia 26: 484. 1973; Mold., Phytol. Mem. 2: 129, 134, 425, & 613. 1980; Mold., Phytologia 53: 264. 1983.

Recent collectors describe this plant as cushion-forming and have found it growing "in small springs on páramo with humid páramo vegetation and abundant *Espeletia hartwegiana*", "in strongly wind-exposed places on windswept ridges with recently burned grass páramos and adjacent scrubby forest", and "in flush bogs in areas of dry low scrub vegetation, more humid in small hollows and valleys", at 2850--3500 m. altitude, in flower in May and September.

Material of this species has been misidentified and distributed in some herbaria as *Eriocaulon* sp.

Additional citations: ECUADOR: Azuay: *Balslev 1535* (Ld, N). Carchi: *Holm-Nielssen, Jeppesen, Løjtnant, & Øllgaard 5277* (Ut--3525738). Morona-Santiago: *Øllgaard & Balslev 9557* (Ac, N, N). Santiago-Zamora: *Steyermark 54342* (W--1901690--isotype).

PAEPALANTHUS EURYPHYLLUS Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 389. 1974; Mold., Phytologia 29: 310. 1974; Mold., Phytol. Mem. 2:

153 & 613. 1980.

Additional citations: *Anderson, Stieber, & Kirkbride 35679* (W--2709585).

PAEPALANTHUS EXIGUUS (Bong.) Körn.

Additional bibliography: Mold., Phytologia 37: 42. 1977; Mold., Phytol. Mem. 2: 153, 425, & 613. 1980.

Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 35647* (W--2709306). Pará: *Secco 238* (Ld); *Secco & al. 192* (Ld). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 574. 1841 (N, W).

PAEPALANTHUS EXIGUUS var. *LONGIFOLIUS* Beauverd

Additional bibliography: Mold., Phytologia 29: 311--312. 1974; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 293. 1908 (N, W).

PAEPALANTHUS EXTREMENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 40. 1976; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 163--164, pl. 103. 1928 (Ld, N, W).

PAEPALANTHUS FALCIFOLIUS Körn.

Additional bibliography: Mold., Phytologia 41: 480. 1979; Mold., Phytol. Mem. 2: 153, 400, & 613. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Additional citations: BRAZIL: Bahia: *Harley, Renvoize, Erskine, Brighton, & Pinheiro in Harley 15633* (W--2791570). Minas Gerais: *Maguire, Mendes Magalhães, & Maguire 49299* (W--2435334).

PAEPALANTHUS FALLAX Beauverd

Additional bibliography: Mold., Phytologia 29: 314--315. 1974; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 288--290. 1908 (N, W).

PAEPALANTHUS FASCICULATUS (Rottb.) Körn.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 1, 2: 206 & 867. 1791; Sweet, Hort. Brit., ed. 2, 597. 1830; Loud., Hort. Brit., ed. 1, 37 (1830) and ed. 2, 37. 1832; G. Don in Loud., Hort. Brit., ed. 3, 37. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 719. 1839; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 179--180. 1927; Savage, Cat. Linn. Herb. Lond. 21. 1945; Anon., Kew Bull. Gen. Ind. 111. 1959; Mold., Phytologia 41: 480--481. 1979; Mold., Phytol. Mem. 2: 110, 117, 122, 124, 126, 153, 425, & 613. 1980.

Recent collectors have found this plant growing on terra firme, in bare sandy areas, and on savannas and sandy campinas, at 120 m. altitude, in both flower and fruit in May, July, and September to November, describing it as a locally common annual to 15 cm.

tall. Madison and his associates refer to it as a tiny terrestrial herb with white flowers, forming turf in open sandy areas of caatinga; their *no. 6314* is a mixture with f. *sphaerocephalus* Herzog, as are also *Alencar 691, Cid & al. 61, Huber & Tillett 6403, Schultes & Cabrera 13110* & *18068*, and possibly *Baldwin 3467*.

Davidson & Martinelli encountered *P. fasciculatus* in disturbed roadside margins in tall forests on terra firme, in laterized clay with sand deposits, and on hot white-sand roadbanks. Pool describes the inflorescence heads as "white, turning light-brown". Knuth (1927) cites an unnumbered Humboldt & Bonpland collection from Bolívar, Venezuela.

Material of *P. fasciculatus* has been misidentified and distributed in some herbaria as *P. lamarckii* Kunth. The *H. L. Clark 6654*, distributed as typical *P. fasciculatus*, actually seems to be its f. *sphaerocephalus* Herzog, while *Maguire & Politi 28309* is a mixture with *Syngonanthus macrocaulon* Ruhl.

Additional & emended citations: COLOMBIA: Amazonas: *Schultes & Cabrera 15531* in part (W--2171633), *16436* (W--2144120). Vaupés: *Schultes, Baker, & Cabrera 18068* (W--2198891); *Schultes & Cabrera 13110* in part (W--2171100), *14174* in part (W--2171374, W--2198865), *18068* in part (W--2172057). VENEZUELA: Amazonas: *H. L. Clark 6457* (Ld, N); *Huber & Tillett 6403* in part (Ld); *Liesner 3403* (Ld); *Maas & Steyermark 5179* (Ut--390371B); *Maguire & Wurdack 34898* in part (W--2168936); *Steyermark & Bunting 102685* in part (W--2622555); *Wurdack & Adderley 42913* (W--2320889). GUYANA: *Maguire & Fanshawe 23560* in part (W--1907830). SURINAM: *Maguire & Stahel 23618* (W--1907848); *W. W. Thomas 2404* (Ld). FRENCH GUIANA: *Hallé 454* (Cy, Cy); *Sastre 5498* (Cy). BRAZIL: Amazônas: *Alencar 691* in part (Ld, N); *Baldwin 3467* (W--1878917); *Cid, Buck, Nelson, Almeida, Mota, & Lima 61* in part (Ld, N); *Davidson & Martinelli CD.10000* (Ld); *Fróes 28044* (W--2341533); *Madison, Kennedy, Monteiro, & Braga 6314* in part (N); *Ongley & Ramos P. 21770* in part (Ld); *Poole 1968* in part (Ld, N, W--2961628); *Prance 23527* (N, W--2935283); *Prance, Anderson, & Schubert 23501* (N); *Prance, Berg, Bisby, Steward, Monteiro, & Ramos 17921* (W--2780466). Amapá: *W. A. Egler 47238* (W--2435327). MOUNTED CLIPPINGS & ILLUSTRATIONS: Herzog, Feddes Repert. Spec. Nov. 29: 205. 1931 (N, W); R. E. Schult., Bot. Mus. Leafl. Harv. Univ. 16 (4): pl. 11. 1953 (Ld).

PAEPALANTHUS FASCICULATUS var. *IÇANENSIS* Herzog

Additional bibliography: Mold., Phytologia 29: 321. 1974; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Recent collectors have found this plant growing in low scrub on white sand, at 220 m. altitude, in both flower and fruit in May and September.

Material of this variety has been misidentified and some even previously cited by me as typical *P. fasciculatus* (Rottb.) Kunth or its f. *sphaerocephalus* Herzog or f. *tenellus* Herzog. The *Steyermark & Bunting 102696* collection is a mixture with a grass.

Additional citations: COLOMBIA: Vaupés: *Cuatrecasas 6976* (N,

N, W--1796732). VENEZUELA: Amazonas: *Steyermark & Bunting 102696* in part (Ld, W--2622554). Bolívar: *Steyermark 89689* (Mi, N, W--2430107, W--2486398). BRAZIL: Amazônas: *Prance, Ramos, Farias, & Philcox 4837* (Ac, N, W--2573082A). MOUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 29: 205. 1931 (N, W).

PAEPALANTHUS FASCICULATUS f. *PROLIFERUS* Mold.

Additional bibliography: Mold., Phytologia 29: 319 & 321--322. 1974; Mold., Phytol. Mem. 2: 117, 153, & 613. 1980.

PAEPALANTHUS FASCICULATUS f. *RIGIDUS* Herzog

Additional bibliography: Mold., Phytologia 29: 322. 1974; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Additional citations: MOUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 29: 205. 1931 (N, W).

PAEPALANTHUS FASCICULATUS f. *SPHAEROCEPHALUS* Herzog

Additional bibliography: Mold., Phytologia 41: 480. 1979; Mold., Phytol. Mem. 2: 110, 117, 122, 153, & 613. 1980.

Recent collectors describe this plant as an herb, 20--30 cm. tall, forming a turf in open sandy areas, terrastrial, often tiny, the heads hemispheric and light-tan, and the bracts dark-tan, the actual flowers white. They have found it growing on terra firme, on "campina de areia branca", in full sun along roadsides, at the edge of water in disturbed forests, on white sand near streams, and forming turf in open areas of caatinga, at 119--120 m. altitude, in both flower and fruit in April, May, July, and October. Clark reports it locally abundant in loose coarse sand in a region of 3.4--3.6 m. rainfall per year.

This form often appears to be merely a growth stage, abundantly mixed with the typical form of the species in herbarium collections, but at other times seems to represent pure-stand populations. The following are some of the collections which are mixtures of this form and typical *P. fasciculatus* (Rottb.) Körn.: *Alencar 691, Cid & al. 61, Huber & Tillett 6403, Madison & al. 6314,* and *Schultes & Cabrera 13110* & *18068.*

Additional citations: COLOMBIA: Vaupés: *Pérez Arbeláez & Cuatrecasas 6757* (W--1796727); *Schultes & Cabrera 12391b* (W--2198863), *13110* in part (W--2171100, W--2198879), *14173* (W--2198864), *14174* in part (W--2198865), *15531* in part (W--2171633), *17194* (W--2171843, W--2198885), *18068* in part (W--2172057), *18347* (Ss, W--2172129, W--2198899), *19554* (Ss, W--2172582, W--2198932); *Zarucchi 1680* (W--2832501); *Zarucchi & Balick 1759* (W--2832409). VENEZUELA: Amazonas: *H. L. Clark 6654* (N); *O. Huber 2586* (Ve); *Huber & Medina 5646* (Ld); *Huber & Tillett 6403* in part (Ld); *Liesner 6364* (Ld), *7473* (Ld); *Maguire & Wurdack 34898* in part (W--2168936); *Maguire, Wurdack, & Bunting 36420* (W--2168976); *Steyermark & Bunting 102685* in part (W--2622555). Bolívar: *Steyermark 90336* (W--2430108). GUYANA: *Cowan & Soderstrom 1737* (W--2678028); *Maguire & Fanshawe 23001* (W--1907816), *23560* in part (W--1907839). SURINAM: *Maguire 23983* (W--1907851). FRENCH GUIANA: *Hoock s.n.* [19 Juillet 1955] (Cy), *s.n.* [22 Mai 1957] (Cy,

Ld). BRAZIL: Amazonas: *Alencar 691* in part (Ld); *Baldwin 3222* (W--1878799), *3389* (W--1878881), *3548* (W--1878944); *Cid, Buck, Nelson, Almeida, Mota, & Lima 61* in part (N); *Lasseigne 21169* in part (W--2780463); *Madison, Kennedy, Monteiro, & Braga 6314* in part (N, W--2889766), *6453* (N); *Nascimento 663* (Ld, N); *Ongley & Ramos P.21770* in part (N, W--2935293); *Poole 1968* in part (W--2961628); *Prance, Coêlho, Maas, & Pinheiro 11659* (W--2801671); *Prance, Maas, Woolcott, Monteiro, & Ramos 15682* (W--2801666); *Prance, Ramos, Farias, & Coêlho 9069* (W--2673076A); *Rodrigues & Coêlho 2574* (N); *Rodrigues, Coêlho, & Monteiro 8590* (W--2920841). Pará: *Cid, Ramos, Mota, & Rosas 1869* [Herb. Inst. Nac. Pesq. Amaz. 96037] (Ld); *Silva & Santos 4691* (N, N). Rondônia: *Cordeiro s.n.* [25 April 1976] (E--2466527). MOUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 29: 205. 1931 (N, W).

PAEPALANTHUS FASCICULATUS f. *TENELLUS* Herzog

Additional bibliography: Mold., Phytologia 41: 480--481. 1979; Mold., Phytol. Mem. 2: 117, 122, 124, 153, & 613. 1980.

Recent collectors have encountered this plant in low restinga vegetation over white sand surrounded by hugh forest on terra firme.

The *Schultes & Cabrera 14968* collection is a mixture with *P. lamarckii* Kunth and *Syngonanthus caulescens* (Poir.) Ruhl.

Additional citations: COLOMBIA: Vaupés: *Schultes & Cabrera 14173* (W--2171373), *14968* in part (W--2198877). VENEZUELA: Amazonas: *Steyermark 57729* (W--1901735). Bolívar: *Maguire, Steyermark, & Maguire 53609* (W--2514909). GUYANA: *Cowan & Soderstrom 1748* (W--2678025). SURINAM: *B. Maguire 24191* (W--1907833), *24298* (W--1907836), *24677* (W--1907842). BRAZIL: Pará: *Campbell, Ongley, Ramos, Monteiro, & Nelson P.22539* (N, W--2935282); *Davidson & Martinelli s.n.* [30 June 1980] (N). MOUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 29: 205. 1931 (N, W).

PAEPALANTHUS FASCICULIFER Alv. Silv.

Additional bibliography: Mold., Biol. Abstr. 61: 4884. 1976; Mold., Phytologia 37: 43. 1977; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl Mont. 1: 73--74, pl. 42. 1928 (Ld, N, W).

PAEPALANTHUS FASCICULIFER var. *CAPILLIFOLIUS* Mold.

Additional bibliography: Mold., Biol. Abstr. 61: 4884. 1976; Mold., Phytologia 37: 43. 1977; Mold., Phytol. Mem. 2: 153 & 613. 1980.

Additional citations: BRAZIL: Goias: *Hatschbach 36839* (W--2849703--isotype).

PAEPALANTHUS FASTIGIATUS (Bong.) Körn.

Additional synonymy: *Paepalanthus fastigiatus* (Bong.) Ruhl., in herb.

Additional bibliography: Mold., Phytologia 29: 325--326. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.

Citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 24. 1831 (N, W); Kunth, Enum. Pl. 3: 573. 1841 (N, W).

PAEPALANTHUS FERREYRAE Mold.

Additional bibliography: Mold., Phytologia 29: 326. 1974; Mold., Phytol. Mem. 2: 134 & 613. 1980.

PAEPALANTHUS FILIPES Mold.

Additional bibliography: Mold., Phytologia 29: 326. 1974; Mold., Phytol. Mem. 2: 122 & 613. 1980.

Citations: GUYANA: *Maguire & Fanshawe 23021* (N--type, W--1907818--isotype).

PAEPALANTHUS FILOSUS Ruhl.

Additional bibliography: Mold., Phytologia 37: 43. 1977; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS FIMBRIATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 29: 326--327. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 197--198, pl. 130. 1928 (Ld, N, W).

PAEPALANTHUS FLACCIDUS (Bong.) Kunth

Additional synonymy: *Paepalanthus flaccidus* Bong. apud Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-Nat. 79: 87. 1908.

Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St. Petersb., ser. 6, 1: 636--637 & 643--644. 1831; Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-Nat. 79: 87. 1908; Mold., Phytologia 37: 43. 1977; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43], 45, 46, 52, & 57, fig. 63--68. 1979; Mold., Phytol. Mem. 2: 1-4, 425, & 613. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Additional illustrations: Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: 57, fig. 63--68. 1979.

Recent collectors describe this plant as an herb, to 30 cm. tall, forming compact hemispheric mounts when in flower, with rigid dark-green leaves, spreading, glossy,yellow-green peduncles, and white flowering-heads. They have encountered it on campo rupestre among dry soil vegetation and in areas of closed cerrado with adjoining grassland and marsh, at 1000--1300 m. altitude, in both flower and fruit in March and July.

Additional & emended citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19790* (Ld, N, W--2936324); *Mori, King, Santos, & Hage 12285* (Ld, W--2854246). Distrito Federal: *Heringer 12138* [Herb. Brad. 64010] (Ja). Minas Gerais: *Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 28576* (W--2861723); *Widgren s.n.* [1845] (N). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 512 & 579. 1841 (N, W).

PAEPALANTHUS FLAVICEPS Körn.

Additional bibliography: Mold., Phytologia 29: 329--330. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS FLAVORUTILUS Ruhl.

Additional bibliography: Mold., Phytologia 37: 43. 1977; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS FOLIOSUS Körn.

Additional bibliography: Mold., Phytologia 35: 25. 1976; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS FORMOSUS Mold.

Additional bibliography: Mold., Phytologia 41: 481. 1979; Mold., Phytol. Mem. 2: 117, 154, & 613. 1980.

Additional citations: BRAZIL: Amazonas: *Maguire & Maguire 35235* (W--2168943, W--2168944, W--2168945), *35432* (W--2168950, W--2168951).

PAEPALANTHUS FRATERNUS N. E. Br.

Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 180. 1927; Mold., Phytologia 41: 478 & 481. 1979; Mold., Phytol. Mem. 2: 117, 122, & 613. 1980; Mold., Phytologia 49: 380--381 (1981) and 50: 245 & 270. 1982; Hocking, Excerpt. Bot. A.39: 101. 1982; Mold., Phytologia 54: 66--67 & 220. 1983.

Recent collectors describe this plant as forming dense clumps on herb-covered mounds or dense tufts, the leaves stiffly coriaceous, rich-green on both surfaces, and the flowering-heads white or whitish to whitish-gray, surrounded by black or dark-maroon involucral bracts. They have found it growing along the edge of sandstone rock formations bordering subsavannas of *Mallophyton* and *Chimantaea*, in low *Mallophyton chimantensis* scrub, in open places, especially in zanjon, and on swampy savannas, at 2300--2685 m. altitude, in both flower and fruit in January, February, and October.

Material has been misidentified and distributed in some herbaria as the very closely related *P. convexus* Gleason. On the other hand, the *Steyermark 93683* & *93958* and *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115991*, distributed as *P. fraternus*, actually are *P. convexus* Gleason, while *Persaud 130* is *P. auyantepuiensis* Mold., *Maguire, Steyermark, Brewer-Carías, Maguire, & Espinosa 65609* and *Steyermark, Brewer-Carías, Dunsterville, & Dunsterville 112437* are *P. fraternus* var. *marahuacensis* Mold., *Steyermark, Brewer-Carías, & Liesner 124407* is *P. fraternus* var. *radiatus* Mold., *Steyermark & Wurdack 490* is *P. fraternus* var. *spathulatus* Mold., *Steyermark 58849* is *P. perplexans* Mold,

Knuth (1927) cites *Connell & Quelch 96* & *659* and *Ule s.n.* from Roraima, Venezuela.

Additional citations: VENEZUELA: Amazonas: *Steyermark 103839* (Ld, N, N). Bolívar: *Huber & Steyermark 7158* (Ld); *Steyermark*

58901 (W--1987399), *93959* (W--2584275); *Steyermark, Espinosa, Mc Diarmid, & Brewer-Carías 115818* (Ld), *115842* (Ld), *115857* (Ac), *115886* (Ac, Ld), *115896* (Ld); *Steyermark, Huber, & Carreño E. 128875* (Ld); *Steyermark & Wurdack 1045* (W--2168529, W--2407799).

PAEPALANTHUS FRATERNUS var. *CHIMANTENSIS* Mold., Phytologia 54: 66--67. 1983.

Bibliography: Mold., Phytologia 54: 66--67 & 234. 1983.

Citations: VENEZUELA: Bolívar: *Steyermark, Huber, & Carreño E. 128944a* (Ld--type).

PAEPALANTHUS FRATERNUS var. *MARAHUACENSIS* Mold., Phytologia 49: 385. 1980.

Bibliography: Mold., Phytologia 49: 385. 1981; Hocking, Excerpt. Bot. A.39: 101. 1982; Mold., Phytologia 50: 245 & 270. 1982.

Collectors refer to this plant as forming dense clumps, the flowering-heads sordid-white, the leaves green, and have found it growing at 2000--2800 m. altitude, in both flower and fruit in February, March, and September. Material has previously been confused with *P. convexus* Gleason and typical *P. fraternus* N. E. Br.

Citations: VENEZUELA: Amazonas: *Maguire, Steyermark, Brewer-Carías, Maguire, & Espinosa 65609* (E--2901867--isotype, E--1901871--isotype, Ld--isotype, N--type); *Steyermark, Brewer-Carías, & Liesner 124391* (E--2901870), *124407* (E--2901863); *Steyermark & Delascio 129106* (Ld). Bolívar: *Steyermark, Brewer-Carías, Dunsterville, & Dunsterville 112437* (N); *Steyermark, Huber, & Carreno E. 128175* (Ld).

PAEPALANTHUS FRATERNUS var. *RADIATUS* Mold., Phytologia 49: 385--386. 1981.

Bibliography: Mold., Phytologia 49: 385--386 (1981) and 50: 245 & 270. 1982; Hocking, Excerpt. Bot. A.39: 101. 1982.

Citations: VENEZUELA: Amazonas: *Steyermark, Brewer-Carías, & Liesner 124407* (N--type).

PAEPALANTHUS FRATERNUS var. *SPATHULATUS* Mold., Phytologia 49: 386. 1981.

Bibliography: Mold., Phytologia 49: 386 (1981) and 50: 245 & 270. 1982; Hocking, Excerpt. Bot. A.39: 101. 1982.

The type collection of this taxon was previously confused with typical *P. fraternus* N. E. Br. and so cited.

Citations: VENEZUELA: Bolívar: *Steyermark & Wurdack 490* (Ld--isotype, Mu--isotype, N--type, W--2168511--isotype, W--2407720--isotype).

PAEPALANTHUS FREYREYSII (Billb.) Körn.

Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St. Petersb., ser. 6, 1: 625--626. 634, & 635. 1831; Mold., Phytologia 37: 44. 1977; Mold., Phytol. Mem. 2: 154 & 613. 1980.

Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog.

Erioc. 26. 1831 (N, W); Kunth, Enum. Pl. 3: 502 & 574. 1841 (N, W).

PAEPALANTHUS FULGIDUS Mold.
Additional bibliography: Mold., Phytologia 29: 390--391. 1974; Mold., Phytol. Mem. 2: 117, 154, & 613. 1980.

PAEPALANTHUS FULGIDUS var. *ZULOAGENSIS* Mold.
Additional bibliography: Mold., Phytologia 29: 291. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Steyermark and his associates describe this plant as subcaulescent, the leaves recurved, shiny dark-green above, pale-green beneath, the "heads white with black [involucral bracts?]", and have found it growing in wet soil at the edges of forests, at 1850--2450 m. altitude, in both flower and fruit in February. The area of collection is apparently on the border of Amazônas, Brazil, and Bolívar, Venezuela, so the taxon probably occurs in both countries.
Additional citations: VENEZUELA: Bolívar: *Steyermark, Huber, & Carreño E. 128937* (Ld).

PAEPALANTHUS FUNCKEANUS Körn.
Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 180. 1927; Mold., Phytologia 29: 391. 1974; Mold., Phytol. Mem. 2: 117 & 613. 1980.
Recent collectors have found this plant growing at 1400 m. altitude, in both flower and fruit in September. Knuth (1927) cites *Funck & Schlim 809* from Trujillo, Venezuela.
Additional citations: VENEZUELA: Trujillo: *Benítez de Rojas 1928* (Eu--48012).

PAEPALANTHUS FUSCOATER Körn.
Additional bibliography: Mold., Phytologia 29: 391--392. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS FUSCOATER var. *MINOR* Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 392. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 181. 1928 (N, W).

PAEPALANTHUS FUSCUS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 44. 197; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 243--244, pl. 162. 1928 (Ld, N, W).

PAEPALANTHUS GARDNERIANUS Walp.
Additional bibliography: Mold., Phytologia 37: 44. 1977; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Walp., Ann. Bot. Syst. 1: 889. 1848 (N, W); G. Gardn. in Hook. f., Icon. Pl. 6

[ser. 2, 2]: pl. 528. 1843 (Ba).

PAEPALANTHUS GARIMPENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 35: 26. 1976; Mold., Phytol. Mem. 2: 154 & 613. 1980.
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PAEPALANTHUS GENICULATUS (Bong.) Kunth
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Additional bibliography: Mold., Phytologia 41: 481. 1979; Mold., Phytol. Mem. 2: 74 & 613. 1980.

PAEPALANTHUS GIBBOSUS Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 479. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 142--144, pl. 89. 1928 (Ld, N, W).

PAEPALANTHUS GLABRIFOLIUS Ruhl.
Additional bibliography: Mold., Phytologia 37: 44. 1977; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS GLAREOSUS (Bong.) Kunth
Additional bibliography: Mold., Phytologia 35: 26. 1976; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 571. 1841 (N, W).

PAEPALANTHUS GLAUCESCENS Körn.
Additional bibliography: Mold., Phytologia 29: 481. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.

PAEPALANTHUS GLAUCOPHYLLUS Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 481. 1979; Mold., Phytol. Mem. 2: 154, 425, 426, & 613. 1980.
Emended citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 23--23, pl. 8. 1928 (Ld, N, W).

PAEPALANTHUS GLAUCOPODUS Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 482. 1974; Mold., Phytol. Mem. 2: 154 & 613. 1980.
Citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 2 & 63 bis. 1928 (Ld, N, W). [to be continued]

DEPPEA LUNDELLII (RUBIACEAE), A NEW SPECIES FROM GUATEMALA

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DEPPEA LUNDELLII Dwyer, sp. nov. -- Herbae parvae caulibus pluribus ex rhizomate gracile orientibus; stipulae ad 1.7 mm longae; folia opposita laminis oblongis vel obovato-oblongis, ad 3.5 cm longis et 1.3 cm latis, venis lateralibus 4-6 (-7), infra in costa venisque villosis; petioli ad 6.5 mm longi. Flores in axillis solitarii, pedicellis ad 1.5 cm longis; calyx lobis 0.5-1.0 mm longis praeditus; corolla alba tubo vix visibile lobis ad 3.5 mm longis, glabris. Fructus maturitate costis sex tenuibus longistrorum et asymmetrice dehiscentes pericarpio apice saepe laciniato, seminibus pluribus reticulatis.

Herbs, the stems several, arising from a slender wiry rhizome, less than 10.0 cm long, densely ferrugineous-villose; stipules persistent, narrowly triangular, to 1.7 mm long, densely ferrugineous-villose; leaves opposite, often with several pairs, variable in length at a node, the blades oblong or obovate-oblong, to 3.5 cm long, to 1.3 cm wide, deltoid to obtuse at apex, acute, attenuate-acute or cuneate at base, the costa slender, prominulous beneath, the lateral veins 4-6 (-7), strongly prominulous beneath, thinning toward the margin, with (0-) 1-2 veins between two adjacent lateral veins arising from the costa, usually 2-4 pinnatiform veins between two lateral veins, the other veins invisible, thin-chartaceous, ± concolorous, occasionally bullate above, villose on costa and veins below, the margin ciliate, the hairs straight or curled. Flowers solitary in axils, the pedicels capillaceous, to 2.5 cm long, 0.25 mm wide; hypanthium ca 1.0 mm long, glabrous or glabrescent, the calycine cup scarcely measurable, the lobes 4, to 1.5 mm long, glabrous; corolla white, the tube to 0.35 mm long, the lobes oblong, to 3.5 mm long, glabrous; stamens 4, the anthers ca 1.35 mm long, apiculate; style slender, ca 3.5 mm long, the stigma narrowly clavate, the ovules on 2 intrusive axile placentas. Fruit when immature, oblong, to 3.5 mm long, to 1.0 mm wide, delicately 6-ribbed, at maturity splitting unevenly from apex toward base, laciniate at apex, the ribs in strong contrast to the thin, scarious white pericarp, the cystoliths abundant, the seeds subrotund, ca 0.2 mm in diam, reticulate.

GUATEMALA; Dept. Baja Verapaz: Niño Perdido, bordering Rio San Jose, 8 km north, in high forest, on wall, C. L. Lundell & E. Contreras 21025 (LL; holotype, MO). Herb; flowers white.

I have examined almost all of the holotypes of Deppea and am certain that the new species is distinct. Deppea is a genus with approximately 25 species restricted to the tropics of Mesoamerica, except for one or two species found in northern South America. The center of distribution of the genus is southern Mexico.

The species is named in honor of Dr. C. L. Lundell who has collected many Rubiaceae in Guatemala, as well as in other countries of Mesoamerica.

Deppea includes subshrubs, shrubs, and trees. There is no species so reduced in stature as the new species. There are several taxa with leaves less than 3.5 cm in length, e.g. D. microphylla Greenman.

The fact that the stipules are persistent, the corolla tube extremely short, and the fruits finally dehiscent precludes it from being assigned to Hoffmannia which has consistently axillary inflorescences. While occasionally one finds a collection of Deppea with a few of the flowers solitary, this is an unusual circumstance. The few fruits of D. lundellii observed as dehiscent, split irregularly into 2 ? parts from apex to base; at least one fruit is laciniate at the apex, presumably a unique feature of the new species. D. tenuiflora Benth., e.g. Breedlove 12006 from Chiapas, Mexico and D. pubescens Hemsley, e.g. Hinton 7402 from Mexico, have fruits which split to the base. The minute flowers of D. anisophylla L. Wms, e.g. Skutch 1539 may have withered fruit as a skeleton-line basket of 4 ribs from which the wall proper pulls away as scarious remnants. The young fruit of D. lundellii does not have a ringlike structure connecting the ribs as they converge at the apex of the pericarp as in D. obtusiflora Benth., D. hamelioides Standl.

CONTRIBUTION TO THE LICHEN FLORA OF URUGUAY XIX.

Lichens from Rio de la Plata coast.

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This is the first paper dealing with the lichen flora of the coast of the Atlantic Ocean and the Rio de la Plata within the limits of the Marsden Square 413 (30°-40° S and 50°-60° W.) Such long-term planned study is a subprogram included in the "Plan de Ciencias del Mar" (URU/82/009) which the financial support of PNUD/UNESCO is carried out by the Facultad de Humanidades y Ciencias, Universidad de la República, Montevideo, Uruguay. The National Coordination of this Program is undertaken by the Director of the Department of Oceanography of this Faculty Prof. C/N Mario Bolívar.

The coast of the Rio de la Plata (RPC) in the Department of Montevideo was choised to begin this floristic study because the suitable habitats for the lichen growth are at present in very critical conditions. A part of the coast is beeing transformed in terraces for recreative purposes and all the eastern zone of the same will be severely affected by the new system of drainage of the waste-waters from Montevideo City.

The literature references from the lichen flora from marine and maritime habitats in the Atlantic coast of South America are infortunately reduced to out dated and scarce quotations from the Patagonic coast of Argentina (Grassi 1950) and in the vicinity of Rio de Janeiro, Brazil (Vainio 1890).

For each of the below listed species (which are preserved in the private herbarium of the author) is pointed out if this species is already reported from maritime habitats.

The zonation scheme used in the present paper is based on Du Rietz (1932).

The numbers between brackets belong to the author's numbering system.

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Buellia montevidensis Malme.
PUNTA GORDA: on rocks, middle hygrohalin zone (7495). This species is only known from the type locality, a small island named Isla de Flores off Rio de la Plata coast (Malme 1927/28, Magnusson 1950). Without doubt this habitat is located in a maritime zone.

Caloplaca americana (Malme) Zahlbr.
RPC: between Punta Shannon and Punta Carretas, upper hygrohalin zone (8193). So far as I know this species is reported at first time from a maritime habitat.

Caloplaca cinnabarina (Ach.) Zahlbr.
RPC: between Punta Shannon and Punta Carretas,upper hygrohalin zone(8192).
PAJAS BLANCAS: on rocks, aerohalin zone (349).
In a former paper (Osorio 1967) three collections of this species were reported from the locality of Piriápolis, Maldonado Department. According with annotations taken from the collector's labels and deposited in our private library the above mentioned samples growth on rocks in the Rio de la Plata coast.

Caloplaca festiva (Fr.) Zw. var. *contigua* (Mass.)Oliv.
PUNTA GORDA: on perpendicular S-faced stones, aerohalin zone (7493). This species is reported at first time from a maritime habitat.

Caloplaca sublobulata (Nyl.) Zahlbr.
PUNTA GORDA: on rocks, middle hygrohalin zone, locally common (7492). Reported at first time for Uruguay. Our collections possess the marginal lobes thick and distinctly effigurate; the protothallus is poorly developed. Dr. A. Fletcher (pers. comm.) had also identified this species among some collections made on the oceanic coast of Uruguay near the boundary with Brazil (unpublished records).

Catillaria chalybeia (Borr.) Mass.
PUNTA GORDA: on stones, aerohalin zone (7494). Already reported by Fletcher (1975a & b) from the supralitoral zone and the terrestrial region.

Diploschistes ochraceus (Anzi) Stein.
RPC: between Punta Shannon and Punta Carretas, on rocks aerohalin zone (8300). This is the first report from a maritime habitat.

Lecanora fusca Müll. Arg.
RPC: between Punta Shannon and Punta Carretas, rocks in a meadow, aerohalin zone (8299). In the Department of Montevideo there are two collections already published from maritime habitats (Magnusson 1950, Osorio 1966).

Lecidea montevidensis Müll. Arg.
PUNTA GORDA: rocks in a meadow, aerohalin zone (7496, 7497).
RPC: between Punta Shannon and Punta Carretas, rocks in a meadow, aerohalin zone (8189).
This is the first report from a maritime habitat.

Ochrolechia osorioana Vers.
PUNTA GORDA: on perpendicular S-faced stones, aerohalin zone (7489).
RPC: between Punta Shannon and Punta Carretas, on rocks upper hygrohalin zone (8191).
Verseghy (1962) published two collections from the Department of Maldonado (Punta Colorada and Punta Fría, Piriapolis) gathered in maritime habitats.

Parmotrema cetratum (Ach.) Hale.
PUNTA GORDA: on perpendicular S-faced stones, locally common, aerohalin zone (7491). Lynge (1929) reported this species from the same locality but no indications about the habitat are given.

Pseudoparmelia papillosa (Lynge ex Gyeln.) Hale
PUNTA GORDA: on perpendicular S-faced stones, aerohalin zone (7490).
RPC: between Punta Shannon and Punta Carretas, on rocks upper hygrohaline zone, (8188). In Uruguay this species is already reported from a maritime habitat: the island Isla de Gorriti off the Rio de la Plata coast, Department of Maldonado (Osorio 1967).

Xanthoparmelia conspersa (Ach.) Hale.
RPC: between Punta Shannon and Punta Carretas, on rocks upper hygrohalin zone (8190). Fletcher (1975a) reported this species from a maritime habitat. Müller Argau (1889) reported *Parmelia conspersa* var. *rugulosa* from the small island Isla de Flores but this old identification needs a revision.
Shortly after the gathering of this species the collection site was filled up. Therefore this is the first documented example of the uncertain future of the lichen flora in such habitats, at least in the Department of Montevideo.

SUMMARY.
Thirteen lichen species collected in the Rio de la Plata coast are listed. *Caloplaca sublobulata* is added to the known flora of Uruguay.
Caloplaca americana, *Caloplaca festiva* var. *contigua*, *Diploschistes ochraceus* and *Lecidea montevidensis* are reported at first time from a maritime habitat.

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STEM PUBESCENCE IN THE SALVIA AZUREA VAR. AZUREA AND VAR. GRANDIFLORA COMPLEX

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Bentham (1848), while describing Labiatae in DeCandolle's Prodromus, distinguished Salvia azurea Lam. with glabrous stems from S. pitcheri Torr. ex Benth. with tomentose, pubescent stems. Further, under S. azurea he described a var. grandiflora. S. longifolia Nutt. was cited as a synonym under var. grandiflora by Bentham. He remarked that although Nuttall described the stem as small, specimens cultivated from Nuttallian seeds attained a height of five feet.

Carl Epling (1939), in his revision of Salvia, subdivided the S. azurea complex into four subspecies: media, mexicana, pitcheri, and typica. He attributed appressed, retrorse pubescence to the stems of subsp. pitcheri (Benth.) Epl. (mostly western) and appressed, ascending pubescence (sometimes nearly absent) to the stems of subsp. media Epl. and subsp. typica Epl. (both mostly eastern in distribution). The subsp. media is characterized with elliptic, pubescent leaves and the subsp. typica is characterized with linear to lanceolate, glabrous leaves. He cited Louisiana as one of the areas for the distribution of these two subspecies.

In his description of S. azurea, Epling remarked that although the single characteristic which was most reliable for the segregation of eastern and western forms was the pubescence on the stem (whether retrorse or ascending), yet even here, there were exceptional specimens of subsp. pitcheri from one collection that had pubescence of both types.

The treatment of this complex by others has varied. Fernald (1952) treated S. pitcheri as a synonym under S. azurea var. grandiflora which he characterized as having short, recurving pubescence on the stem. Gleason (1963) did the reverse of Fernald and made S. azurea var. grandiflora a synonym under S. pitcheri. Correll and Johnston (1970) cited two varieties of S. azurea: var. azurea with ascending or spreading hairs on the stem and var. grandiflora Benth. (including S. pitcheri Torr. ex Benth.) with reflexed hairs on the stem. They also wrongly attributed the epithet S. pitcheri to Nuttall.

The authors made a study of the occurrence and nature of the pubescence on more than 70 specimens of this complex that are on deposit in the Northeast Louisiana University Herbarium. The degree of pubescence was variable from almost none to dense. The pubescnece, when present, was found to occur in the following pattern: the

pubescence on the leaf, pedicel, and calyx was always ascending. In 16 specimens the pubescence on the stem and rachis was mostly ascending, rarely spreading. In 40 specimens, the hairs on the rachis were ascending but reflexed on the stem. In 5 specimens the hairs both on the stem and on the rachis were reflexed. In 11 specimens the hairs on the stem were found to be in a mixed condition such as ascending, reflexed, and spreading. All such variations were found at one internode or on adjacent internodes. In these 11 specimens the hairs on the rachis were ascending or reflexed. Basically following the interpretation of Correll and Johnston, we have included all such specimens that are nearly glabrous or bearing ascending and/or spreading hairs under the variety azurea and the specimens bearing reflexed hairs on the stem under the var. grandiflora. The mixed condition of hairs on the stem is probably due to the hybridization between the type var. azurea and the var. grandiflora and such specimens are included under the var. grandiflora. This mixed condition could point to a phenomenon called 'character displacement' (Luria et. al. 1981). As thus delimited, the var. azurea includes forms with elliptic and pubescent or glabrescent leaves and forms with linear to lanceolate and pubescent or glabrescent leaves. Hence, we could not follow Epling who classified these forms as subsp. media and subsp. typica

We are thankful to Dr. T. P. Ramamoorthy (Departamento de Botanica, Universidad Nacional Autonoma de Mexico, 04510 Mexico, D.F.) for valuable suggestions.

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NEOTROPICAL MYRSINACEAE -- X

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AURICULARDISIA AURICULATA (Donn. Sm.) Lundell, comb. nov. Ardisia auriculata Donn. Sm., Bot. Gaz. 24: 395. 1897.

AURICULARDISIA CHONTALENSIS (Mez) Lundell, comb. nov. Ardisia chontalensis Mez, Pflanzenreich IV. 236: 90. 1902.

AURICULARDISIA CONOIDEA (Lundell) Lundell, comb. nov. Ardisia conoidea Lundell, Wrightia 4: 56. 1968.

AURICULARDISIA GLANDULOSO-MARGINATA (Oerst.) Lundell, comb. nov. Ardisia glanduloso-marginata Oerst., Vid. Medd. Kjoebenhavn 1861: 128. 1861.

The asymmetric sepals are asymmetrical and inconspicuously auriculate. Flower size varies considerably in this taxon.

AURICULARDISIA MAMMOSA (Lundell) Lundell, comb. nov. Ardisia mammosa Lundell, Wrightia 4: 60. 1968.

AURICULARDISIA NIGROPUNCTATA (Oerst.) Lundell, comb. nov. Ardisia nigropunctata Oerst., Vid. Medd. Kjoebenhavn 1861: 127. t. 2. 1861.

AURICULARDISIA PULVERULENTA (Mez) Lundell, comb. nov. Ardisia pulverulenta Mez, Pflanzenreich IV. 236: 88. 1902.

AURICULARDISIA WEDELII (Lundell) Lundell, comb. nov. Ardisia Wedelii Lundell, Am. Midland Nat. 29: 486. 1943.

GRAPHARDISIA OLIVERI (Mast.) Lundell, comb. nov. Ardisia Oliveri Mast., Hook.f., in Bot. Mag., t. 6357. From a cultivated plant, J. D. Hooker f. illustrates and redescribes Ardisia Oliveri Mast., Gard. Chron. II. 680. 1877.

OERSTEDIANTHUS CARLSONAE (Steyermark) Lundell, comb. nov. Ardisia Carlsonae Steyermark, Ceiba 4: 301. 1955.

BOOK REVIEWS

Alma L. Moldenke

"AN INTEGRATED SYSTEM OF CLASSIFICATION OF FLOWERING PLANTS" by Arthur Cronquist, xviii & 1262 pp., 250 b/w plates, 12 photos and 9 fig. Columbia University Press, New York, N. Y. 10025. 1981. $120.00.

This excellent text is based upon a professional lifetime productively spent in the field, in herbaria, in botanical libraries, in sharing ideas with botanical students and confreres (esp. Takhtajan) and then in sorting out thoughts to produce this book that should prove to be a major taxonomic and systematic guide in this and other countries for quite a few years to come. Using the modern classificatory terms the dicots are placed in the Class *Magnoliopsida* with 6 subclasses and the monocots in Class *Liliopsida* with 5 subclasses and then each of these is divided into the more familiar orders and less than 400 families. Each group, through the families, is taxonomically described and provided with a carefully prepared full plate drawing with dissected parts of a type or typical species. Well chosen bibliography is provided after each subclass section. The author has tended to be a logical, never careless, "lumper" rather than a "splitter" as expressed in the family limitations. It is a pity, especially for students, that the price of the book has to be so large, but it is really justifiable for a book which is so large quantitatively and qualitatively.

"THE GRASSES OF SOUTHERN QUEENSLAND" by T. C. Tothill & J. B. Hacker, x & 475 pp., 149 b/w pl., 14 photos, 31 fig., 2 tab. & 1 map. University of Queensland Press, St. Lucia, London & New York, N. Y. 10023. 1983. $32.50.

This valuable study was published for the Tropical Grassland Society of Australia. It supersedes "The Grasses of Southeast Queensland" of 1973, covering a much greater geographical range with many arid zone grasses and using the same helpful format. The few errors in the earlier work have been corrected and the taxonomy updated. This book is very well planned "to meet the needs of agriculturalists, ecologists and graziers who wish to identify the grasses that they encounter or with which they are working" and to serve as a field guide for amateur naturalists. The well organized introduction shows a marked map of the area, describes and photographs the typical phytogeographical areas, diagrams and explains typical grass structures and gives a workable key to genera. Keys to species follow these descriptions where more than one species is recorded.

"FLORA ILUSTRADA CATARINENSE" edited by Raulino Reitz for the CNPq, IBDF, SAA, U. S. National Science Foundation in Washington, D.C., U.S.A. and Herbario "Barbosa Rodrigues" in Itajai, Santa Catarina, Brazil. It plans to publish 180 monographs by 60 Brazilian and foreign taxonomists in Part I. Part II will deal with the various phytogeographical zones, Part III with plant associations, Part IV with history of collections and collectors and Part V with phytogeographic maps. Paperbound. Parte I GRAMINEAS 1. *Bambusa* to 44. *Chloris* por Lyman B. Smith, Dieter C. Wasshausen e Roberto M. Klein. 1981. Parte I GRAMINEAS 45. *Deschampsia* to 84. *Pseudechinolaena* por Lyman B. Smith, Dieter C. Wasshausen e Roberto M. Klein. 1982. Parte I GRAMINEAS 85. *Paspalum* to 115. *Zea* por Lyman B. Smith, Dieter C. Wasshausen e Roberto M. Klein. 1982.

The taxonomic and economic treatment for the family is in the first section, as well as a glossary and a key to the tribes and a key to the genera and species alphabetically up through *Chloris*. For almost every species in these three parts there are given scientific and local common names, synonymy, descriptions in text and plates, and distributions in text and maps. This is a huge undertaking that has herein an excellent start, fine future prospects and great intrinsic value.

"NATURE'S SECOND KINGDOM - Explorations of Vegetality in the Eighteenth Century" by François Delaporte translated by Arthur Goldhammer, xii & 266 pp. & 7 b/w photo plates. The M I T Press, Cambridge, Massachusetts 02142. 1982. $20.00.

The original edition was entitled "Le Second Règne de la Nature" and was published in Paris in 1979. I am quite sure that there is no English-language book among the histories of botany and biology and the advanced (historically oriented introductory chapters of) plant physiology texts with this orientation in this detail. Subsequently the contend of this book will prove interesting to botanists and zoologists and the broader labelled biologists. "Knowledge of animal functions preceded knowledge of plant functions, or vegetality, for one very good reason: the seekers of knowledge were animals....[who] sought a substitute for studying their own nature". Plants were likened to upside-down animals whose roots served as mouths, etc. Cartesian thinking claimed that "Man is a living and thinking machine, whereas animals are living machines....Plants...are only machines and are not alive". Additional interpretations of nutrition, generation and movement follow as developed during the eighteenth century.

"THE ECOLOGY OF ANIMALS" by N. P. Naumov, edited by Norman D. Levine, translated by Frederick K. Plous, Jr., x & 650 pp., 287 b/w fig. incl. maps & 75 tab. University of Illinois

Press, Urbana, Illinois 61801. 1972. $35.00.

This well organized text was first published as "Ekologiya shivotmykh", a text for the state universities of the U.S.S.R. It is richly descriptive in approach first in terms of individual animals, then as populations of the same species, and finally as associations of plants with animals, prey and predators, more intimately hosts and parasites, biocenoses, and human activity and the animal world. Naturally, most of the examples of ecological phenomena are Russian in origin and enriching to students and faculty using American and British texts. There is a very full and detailed bibliography, but with no mention of Odum. It is indeed good that this text is still available in the U. S. as it certainly enriches teaching materials in ecology courses. U. S. funds paid for this translation.

"THE DAYS OF HENRY THOREAU - A Biography" by Walter Harding, xx & 498 pp. * 36 b/w photos. Dover Publications, Inc., New York, N. Y. 10014. 1982. $8.95 paperbound.

This "is an enlarged and corrected edition of the sixth printing (1970) of the work originally published by Alfred A. Knopf, Inc. in 1965....The new material in the Dover edition is in the Afterword and the Notes that appear at the end of the book." This book is only one of several articles written by the author about Thoreau. "Emerging from this long study of Thoreau, I find myself most impressed by Thoreau's aliveness. All his senses were thoroughly awake and he was able to examine the worlds of both man and nature with a keenness and clarity that have made him one of the great observers of the American scene." This is a very well balanced, detailed, richly documented, and interesting biography. Of Thoreau's many writings "Walden" is most famous: "it has been reprinted in more than one hundred and fifty editions, has been translated into virtually every modern language, and has sold untold millions of copies."

"THE HIGH SIERRA" by Ezra Brown & the editors of Time-Life Books, 184 pp., 18 color & 3 b/w double photo plates, 96 color & 9 b/w photos, 3 maps. Time-Life Books, Inc., Alexandria, Virginia 22314. 1972. $12.95.

This is such an inspirationally beautiful book! Such exquisite photographs, such interesting text descriptive of times, places, people like John Muir, and events! There is an important chapter on "Preserving What Is Left". It is fortunate that this book is still available. It makes a wonderful gift to be given or to give.

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FIFTIETH JUBILEE YEAR

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Una nueva especie de pino de Jalisco, México.

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SUMMARY

Pinus jaliscana is described as new on the basis of material collected in the municipalities of El Tuito, Talpa de Allende and Mascota, state of Jalisco, Mexico, where it grows on soils derived from granitic rocks, at altitudes between 850 and 1650 m. The taxon belongs in the subsection *Oocarpae*, according to the classification of Critchfield & Little, and is related to *Pinus patula*, *P. oocarpa* and *P. Pringlei*.

INTRODUCCION

En una gira organizada en los meses de enero y febrero de 1983 que realizó el autor acompañado por los investigadores en gramíneas Francisco Javier Santana Michel (IBUG) y Rafael Guzmán Mejía (COTECOCA) a la Sierra de Cuale en los municipios de El Tuito y Talpa de Allende del estado de Jalisco se colectó un ejemplar el cual, por su porte, tamaño y color de las hojas, así como las dimensiones aparentes de los conos hacía suponer que se trataba de *Pinus Herrerai* Martínez, colectado en otros lugares de la mencionada sierra.

Una vez ya secos los ejemplares en el Instituto de Botánica se procedió a su identificación, no encontrando en la literatura disponible datos suficientes para ubicar la planta en cuestión. Por el tamaño y número de las hojas se asemeja a la Sección Teocote de Martínez (1948), más especificamente a *Pinus Herrerai*. En Jalisco se han encontrado ejemplares de esta especie con 3, 4 y hasta 5 hojas por fascículo y con conos de similares dimensiones al individuo de la Sierra de Cuale. Una revisión minuciosa de la apertura de las escamas del cono y de la anatomía de las hojas descarta de toda relación con la especie anteriormente mencionada y señala semejanzas con los miembros de la Sección Serotinos de Martínez (op. cit.), pero sin que coincida con ninguno de ellos en particular.

El primer lugar donde se visualizó este especímen fue en el Km 5.5 de la terracería que parte de la carretera Puerto Vallarta - El Tuito, hacia la mina de Zimapán. En un segundo viaje, hecho con la finalidad de tomar más datos del habitat, se encontró que la especie se distribuye a lo largo de una franja de 28 Km en dirección E. En fecha posterior se encontró en el rancho El Saucillo, municipio de Mascota, distante 60 Km dirección NE de la primera localidad.

Pinus jaliscana Pérez de la Rosa sp. nov.

Arbor 12-25 m alta, coma plus minusve compacta, cortex in tabulis griseo-rubellis dispositus. Lignum durum. Folia (3-) 4-5 per fasciculum, 12-16 cm longa, 0.6-0.8 mm lata, viridi-lutea, fulgentia, triquetra, stomatibus in quaque superficie instructa; hypodermis tenuis, uniformis; ducti resiniferi (1-) 2-3 (-5), septales, raro aliquot interni; fasciculi fibrovasculares 2; vagina persistens, 0.8-1.2 cm longa. Strobili masculi 1.3-1.8 cm longi, 0.4-0.5 cm lati. Strobili feminei serotine, persistentes in pedunculis 0.8-1.4 cm longis, ochracei, lucidi, longe conici, acuti, 35-60 g pondo, 4.5-8.5 cm longi, 3.5-5.5 cm lati; squamae 95-115, durae, rigidae, 20-28 mm longae, 13-16 mm latae, umbo dorsalis, brunneo-luteus, semi-tetragonalis, 1.1-1.4 cm latus, 0.4-0.6 cm altus; apophysis applanata, cuspis non prominens, spina minuta, decidua. Semina 2 per squamam, semi-triangularia, 4-6 mm longa, 2-3 mm lata, castanea pallida, ala articulata, 1.3-1.7 cm longa, 0.6-0.8 cm lata.

Arbol de 15-25 m de altura, de copa regular y más o menos compacta, tronco hasta 80 cm de diámetro; corteza en placas grises rojizas de 1.5-3.5 cm de espesor. Ramillas algo escamosas de color moreno rojizo o rojo amarillento, con la inserción de los fascículos foliares poco marcada, cuando estos se desprenden. Madera dura. Hojas en fascículos de 4 y 5 (raramente 3), siendo más constante el número de 5, de 12-16 cm de longitud; de 0.6-0.8 mm de ancho, de color verde-amarillo brillante, triangulares, rígidas y extendidas, colocadas en toda la ramilla, de ápice agudo y márgenes con numerosos dientecillos muy pequeños; los estomas están dispuestos de 2-3 hileras en las caras internas y de 4-6 en la cara externa.

La hipodermis es homomorfa constituida por dos hileras continuas de células. Los canales resiníferos varían de 1-5, más comunmente 2-3 siendo septales y en ocasiones se presentan 1 ó 2 internos. El cilindro central es de forma triangular, la endodermis está integrada por células engrosadas, con 2 haces fibrovasculares separados.

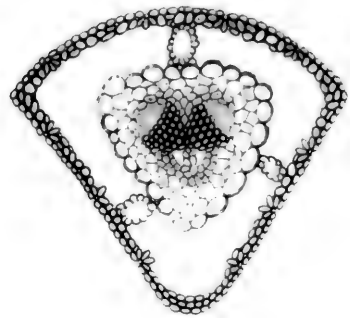

Fig. 1. Anatomía interna de la hoja de *Pinus jaliscana* Pérez de la Rosa, vista en sección transversal.

Las vainas son persistentes, de base decurrente, de 0.8-1.2 cm de longitud, cayendo junto con las hojas, son de color amarillo castaño en las hojas jóvenes y gris débil en las adultas.

Estróbilos masculinos de color amarillo violáceo, de 13-18 mm de longitud por 4-5 mm de ancho, los cuales se desarrollan en la base de las nuevas ramillas. Los estróbilos femeninos, maduran en el segundo año después de la fecundación, son serotinos, persistentes, oblicuos, largamente cónicos, puntiagudos, de color ocre, lustrosos, colgantes, casi simétricos en pedúnculos de 0.8-1.4 cm de largo y 0.5-0.7 cm de grueso manteniendo a los conos maduros en posición perpendicular al suelo, se desprenden con el cono, el cual se puede encontrar generalmente solo, a veces en grupos de 2 y ocasionalmente en grupos de 3; pesan 35-60 gr., su longitud es de 4.5-8.5 cm y el diámetro de 3.5-5.5 cm en su parte media cuando estan abiertos. Escamas duras y rígidas en número de 95-115, ligeramente cóncavas, planas en su cara interna y convexas en su cara externa, de color moreno pálido la interior y ocre intenso casi negro la exterior hasta el umbo. Umbo dorsal de color café-amarillo y de forma semitetragonal, de 11-14 mm de ancho y de 4-6 mm de altura en las escamas de la parte media. Apófisis aplanada de color ocre brillante, en su parte transversal aquillada. Cúspide no protuberante, pequeña, de color castaño grisáceo que lleva en su extremo una pequeña espinita, prontamente caediza, dirigida hacia el ápice del cono. Las escamas de la parte central del cono, son las más desarrolladas y miden 20-28 mm de largo por 13-16 mm de ancho; el ápice de la escama es irregular, terminando generalmente en un ángulo obtuso.

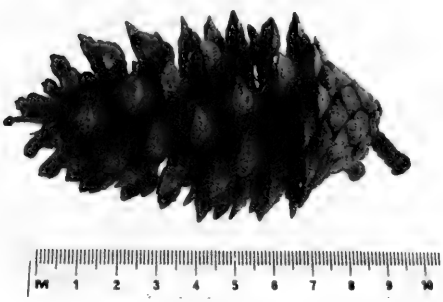

Fig. 2. *Pinus jaliscana* Pérez de la Rosa; estróbilo femenino maduro.

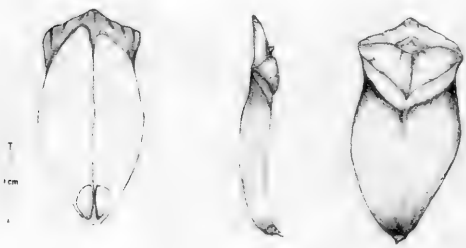

Fig. 3. Vistas interna, lateral y externa de una escama de la parte media del estróbilo de *Pinus jaliscana* Pérez de la Rosa.

Se encuentran dos semillas semitriangulares en la base interna de cada escama de color castaño obscuro, casi negro, de testa muy delgada, miden de 4-6 mm de ancho, la cubierta seminal es de color castaño claro; poseen una ala articulada que mide de 13-17 mm de largo por 6-8 mm de ancho, de color castaño obscuro, el cual se distribuye en tonalidades de diferente intensidad a lo largo y ancho.

TIPO: Jorge Alberto Pérez de la Rosa 370, colectado el 19 de abril de 1983, en el Km 25 de la brecha que entronca Puerto Vallarta - El Tuito hacia la mina de Zimapán, municipio de El Tuito, estado de Jalisco, México. Altitud 1000 m, bosque mixto de pino y encino, suelo profundo. El ejemplar se encuentra depositado en el Herbario del Instituto de Botánica de la Universidad de Guadalajara (IBUG) y los isotipos se distribuirán a los siguientes herbarios del país: MEXU, ENCB, CHAPA y en el extranjero P, K, US, MICH, UC y F.

Otros ejemplares examinados:

El Saucillo, brecha Mascota - San Sebastian; altitud 1500 m; julio 14 de 1976; Román Lamas Robles y Ramón Torres 56; CREG, IBUG. Bosque de *Pinus oocarpa* Schiede; árbol de 25 m de altura.

Km 6 camino de terracería El Tuito - La Mina; altitud 810 m; abril 6 de 1977; Román Lamas Robles y Ramón Torres 178; CREG, IBUG. Bosque de *Pinus oocarpa* Schiede y *Pinus sp.*; árbol de corteza delgada de 20 m de altura, hojas de color verde limón.

Km 5.5 del camino Puerto Vallarta - El Tuito hacia la mina de Zimapán, municipio de El Tuito; altitud 900 m; enero 31 de 1983; Jorge A. Pérez de la Rosa 314; IBUG. Bosque mixto de pino y encino, suelo profundo; árbol abundante de 17 m de altura y 35 cm de diámetro.

Km 7 del camino Puerto Vallarta - El Tuito hacia la mina de Zimapán, municipio de El Tuito; altitud 900 m; febrero 16 de 1983; Jorge A. Pérez de la Rosa 348; IBUG. Bosque de *Pinus jaliscana*, *P. maximinoi* Moore, *P. oocarpa* Schiede, *Clusea salvinii* Donn.*Quercus magnoliifolia* Née y *Q. elliptica* Née, suelos arenosos; ejemplar de 9 m de altura y 30 cm de diámetro.

Km 17 del camino Puerto Vallarta - El Tuito hacia la mina de Zimapán municipio de El Tuito; altitud 930 m; febrero 16 de 1983; Jorge A. Pérez de la Rosa 354; IBUG. Bosque mixto de pino y encino, suelos húmedos, profundos y de origen granítico; árbol abundante de 18 m de altura y 55 cm de diámetro.

Km 27 del camino Puerto Vallarta - El Tuito hacia la mina de Zimapán, municipio de Talpa de Allende; altitud 1000 m; febrero 16 de 1983; Jorge A. Pérez de la Rosa 355; IBUG. Bosque mixto de pino y encino, suelos profundos y húmedos; árbol abundante de 12 m de altura y 40 cm de diámetro

Km 30 del camino Puerto Vallarta - El Tuito hacia la mina de Zimapán, municipio de Talpa de Allende; altitud 1250 m; febrero 16 de 1983; Jorge A. Pérez de la Rosa 359; IBUG. Bosque mixto de *Pinus*

oocarpa Schiede, *Quercus salicifolia* Née, *Q. laurina* Humb. et Bonpl. y *Q. glaucescens* Humb. et Bonpl.; pino escaso de 16 m de altura y 55 cm de diámetro.

Ejido Provincia, Km 7.5 del camino que inicia a partir de la carretera Puerto Vallarta - El Tuito hacia la mina de Zimapán, municipio de El Tuito; altitud 1000 m; 19 de junio de 1983; Jorge A. Pérez de la Rosa 369; IBUG. Bosque mixto de pino y encino, suelos profundos, bien drenados de origen granítico; árbol de 18 m de altura y 45 cm de diámetro.

Km 3 al N del rancho El Saucillo, camino a San Sebastian, municipio de Mascota; altitud 1650 m; septiembre 11 de 1983; Jorge A. Pérez de la Rosa 383; IBUG. Bosque mixto de *Pinus oocarpa* Schiede, *P. Douglasiana* Martínez y *Quercus eduardii* Trel., *Q. elliptica* Née, *Q. obtusata* Humb. et Bonpl. y *Q. magnoliifolia* Née; árbol muy escaso de 5 m de altura y 20 cm de diámetro.

HABITAT

El estado de Jalisco, según Anónimo (1981) se encuentra dividido por fracciones de cuatro provincias fisiográficas, entre la que se encuentra la Sierra Madre del Sur, la cual atraviesa varios estados del Sur Occidente de México, en esta entidad limita al E con el Eje Neovolcánico y al W con el Océano Pacífico. Esta sierra en su exposición W forma varias cuencas y microcuencas, las cuales tienen una rica flora y fauna. Es a lo largo de 65 Km en el fondo de estas cuencas en los municipios de El Tuito, Talpa de Allende y Mascota, donde se localiza *Pinus jaliscana* en alturas de 850 a 1650 m, de clima semitropical y en algunas ocasiones francamente tropical como lo demuestran algunos cultivos ahí introducidos por el hombre, tales como: papaya (*Carica papaya* L.), cáña de azúcar (*Saccharum officinarum* L.) y plátano (*Musa sp.*).

En el Km 25 del camino que parte de la carretera Puerto Vallarta - El Tuito hacia la mina de Zimapán, se encuentra la mayor población de *Pinus jaliscana* (localidad típica), es una superficie de aproximadamente 300 hectáreas, a una altura sobre el nivel del mar de 930 m. Este pino se asocia con *Pinus maximinoi, Quercus salicifolia* y *Clusea salvinii* en suelos húmedos, profundos, arenosos, de origen granítico; las áreas más secas de esta localidad se encuentran pobladas por: *Pinus oocarpa, Quercus magnoliifolia, Q. elliptica* y *Q. glaucescens*. Anónimo (op. cit.) señala a esta zona como de clima cálido subhúmedo, con precipitación pluvial de 1000-1500 mm anuales y una temperatura media anual de 22-26°C.

La distribución de este pino se caracteriza por condiciones edáficas bastante constantes, sin embargo, en la parte más alta de la cuenca se localizó una población constituída por un pequeño número de ejemplares sensiblemente más pequeños, de fuste sinuoso y hojas de color verde pálido, en suelos someros de ladera.

DISCUSION

Este pino por tener conos persistentes, serotinos y lustrosos, se encontraría ubicado según Shaw (1914) en la Sección *Diploxylon*, Subsección *Pinaster*, Grupo *Insignes*. Para Martínez (1948) estaría en la Sección *Serotinos*, Grupo *Patula*, cuyos integrantes poseen conos oblicuos, duros, tenazmente persistentes y brillantes. Para Crithfield y Little (1969) se ubicaría en el Género *Pinus*, Subgénero *Pinus*, Sección *Pinus*, Subsección *Oocarpae* a la cual los mencionados autores adscriben siete especies: *Pinus radiata* Don., *P. attenuata* Lemm., *P. muricata* Don., *P. patula* Schl. et Cham., *P. Greggii* Engelm., *P. oocarpa* Schiede y *P. Pringlei* Shaw, caracterizadas por: hojas casi siempre 3 (2-5), hipodermis normalmente biforme, por lo común canales resiníferos medios, algunas veces internos y otros septales, ramillas primaverales en verticilos de 2 a muchas (multinodales) o solitarias (uninodales), estróbilo casi siempre oblicuo, semicerrado, largamente persistente, escamas con espina o protuberantes. Los miembros de esta Subsección encuentran una distribución geográfica únicamente en el Continente Americano: desde el suroeste de los Estados Unidos de Norteamérica hasta el límite sur de este género en América (Nicaragua).

Los conos sésiles y las hojas gruesas en número de 2-3 por fascículo lo hacen sensiblemente distinto a *Pinus Greggii*, *P. muricata*, *P. attenuata* y *P. radiata* de *P. jaliscana*. Al parecer, un mayor número de características similares se encuentran en especies geográficamente más cercanas. Así tenemos *Pinus patula* var. *longepedunculata*, que muestra semejanza en el número de hojas por fascículo, en hojas muy delgadas, en el número de canales resiníferos, en el hipodermo delgado y uniforme, en la longitud, la forma y el pedúnculo del cono; sin embargo *P. jaliscana* es diferente por tener hojas más pequeñas y erectas, canales resiníferos septales, ocasionalmente con alguno interno, conos solitarios o en pares y en habitar en un clima semitropical-tropical. *P. Pringlei* muestra estrecha afinidad por sus canales resiníferos internos con algunos medios y septales, por la longitud, la forma y el pedúnculo del cono, además de habitar en un clima similar; aquí las diferencias consisten básicamente en que la última especie aludida muestra hojas más delgadas y pequeñas, fascículos de 4-5 hojas; hipodermo delgado y uniforme. *P. oocarpa* var. *microphylla* guarda similitud en las

dimensiones de las hojas, en el tamaño de la vaina de las hojas, en el hipodermo delgado y uniforme así como en habitar en climas similares, pero por su parte *Pinus jaliscana* difiere en el número de hojas por fascículo, en los canales resiníferos septales con alguno interno, en la forma del cono y en el tamaño del pedúnculo. Martínez (op. cit.) señala en la distribución del *Pinus oocarpa* var. *microphylla* una localidad en el estado de Jalisco conocida con el nombre de Cuale, en la que hace la observación de: cono largamente ovoide, de 7 cm de largo por 3 cm de diámetro. Tanto las dimensiones del cono como la localidad hacen pensar que el ejemplar que vió el mencionado autor pertenece al que aquí se describe.

Pinus jaliscana prospera en los municipios de El Tuito y Talpa de Allende al lado de *P. oocarpa* y *P. maximinoi*; en el municipio de Mascota (a mayor altitud) convive con *P. oocarpa* y *P. Douglasiana*. En ambas localidades nunca llegan a mezclarse las poblaciones, pués las especies mencionadas prosperan en condiciones edáficas diferentes. La población disyunta de la parte alta de la cuenca en la cual habita, hace suponer que en épocas pasadas el área del taxon referido cubrió mayores superficies y en la actualidad se encuentra en contracción.

En la Subsección *Oocarpae* se encuentran algunas de las especies más cultivadas en el mundo como *Pinus radiata* y *P. patula*; estudios posteriores podrán revelar la potencialidad de *P. jaliscana* en programas de reforestación.

RESUMEN

Se describe como nueva la especie *Pinus jaliscana*, a base de materiales colectados en los municipios de El Tuito, Talpa de Allende y Mascota, Jalisco, México, donde prospera en suelos de origen granítico,en altitudes entre 850 y 1650 m. El taxon pertenece a la Subsección *Oocarpae*, según la clasificación de Critchfield y Little, y está relacionado con *P. patula*, *P. oocarpa* y *P. Pringlei*.

CUADRO DE COMPARACION DE CARACTERISTICAS DE LAS ESPECIES CON LAS QUE GUARDA MAS AFINIDAD EL TAXON DESCRITO.

		Pinus Pringlei	*Pinus patula* var. *longepedunculata*	*Pinus jaliscana*	*Pinus oocarpa* var. *microphylla*
HOJAS	NUMERO	3	3 - 4 (-5)	(3-) 4 - 5	5
	LONGITUD (cm)	15 - 28	12 - 25	12 - 16	9 - 16
	ANCHO	Muy gruesas más de 1 mm.	Muy delgadas menos de 1 mm.	Muy delgadas menos de 1 mm.	Muy delgadas menos de 1 mm.
	VAINAS (mm)	12 - 20	8 - 15	8 - 12	5 - 10
	NUMERO DE CANALES RESINIFEROS	4 - 7	2	1 - 3 (-5)	1 - 2
	DISPOSICION DE CANALES RESINIFEROS	Internos, algunos medios y septales.	Medios.	Septales, ocasionalmente alguno interno.	Internos.
	HIPODERMO	Con profundos entrantes.	Delgado y uniforme.	Delgado y uniforme.	Delgado y uniforme.
CONOS	LONGITUD (cm)	5.5 - 8.5	5 - 8	5 - 8	5.5 - 8
	PEDUNCULO (mm)	8 - 10	5 - 15	8 - 14	30 - 35
	AGRUPACION	2	2 - 5	1 - 2	1 - 3
	FORMA	Largamente ovoides o casi oblongos, reflejados o poco extendidos, algo atenuados en la base.	Oblongo ovoides o largamente cónicos a veces encorvados u oblicuos, agudos y reflejados.	Largamente cónicos, ligeramente reflejados, poco atenuados en la base y puntiagudos.	Anchamente ovoides - ovoide cónicos cortamente atenuados, casi globosos.
CLIMA		Semitropical.	Templado frío.	Semitropical Tropical.	Semitropical Tropical.

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ANGIOSPERM FLORA OF SAMBARU KONDA OF GUDEM, VISAKHAPATNAM DISTRICT

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INTRODUCTION

Sambaru Konda a huge range in Gudem Agency is located along with the Eastern Ghats in Visakhapatnam District of Andhra Pradesh, India (long. 81°30'-82°15' E and lat. 17°15'-18° N). The forest is occupied by the tribel people. The general rainfall for the area as a whole ranges between 45"-55". Sambaru Konda and the surrounding hill ranges constituting chiefly of crystalline metamorphic rocks. The hill throughout the region under study are covered with dense flora and characteristic barren top where mostly grasses and a few herbs grow. Lushington visited a part of the Garden area of the Visakhapatnam District and collected a few specimens in early of this century. A part of it and the surrounding tract were next visited by Narayanaswami of the Botanical Survey of India in 1920 and then in 1949. Later in 1958 Seshagiri Rao studied the Rampa and a part of Garden Agency tracts in detail.

ENUMERATION OF SPECIES

The identification of plant materials collected were made with the help of 'Flora of Madras Presidency' and later verified by the Botanical Survey of India.

ACANTHACEAE: Acanthus ilicifolius, Linn.; Adhatoda vasica, Nees; Strobilanthes circarensis, Gamble.

ACERACEAE: Acer oblongum, Wall.

ANACARDIACEAE: Buchanania Lanzan, Spreng; Mangifera indica, Linn; Spondias mangifera, Willd.

ANONACEAE: Anona squamosa, Linn.; Anona reticulata, Linn.; Saccopetalum tomentosum, Hook.

APOCYNACEAE: Alstonia scholaris, R. Br.; Carissa carandas, Linn.; Carissa spinarum, Linn; Holarrhena antidysenterica, Wall.; Ichnocarpus frutescens, R.Br.

ARISTOLOCHIACEAE: Aristolochia indica, Linn.

ASCLEPIADACEAE: Hemidesmus indicus, R.Br.; Leptadenia reticulata, L.

BIGNONIACEAE: Dolichandrone falcata, Seem; Oroxylum indicum, Vent.

BIXACEAE: Cochlospermum religiosum, Linn., Flacourtia Ramontchi, L.; Flacourtia sepiaria, Roxb.

BORAGINACEAE: Cordia obliqua, Willd.

CAESALPINIACEAE: Bauhinia purpurea, Linn.; Bauhinia racemosa, Lamk.; Bauhinia variegata, Linn.; Caesalpinia digyna, Rottl.; Cassia fistula. Linnl; Cassia siamea, Lamkl; Cassia tora, Linn.; Hardwickia binata,Roxb.

CAPPARIDACEAE: Capparis stylosa, DC.; Crataeva religiosa, Forst.

CELASTRACEAE: Celastrus paniculata, Willd.; Elaeodendron glaucum, Pers.; Gymnosporia montana, Benth; Pleurostylia wightii, W & A.

COMBRETACEAE: Anogeissus acuminata, Wall.; Combretum decandrum, Roxb.; Terminalia Arjuna, W & A.; Terminalia bellerica, Roxb.; Terminalia chebula, Retz.

DIOSCOREACEAE: Dioscorea esculenta, Burk.; Dioscorea pentaphylla, Linn.;

DROSERACEAE: Drosera burmanni, Vahl.

EBENACEAE: Diospyros chloroxylon, Roxb.; Diospyros melanoxylon, Roxb.; Diospyros microphylla, Bedd.; Diospyros montana, Roxb.

EUPHORBIACEAE: Bioschofia javanica, Bridelia tomentosa, Blume.; Cleistanthus collinus, Benth.; Euphorbia tirucelli, Linnl; Fluggea leucopyrus, Willd.; Givotia rottleriformis, Griff.; Mallotus philippinensis, Muell.; Trewia nudiflora, Linn.

HERNANDIACEAE: Gyrocarpus americanus, Jacq.

LECYTHIDACEAE: Barringtonia acutangula, Gaertn.; Careya arborea, Roxb.

LILIACEAE: Aloe vera, Linn.; Smilax zeylanica, Linn.

LINACEAE: Erythroxylon monogynum, Roxb.; Hugonia mystax, Linn.

LOGANIACEAE: Strychnos Nux-vomica, Linn.; Strychnos potatorum, Linn.

LYTHRACEAE: Lawsonia inermis, Linn.; Woodfordia fruticosa Kurz.

MELIACEAE: Amoora Rohituka, W & A.; Cedrela toona, Roxb.; Cipadessa fruticosa, Bl.; Chukrasia taberlaris, Adr. Juss.; Soymida febrifuga Adr. Juss.

MERISPERMACEAE: Tinospora cardifolia, Miers.; Cyclea peltata Diels.

MIMOSACEAE: Acacia ferruginea, DC.; Acacia pennata, Willd.; Acacia sundra, DC.; Albizzia odorattissima, Benth.; Albizzia marginata, Merr.; Mimosa rubicaulis, Lamk.; Ficus glomerata, Roxb.; Ficus hispida, Linn.; Ficus retusa, Linn.; Ficus tsiela, Roxb.; Streblus asper, Hour.

PAPILIONACEAE: Dalbergia latifolia, Roxb; Dalbergia paniculata, Roxb.; Dalbergia sissoo, Roxb.; Dalbergia spinosa, Roxb.; Flemingia chappar, Ham.; Indigofera pulchella, Roxb.; Mundulea suberosa, Benth.; Mucuna prurita, Hook.; Pterocarpus marsupium, Roxb.

RHAMNACEAE: Ventilago maderaspatana, Gaertn.; Zizyphus ocnoplia, Mill.; Zizyphus xylopyrus, Willd.

RUBIACEAE: Coffea arabica, Linn.; Gardenia lucida, Roxb.; Hymenodictyon excelsum, Wall.; Mitragyna parvifolia, Korth.; Pavetta inica, Linn.; Randia dumetorum, Lamk.

RUTACEAE: Glycosmis pentaphylla, Correa.; Limonia crenulata, Roxb.; Murraya konigii, Spreng.

STERCULIACEAE: Helicteres isora, Linn.; Sterculia urens, Roxb.; Plerospermum acerifolium, Willd.

TILIACEAE: Grewia asiatica, Linn.; Grewia pilosa, Lam.; Grewia hirsuta, Vahl.; Grewia laevigata, Vahl.

VERBENACEAE: Clerodendrum canosulum, Bak.; Lamtana trifolia, Linn.; Premna hispida, Benth.

ZYGOPHYLLACEAE: Tribulus terrestris, Linn.; Seetzenia orientalis, Dcne.

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CHROMOSOME COUNTS FROM NEW MEXICO AND SOUTHERN COLORADO

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The counts reported here are the result of general collecting in New Mexico and southern Colorado. Most agree with previously published counts, however, a few are unique and may provide clues suggesting intraspecific chromosomal variation, and the majority of them expand the cytogeographical knowledge of certain species into this area. Floral buds were collected into modified Carnoy's solution (4 chloroform: 3 absolute ethanol: 1 acetic acid) and then stained in Snow's (1963) hydrochloric acid-carmine stain. Voucher are deposited at NMC; dupes of some are at NY, TEX, MO, or UNM. The following codes for collectors are used in the listing: RJS = Robert Soreng, RWS = Richard Spellenberg, T = Thomas Todsen, and W = Darrell Ward.

ASTERACEAE Acourtia nana (A. Gray) Reveal & King. n=27. NM, Luna Co., N end of Sierra Rica Mtns., 2.5 air km ENE of right angle in U.S.-Mexican boundary. W & RWS 80-002.

Aster commutatus (Torr. & Gray) Gray var. commutatus. n=15. NM, McKinley Co., 3 km S of Fort Wingate, roadside of NM-400. RWS & W 6195.

Aster exilis Ell. n=5. NM, Grant Co., Faywood Hot Springs, N of intersection of NM-61 and US-180. RWS 6208.

Bahia absinthifolia Benth. var. dealbata (A. Gray) A. Gray. 2n=24II + 2B. NM, Doña Ana Co., 5 km E of Las Cruces. W 81-065. All cells examined had two spherical supernumeraries which were smaller than the rest of the chromosomes present.

Bahia oppositifolia (Nutt.) DC. n=24. NM, Harding Co., 3 km W of Mills. RWS, RJS & W 6006.

Berlandiera lyrata Benth. var. lyrata. n=15. NM, Sierra Co., NM-52 roadside, 30 km NW of Cuchillo. W & T 81-167.

Bidens tenuisecta Gray. n=24. NM, Luna Co., roadside of NM-61, 5.5 km S of Faywood. RWS 6211.

Brickellia simplex Gray. n=9. NM, Hidalgo Co., Peloncillo Mtns., Skull Canyon. W & T 81-412.

Erigeron colo-mexicanus A. Nels. n=27. NM, Doña Ana Co., Organ Mtns., Dripping Springs Canyon, 17 km E of Las Cruces. W 81-076; and Harding Co., 16 km NNW of Mills. RWS et al. 6040. Pollen fertility of the specimen, as determined by cotton-blue staining, is very low (19% stained).

Erigeron divergens Torr. & A. Gray var. divergens. n=18. NM, Doña Ana Co., 0.8 km W of Organ, US-70 roadside. W & RWS 81-020.

Gaillardia pulchella Foug. var. pulchella. n=17. NM, Doña Ana Co., Organ Mtns., Aguirre Springs Recreation Area, 8 km SE of Organ. W & Arsuffi 81-096.

Galinsoga parviflora Cav. n=16. NM, Grant Co., Black Range, near NM-180, 9.5 air km SW of Emory Pass. W 80-022.

Gutierrezia glutinosa (Schauer) Sch. Bip. n=4. NM, Doña Ana Co., 13 km SE of Las Cruces. W & Price 81-108.

Hymenothrix wislizenii Gray. n=12. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6201.

Hymenoxys acaulis (Pursh) Park. var. arizonica (Greene) Park. n=15. NM, Harding Co., 16 km NNW of Mills. RWS et al. 6037.

Leucelene ericoides (Torr.) Greene. n=16. NM, Guadalupe Co., 1 km N of Vaughn. RWS, RJS & W 6086; and Grant Co., 11 km NNW of Buckhorn, roadside of USFS-147. RJS & W 2140.

Machaeranthera gracilis (NUtt.) Shinners. n=2. NM, Hidalgo Co., Peloncillo Mtns., Skeleton Canyon, 2.5 km E of Arizona border. RWS 6299.

Machaeranthera grindelioides (Nutt.) Shinners. n=8. NM, McKinley Co., 3 km S of Ft. Wingate on NM-400. RWS & W 6193.

Machaeranthera linearis Greene. n=4. NM, Luna Co., in Columbus. RWS 6346.

Machaeranthera pinnatifida (Hook.) Shinners var. chihuahuana Turner & Hartman. n=4. NM, Otero Co., US-70 roadside, 22 km SW of Holloman Air Force Base. W et al. 81-133.

Melampodium leucanthemum T & G var. leucanthemum. n=10. NM, Mora Co., 16 km W of Canadian River crossing on NM-120. RJS 1640.

Palafoxia sphacelata (Torr.) Cory. n=12. NM, Quay Co., US-54 roadside, 8 km NE of Logan. RWS 1934.

Pectis angustifolia Torr. var. angustifolia. n=12. NM, Doña Ana Co., 9.5 km ENE of southern Las Cruces. W & Price 81-117.

Psilostrophe tagetina (Nutt.) Greene. n=16. NM, Otero Co., US-70 roadside, 22 km SW of Holloman AF Base. W et al. 81-134.

Senecio douglasii DC. var. longilobus (Benth.) Benson. n=20. NM, Dona Aña Co., 5 km E of Las Cruces. W 81-061.

Senecio fendleri Gray. n=23. NM, Lincoln Co., on a N ridge of Sierra Blanca peak. RJS & RWS 2018.

Senecio neomexicanus A. Gray var. metcalfei (Greene) T.M. Barkley. n=46. NM, Grant Co., 18 km N of Mimbres. W 81-046.

Senecio neomexicanus A.Gray var. neomexicanus. n=23. NM, Otero Co., White Mtns., 18 air km SE of Carrizozo. W & RJS 81-059.

Senecio neomexicanus A. Gray var. toumeyi (Greene) T. M. Barkley. n=22. NM, Sierra Co., Black Range, Taylor Canyon, 8 air km NE of Gila Cliff Dwellings National Monument. W & T 81-184.

Senecio vulgaris L. n=20. NM, Doña Ana Co., Las Cruces. W 81-017.

Stephanomeria pauciflora (Torr.) A. Nels. n=8. NM, Doña Ana Co., 13 km E of Las Cruces. W et al. 81-140.

Thelesperma megapotamicum (Spreng.) Ktze. n=11. NM, Sierra Co., 30 km NW of Cuchillo along NM-52. W & T 81-168.

Townsendia grandiflora Nutt. n=9. NM, Harding Co., 3 km W of Mills. RWS,RJS & W 5996.

Trixis californica Kell. n=27. NM, Doña Ana Co., 5.7 km E of Las Cruces. W & RJS 81-160; and 13 km E of LC. W et al. 81-136.

Verbesina encelioides (Cav.) Benth. & Hook. var. exauriculata Robins. & Greenm. n=17. NM, Doña Ana Co., 11 km E of Las Cruces. W 81-123.

Viguiera dentata (Cav.) Spreng. n=17. NM, Luna Co., N end of the Florida Mtns. RWS 6206.

Zinnia acerosa (DC.) A. Gray. n=10. NM, Doña Ana Co., 11 km E of Las Cruces. W & Price 81-111.

BORAGINACEAE Cryptantha barbigera (Gray) Greene. n=6. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon. RWS 5971.

Cryptantha pterocarya (Torr.) Greene. n=12. NM, Hidalgo Co., Granite Gap, roadside of US-80, 20 km S of Road Forks. RWS 6457.

Cryptantha jamesii (Torr.) Pays. var. multicaulis (Torr.) Pays. n=6. NM, Doña Ana Co., 5.7 km E of Las Cruces. RWS & Singer 5954.

Mertensia franciscana Heller. n=12. NM, Lincoln Co., White Mtns., Eagle Creek, 5.6 km WNW of Alto. W et al. 81-125b.

Pectocarya recurvata Johnst. n=12. NM, Hidalgo Co., Granite Gap, along US-80, 20 km S of Road Forks. RWS 6454.

BRASSICACEAE Arabis fendleri (Wats.) Greene. n=7. NM, Grant Co., 19 km N of Mimbres, NM. W 81-048; and Doña Ana Co., Dripping Springs Canyon, 18 km E of Las Cruces. W 81-077.

Descurainia pinnata (Walt.) Britt. var. ochroleuca (Wooton) Shinners. n=14. NM, Doña Ana Co., NMSU campus, Las Cruces. W 81-038; and N base of Mt. Summerford, 5 km NE of Doña Ana. W & Suberkropp 81-035.

Draba helleriana Greene var. blumeri C. L. Hitchc. n=9. NM, Sierra Co., Black Range, Diamond Creek. W & T 81-181.

Draba mogollonica Greene. n=16. NM, Grant Co., Black Range, upper Mimbres River Valley, 17 km N of Mimbres. W 81-047.

Dryopetalon runcinatum A. Gray var. runcinatum. n=12. NM, Doña Ana Co., Organ Mtns., Dripping Springs Canyon, 17 km E of Las Cruces. W 81-075.

Lepidium lasiocarpum Nutt. var. rotundum C. L. Hitchc. n=16. NM, Doña Ana Co., S edge of Las Cruces. W 81-053.

Lesquerella aurea Wooton. n=7. NM, Otero Co., Sacramento Mtns., Cox Canyon, 2.5 km S of Cloudcroft. RJS & W 1651.

Lesquerella fendleri (A. Gray) Wats. n=6. NM, Doña Ana Co., 13 km SE of Las Cruces. W & Price 81-106.

Lesquerella valida Greene. n=5. NM, Lincoln Co., White Mtns., 5 km E of Bonito on NM-37. W & RJS 81-055.

Nerisyrenia camporum (A. Gray) Greene. n=36. Otero Co., US-70 roadside, E edge of Tularosa. W & Suberkropp 81-031. This octoploid increases the large aneuploid assortment of chromosome counts stated in Bacon (1976).

Sisymbrium altissimum L. n=7. NM, Sierra Co., Black Range, Taylor Canyon. W & T 81-191.

Sisymbrium irio L. n=7. NM, Otero Co., US-70 roadside, E edge of Tularosa. W & Suberkropp 81-032a.

Thlaspi montanum L. var. fendleri (A. Gray) P. Holmgren. n=7. NM, Grant Co., Black Range, 18 km N of Mimbres, NM. W 81-042.

CARYOPHYLLACEAE Arenaria confusa Rydb. n=22. NM, Otero Co., Sacramento Mtns, 8 km NE of Cloudcroft. RJS, RWS, & W 2034.
Cerastium arvense L. ssp. strictum (L.) Ugborogho. n=18. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 6.4 air km WNW of Alto. W & Arsuffi 81-085.
Cerastium vulgatum L. var. vulgatum. n= ca. 68. New Mexico, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 air km WNW of Alto, NM. W et al. 81-132b.

EUPHORBIACEAE Croton pottsii (Kl.) Muell. Arg. var. pottsii. n=20. NM, Doña Ana Co., 8 km E of Las Cruces. W & Price 81-116b.
Ditaxis neomexicanus (Muell. Arg.) Heller. n=12. NM, Doña Ana Co., 13 km SE of Las Cruces. W & Price 81-109.
Euphorbia dentata Michx. n=14. NM, Luna Co., roadside of NM-61, 5.6 km S of Faywood. RWS 6216.
Euphorbia glyptosperma Engelm. n=11. NM, Luna Co., NM-61 hwy ca. 5.6 km S of Faywood. RWS 6218.
Euphorbia hyssopifolia L. n=6. NM, Luna Co., roadside of NM-61, 5.6 km S of Faywood. RWS 6212.
Euphorbia indivisa (Engelm.) Tides. n=9. NM, Luna Co., roadside of NM-61, 5.6 km S of Faywoood. RWS 6213.
Euphorbia revoluta Engelm. n=10. NM, Grant Co., W edge of Bayard. RWS 6220.
Euphorbia supina Raf. n=7. NM, Luna Co., roadside of NM-61, 5.6 km S of Faywood. RWS 6217.

FABACEAE Astragallus bisulcatus (Hook.) Gray var. bisulcatus. n=11. NM,Union Co., 8 km E of NM-120, 1.5 km S of US-56. RWS 7033.
Crotalaria pumila Ortega. n=16. NM, Hidalgo Co., Peloncillo Mtns., Skeleton Canyon. RWS 6321.
Dalea purpurea Vente. var. arenicola (Wemple) Barneby. n=7. NM, Harding Co., 3 km W of Mills. RWS, RJS & W 5992.
Desmodium neomexicanum Gray. n=11. NM, Grant Co., W edge of Bayard. RWS 6223.
Desmodium rosei Schubert. n=11. NM, Grant Co., W edge of Bayard. RWS 6222.
Hedysarum boreale Nutt. n=8. NM, Harding Co., 10 km N of Mills on NM-39. RWS, RJS, Fletcher & Fisher 6032.
Lathyrus graminifolius (Wats.) White. n=7. NM, Catron Co., Mogollon Mtns., 10 km S of Glenwood. RJS & W 2133.
Lotus neomexicanus Greene. n=7. NM, Doña Ana Co., S roadside of US-70, 0.8 km W of Organ. W & RWS 81-019.
Lupinus plattensis Wats. n=24. NM, Union Co., 32 km E of Clayton, roadside of US-56. RWS 7050.
Medicago lupulina L. n=8. NM, Lincoln Co., White Mtns., on the banks of Eagle Creek, 5.6 km WNW of Alto. W & Arsuffi 81-094.

Prosopis velutina Wooton. n=14. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5967.
Psoralea tenuiflora Pursh var. tenuiflora. n=10. NM, Guadalupe Co., 24 km N of Santa Rosa. RJS, RWS & W 1615.
Vicia americana Muhl. var. linearis (Nutt.) Wats. n=7. NM, Lincoln Co., Eagle Creek, 5.6 km WNW of Alto. W et al. 81-129.

HYDROPHYLLACEAE Nama hispidum A. Gray var. mentzelii Brand. n=7. NM, Doña Ana Co., NMSU campus, Las Cruces. W 81-039.
Phacelia arizonica A. Gray. n=11. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5968.
Phacelia bombycina Wooton & Standley. n=11. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5969.

LAMIACEAE Agastache cana (Hook.) Woot. & Standl. n=9. NM, Luna Co., N end of Florida Mtns. RWS 6205.
Hedeoma nanum (Torr.) Briq. var nanum. n=18. NM, Doña Ana Co., 8 km E of Las Cruces. W & Price 81-116a.

LINACEAE Linum vernale (Wooton) Small. n=15. NM, Doña Ana Co., 5.6 km E of Las Cruces. RWS & Singer 5955.

LOASACEAE Mentzelia albicaulis Dougl. n=18. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5972.

MALVACEAE Sphaeralcea angustifolia (Cav.) G. Don. var. cuspidata (Britt.) Gray. n=5. NM, Grant Co., roadside of US-180, Mangus Springs. RJS & w 2118
Sphaeralcea coccinea (Nutt.) Rydb. var. coccinea. n=10. NM, Guadalupe Co., 1 km N of Vaughn. RWS, RJS & W 6080.
Sphaeralcea wrightii Gray. n=10. NM, Sierra Co., .4 km N of Elephant Butte Dam. RWS, RJS & Medina 6391.
Sida filicaulis Torr. & Gray. n=6. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6200.

NYCTAGINACEAE Allionia incarnata L. n=20. NM, Doña Ana Co., 9.6 km ENE of NMSU campus, Las Cruces. W 81-115. Only one previous count, n = ca. 58 from Peru, has been reported for this species (Federov, 1969).

OROBANCHACEAE Conopholis alpina Liebm. var. mexicana (A. Gray) Haynes. n=20. NM, Otero Co., White Mtns., Nogal Canyon, 19 air km SE of Carrizozo. W & RJS 81-060.

PAPAVERACEAE Corydalis aurea Willd. n=8. NM, Grant Co., Black Range, upper Mimbres River Valley, 12 mi N of Mimbres. W 81-044.

POACEAE Bromus tectorum L. n=7. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 km WNW of Alto. W et al. 81-130.

Glyceria striata (Lam.) Hitchc. n=10. NM, Lincoln Co., White Mtns., 5 air km W of Alto. W & Arsuffi 81-153.
Hordeum jubatum L. n=7. NM, Doña Ana Co., Las Cruces. W 81-037.
Poa trivialis L. n=7. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 7 km WNW of Alto. RJS & W 1609.

POLEMONIACEAE Gilia mexicana A. & V. Grant. n=18. NM, Grant Co., NM-61 roadside, 6.4 km N of Faywood. W & Hansen 81-067; and Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon. RWS 5973. The collection RWS 5973 was found growing with G. flavocincta A. Nelson ssp. australis (A. & V. Grant) Day & Grant (collected as RWS 5974), and had small- to intermediate-sized corollae. One plant had pollen stainability of 91%; another plant had stainability of 93%. The collection from Faywood (W & Hansen 81-067) near the south edge of the Gila Wilderness was not sympatric with congeners. Two classes of pollen grains were found; one type was spherical with 570 micron diameter, and the other was flattened globes measuring 290 microns in diameter and 240 microns thick. Of the larger type, 92% stained normally; of the smaller ones, 22% were stainable.
Ipomopsis longiflora (Torr.) V. Grant. n=7. NM, Doña Ana Co., 5 km E of Las Cruces. W 81-066.
Ipomopsis multiflora (Nutt.) V. Grant. n=7. NM, McKinley Co., 3 km S of Ft. Wingate, roadside of NM-400. W & RWS 81-495.
Ipomopsis pumila (Nutt.) V. Grant. n=7. NM, Doña Ana Co., 5 km E of Las Cruces. W 81-063.
Microsteris gracilis (Dougl. ex Hook.) Greene var. humilior (Hook.) Cronq. n=7. NM, Upper Mimbres River Valley, Grant Co., 18 km N of Mimbres. W 81-049.

POLYGONACEAE Eriogonum abertianum Torr. in Emory var. abertianum. n=20. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6199
Eriogonum abertianum Torr. in Emory var. cyclosepalum (Greene) Fosberg. n=20. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6198.
Eriogonum havardii S. Wats. n=20. NM, Guadalupe Co., 1 km N of Vaughn. RWS, RJS & W 6074.
Rumex acetosella L. n=21. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 km WNW of Alto. W et al. 81-127.
Rumex hymenosepalus Torr. n=20. NM, Doña Ana Co., roadside of US-70, 0.8 km W of Organ. W & RWS 81-018.

PRIMULACEAE Androsace occidentalis Pursh var. occidentalis. n=10. NM, Grant Co., 18 km N of Mimbres. W 81-041.
Androsace septentrionalis L. var. subulifera A. Gray. n=10. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 6.4 km WNW of Alto. W et al. 81-026.

RANUNCULACEAE Ranunculus inamoenus Greene var. inamoenus. n=24. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 km WNW of Alto. W & Arsuffi 81-093.

ROSACEAE Rosa neomexicana Cockl. n=7. NM, Lincoln Co., White Mtns., Villa Madonna, 5 km NW of Alto. RWS 5981.

SCROPHULARIACEAE Besseya plantaginea (James) Rydb. n=24. NM, Sierra Co., Black Range, Taylor Canyon. W & T 81-187b.

Castilleja integra A. Gray. n=24. NM, Doña Ana Co., Organ Mtns., 18 km SE of Las Cruces. RWS & Singer 5957.

Castilleja lanata A. Gray. n=12. NM, Catron Co., Mogollon Mtns., 10 km S of Glenwood. RJS & W 2126.

Castilleja wootoni Standley. n=12. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5 km NW of Alto. RJS, RWS & W 2024.

Linaria texana Scheele. n=6. NM, Doña Ana Co., Organ Mtns., 14 km E of Las Cruces. W 81-083.

Orthocarpus luteus Nutt. n=14. CO, Saguache Co., SW corner of county, 21 km W of Colorado-114 on Road 8EE. RWS & RJS 5821.

Penstemon albidus Nutt. n=8. NM, Union Co., 32 km E of Clayton on US-56. RWS 7048.

Penstemon superbus A. Nelson. n=8. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon. RWS 5965.

Schistophragma intermedia (Gray) Pennell. n=20. NM, Hidalgo Co., Peloncillo Mtns., Skeleton Canyon, 2.5 km E of Arizona border. RWS 6297.

Veronica arvensis L. n=8. NM, Lincoln Co., Eagle Creek Canyon, 3.5 mi WNW of Alto. W et al. 81-132a.

Veronica americana Schwein. ex Benth. n=18. NM, Lincoln Co., White Mtns., 3 air mi W of Alto. W & Arsuffi 81-154.

Thanks are extended to Dr. T. M. Barkley for confirming the identities of the Senecio spp. and to Dr. Reed Rollins for confirming my identification of Lesquerella valida and many of the other crucifers.

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GREASEWOOD (SARCOBATUS VERMICULATUS (HOOK.) TORR.)

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TAXONOMY

Nomenclature. Big greasewood, black greasewood or here simply greasewood, is a spiny deciduous shrub with simple, fleshy leaves. It is a member of the worldwide goosefoot family (Chenopodiaceae) with 14 genera in the U.S.A. Seepweeds (Suaeda spp.) glass worts (Salicornia spp.) and pickleweed (Allenrolfea occidentalis), all halophytes, are its close relatives. The family formula is $K^5C^0A^5\underline{G}^2$ or $Ca^2Co^0S^{2-5}P^1$ (45,65).

The genus name is derived from the Greek "sarx" meaning flesh and "batos" meaning bramble. The adjective is from the Latin "vermis" meaning worm and "culus" meaning small.

The species is both monoecious and dioecious. The worm-like staminate aments are 0.5-3.0 cm. (0.2-1.2 in long. The pistillate flowers are either solitary or in small clusters. The colorful, winged fruits are 0.8-1.3 cm. (0.3-0.5 in.) long and broad. It is known to hybridize with other goosefoot genera (21).

Greasewood attains heights of ½-3 m. (1½-10 ft.). The wood is hard and strong. The bark varies from yellow to black. It is not to be confused with other "greasewoods", creosotebush (Larrea tridentata) or chamiso (Adenostema fasciculatum), nor with greasebush, (Forsellesia spinescens)(20, 35, 46, 67).

DISTRIBUTION

Greasewood thrives in many associations from Mexico to Canada but prefers the cold deserts north of 37° latitude. It is estimated to cover over 4.8 million ha. (12 million acres), more than any other phreatophyte (64).

Alkali sinks of the Great Basin are encircled by zones of greasewood. It is a minor component of sandhill vegetation of the Mississippi Valley. Neither alkali, salt, nor high watertable are absolute requirements (22). It is found among other succulents of the strand above tide water mark in southern California (3).

When native shrub communities of the sagebrush-wheatgrass (Artemisia sp.-Agropyron sp.) zone are ranked in importance (sic) in southeastern Washington and adjacent Idaho, greasewood stands

fifth behind Artemisia, spiny hopsage (Grayia spinosa), bitterbrush (Purshia tridentata) and sage (Salvia sp.) (19). It is the principal phreatophyte, other than riparian, in the shadscale zone of western Nevada (8,43), and the most extensive halophytic type of the intermountain region (7, 12, 54). It forms large colonies on alkali plains of Utah and Nevada with creosote bush, rubber rabbitbrush (Chrysothamnus spp.), and Artemisia spp. It is found at elevations of 300 to 2400 m. (1000-8000 ft.)(5,20). Its range is more extensive than that of big sagebrush (Artemisia tridentata) in western North America (19, 58).

EVOLUTIONARY HISTORY

The origin of greasewood and its first appearance in western America are obscure. Greasewood pollen and grass pollen have been dated as Eocene epoch or 50 million years ago.

The pollen grains of greasewood are quite distinct from those of other Chenopods (40). They have been recovered in small numbers with other pollen samples in the north central states and also by high level air sampling. However, existence of greasewood in the Lake States in recent time is doubtful.

Numerous paleobotanical studies focusing particular attention upon fossils of differenct periods of the Cenozoic era make no mention of greasewood. nor of the Chenopodiaceae (3, 11, 14, 15, 29, 38, 60, 78). Fossil floras of four western states have been catalogued to include 150 species in 37 families without any chenopods (11).

Ecoclinal variation. Taxonomists differ about the number of species of greasewood (76). The dwarf form, which is non-phreatic, darker in color, more pubescent, with broader wings on the fruits is accepted as a species, S. baileyi (6,66). Others prefer Sarcobatus vermiculatus var. baileyi while others insist that no consistent morphological differences warrant varietal status (1). No biochemical or cytological studies are available to clarify this situation.

The "baileyi" form associates with shadscale (Atriplex confertifolia), bud sagebrush (Artemisia spinescens), winterfat (Ceratoides lanata), and other xeric species on well-drained slopes in about 20 percent of Nevada and in adjacent California (6).

DEVELOPMENTAL HISTORY

The gametophyte chromosome number most common in Chenopodiaceae

is 9 (77). The number in greasewood is believed to be 18 (4, 21). Tetraploid and Octoploid populations have also been reported (9).

A great deal of information is lacking about the ontogeny and phylogeny of greasewood. More is known about its phenology (57).

Seed cast appears scanty when compared with associated shrubs. Wind and gravity are evidently agents of pollination and seed dispersal, as indicated by the broad wings on the achenes, especially of the "baileyi" form. Staminate flowers are high on the plant and pollen production is lavish (72).

Greasewood seeds germinated well at constant moderate temperature 11°C (52°F) in 5½ days. All higher temperature regimes inhibited germination; for example, at constant 26°C (79°F) 98% of the seeds failed to germinate while 2% did germinate in 3 days. Seeds subjected to an 8 hr./16 hr. alternating temperature pattern were devitalized 80% by a "day" temperature of 26°C (79°F).

Seeds responded to moisture stress above -10 bars by slower but not significantly lower germination even at -16 bars. Light was not found to influence germination (58a).

Reproduction by seed, in the writer's opinion, is much less common than among many of its co-dominant shrubs, e.g. sagebrush, rabbitbrush, or saltbushes (Atriplex spp.). Most often, upon examination, juveniles prove to arise from adventitious buds in roots that have been exposed or mechanically injured. These young shoots are herbaceous and succulent. They elongate rapidly and sometimes produce seed the first year (17). "Halogeton looks like baby greasewood" (2).

Greasewood sprouts readily from its crown or its widely spreading roots. The deep taproot has been traced to 5.7 m.(to 19 ft.). Coarse roots at 0.6-0.9 m. (2-3 ft.) have been found associated with 4-5 m. (15 ft.) taproots (10, 24, 34).

Reproductive development and vegetative growth of greasewood in 5 stands of different densities, cover percentages, and in different association on 5 different soils have been studied recently. Twig elongation of 1-2 mm. per day occurred in June, about at the time of the opening of the staminate spikes. Seasonal stem elongation ranged from 7-10 cm. (3-4 in.) (57).

The rate of accumulation of phytomass has not been sufficiently measured. Shrubs in a particular habitat type tend to stabilize at a uniform height and spacing.

Longevity of greasewood may be assumed to be great for two reasons. It regenerates the shoot system rapidly after removal of same. Individual bushes frequently stand on hummocks or mounds created by wind erosion and deposition of soil and litter, presumably over a long time.

ECOLOGY

If greasewood is considered in its relation to light, temperature, and soil moisture, it is seen to be narrow in its light tolerance, wide in hardiness, and sensitive to presence and changing levels of ground watertables.

Greasewood has relatively few competitors for light, owing to its stature and osmotic pressure. Its shade is too thin to suppress subdominants.

Greasewood communities are most common in valley bottoms which have extreme maximum and minimum daily and annual temperatures. Soil surface temperature exceeds 71 C. (160°F.) briefly in July and August afternoons in such areas.

The common associates of a species are useful in understanding its ecology. Greasewood is regularly a dominant with subdominant grasses, e.g. wildryes (Elymus spp.), Indian ricegrass (Orzopsis hymenoides), squirreltail (Sitanion hystrix), saltgrass (Distichlis stricta), alkali grasses (Puccinellia sp.), dropseeds (Sporobolus spp.). Winterfat and several saltbushes are common subdominant shrubs. Bassia hyssopifolia is a palatable forb of alkaline soil often present in these communities.

The maximum biomass of greasewood in relation to site characters is unknown. However, it is apparent that its leaf retention, height, and density respond to the levels and fluctuations of the ground water (43). Where greasewood roots cannot tap the capillary zone, the shoot tends to assume the dwarf "baileyi" form commonly associating with shadscale. Wolfberry (Lyceum cooperi) is an associate here (19). These well-drained communities sometimes extend onto captured dunes bordering alkali playas (17).

During recession of Great Salt Lake in the drought years of the 1930's, greasewood was observed creeping out on the playas (26).

Seasonally water may pond on the surface and evaporate without adding to the watertable, or to the root zone in tight sodic clay. Infiltration rates consistently less than 0.25 cm. (0.10 in.)/hr. have been measured in the barren interspaces. This was in contrast to 5.1 cm. (2 in.)/hr. in the hummocks or coppice dunes crowned by greasewood. The rates were associated with exchangeable sodium percentage levels (56).

Edaphic Relationships. Agricultural development and need for information for land use planning occasioned several classic pioneer studies of soil-plant relationships in greasewood and adjacent communities (12, 16, 42, 61).

Greasewood has a wide range of tolerance for saline and alkali soils (28, 47). Soils under greasewood in salt desert in Utah contained a higher exchangeable sodium content and higher pH (9.25-9.83) than those under any other associated shrub (24, 50, 53). Not all studies support this finding (56). Tissue salt content was 157% as much as in Nuttall saltbush (Atriplex nuttallii) and 93% that in shadscale.

Distribution of greasewood is believed to be related to the amount of exchangeable sodium and the percent of water retained at field capacity (13). Salt content of soils in greasewood communities is found to vary from 500 to 16,000 ppm. (0.05%-1.6%)(54). The plant was found to grow in a zone of average maximum soil moisture stress of -70 bars. Massive zonal communities were mapped in the western half of Nevada, western and eastern thirds of Utah, northern Wyoming, southeastern Oregon, southwestern Idaho, and southern California (10). These zones are typically between zones of saltgrass and sagebrush (18).

In S. E. Washington cheatgrass (Bromus tectorum) was seen to grow more luxuriantly in higher density in greasewood interspaces than in adjacent interspaces between big sagebrush (Artemisia tridentata). Sampling at dm. (4-in.) intervals to 1 m. (3.3 ft.) throughout the year revealed that the increase in available moisture in the greasewood soil exceeded that in the sagebrush in the 4 upper dm. (16 in.). This occurred despite a higher percolation rate in the sagebrush interspaces. Less transpiration by greasewood, owing to its leafless winter condition, contributed to a favorable moisture relationship whereas the evergreen sagebrush preempted the scanty accumulation. The shallow-rooted cheatgrass was not inhibited by the higher salinity and exchangeable sodium below 2 dm. (8 in.) (51).

High concentration of boron was found to be a factor in preventing colonization of greasewood interspaces (56).

A soil supporting greasewood and salt rabbitbrush in northern Nevada was classified as a "mixed (Calcareous) mesic Aquic Durorthidic terriorthent" (17). Another greasewood soil in northern Nevada was classified as "a member of a fine-loamy, mixed, mesic family of Typic Camborthids" (62). While greasewood tolerates tight sodic clays and very weak drainage, it thrives in sand. Among the largest plants are those on dunes with less than 0.1% salt content in the first 3 dm. (1 ft.) (34). In a greasewood-rabbitbrush site in northern Nevada, the watertable was at 2.9-3.0 m. (8-10 ft.). The soil texture of small hummocks was loam to very fine sandy loam, whereas soil in barren interspaces was finer, being silt loam to

loam. At 0.3-0.9 m. (1-3 ft.) the siliceous duripan permitted root passage when moist (56).

Vegetation analysis of sites on clay and clay loam soils in Utah where greasewood comprised 45% of the vegetation found few associates - commonly five. The greasewood plants were 0.9-1.2 m. (3-4 ft.) tall with a density of 5200/ha.(2100/acre). Vegetal cover ranged from 4.4%-29.5% (22).

Chemical changes in the soil profile are directly caused by greasewood (53). When greasewood and sagebrush grow in mixture in natural communities, the basicity is higher under the former. Where growing in separate communities in central Utah the soil pH was 7.36 in sagebrush and 9.21 in greasewood (12). Around Great Salt Lake it is an indicator of black alkali, sodium carbonate and moist saline soil (26).

Soil moisture and chemical tests in a greasewood-sagebrush community revealed both higher moisture and higher sodium contents under greasewood than under sagebrush (48).

Fire Response. One record of response to fire is available from northern Nevada. Stump sprouts were 0.75 m. (2½ ft.) tall in the third year after wildfire. Return to full vegetative structure was predicted to require 5-10 years (62).

Biotic Relationships. Suitable habitats for mammals, birds, reptiles and invertebrates are found in greasewood communities. seventeen species of mammals, 37 of birds and 111 of invertebrates were recorded in Utah. Insect populations were similar to those in sagebrush communities (22, 72, 74).

In west central Utah greasewood communities on sandy soils, including captured dunes, are favorable habitats for as many as nine species of rodents. The loamy mounds formed by the shrubs are usually perforated by burrows where seed and leaves are stored (74).

The pests and diseases of greasewood appear not to have attracted scientific attention. Old bushes are usually highly interspersed with dead branches, or shoots, possibly caused by insects or lower organisms.

Higher herbivores rarely injure greasewood because of its armor and frequent presence of more palatable forage. However, it is food for the Zuni prairiedog, painted and western chipmunks, jackrabbit and porcupine (74a).

Interspecific competition in greasewood communities is circumstantial, considering the wide interspacing and paucity of vegetation between shrubs. A vigorous growth response follows release from competition. Higher seed production and a prolonged growth period resulted (57). Subdominant species tend to be more abun-

dant under the shrub canopy in the surface litter. This observation of mine appears to contradict the records of salt accumulation from leaching of litter. Shade, litter, and wind deposits may be compensating factors.

PHYSIOLOGY

The ability of greasewood to survive several weeks of flooding or ponding while behaving normally as a phreatophyte suggests that its roots have capacity for anaerobic respiration. However, it is by no means a hydrophyte, shown by its demise when the watertable stands at the surface, doubtless a function of time and temperature (36).

The efficiency of greasewood in carbon assimilation, reserve food storage, and rates of biomass accumulation have not been reported.

Seven elements tend to concentrate in greasewood organs. Samples of greasewood tissue analyzed at Malad, Idaho, contained higher concentrations of sodium, potassium, chloride, sulfate, calcium, magnesium and boron (in order of diminishing quantity) than the soil in which it was growing. Although the leaves contained the greatest concentration, the woody parts still contained more of these elements than the underlying 7.6 cm. (3 in.) depth of soil (54).

CHEMICAL CONTROL

Physiology of growing plants is subject to many chemical disturbances. Foliar application of herbicides has often not been an effective method of control (44). However, recent investigations have disclosed that a kill as high as 72% is possible by spraying a mixture of 2,4-D (2, 4-dichlorophenoxy acetic acid) and Picloram (4-amino-3,4,6-trichloropicolinic acid). Careful attention must be given to phenology and soil moisture content. Higher resistance was encountered near the initiation and end of active growth and depletion of available moisture. Resprouting shoots are most susceptible. Respraying with 2,4-D at a rate of 3.3 kg/ha. (3 lb./a.) gave 92-100% control (17).

ECONOMIC CONSIDERATIONS

The economic roles of greasewood are principally as an indicator of land use potential and as range forage. The values range from positive to negative depending upon use or need.

Land Use Indicator. From the beginning of western settlement greasewood has been considered a reliable indicator of the agricultural constraints of the land (27, 68). It thrives on both saline and sodic soils. Big greasewood sites are more amenable to use than are the drier "Bailey greasewood" lands. However, preparation

for cultivation usually requires deep drainage and much leaching by repeated irrigation.

In dry saline sites available water at considerable depth is reached by the taproot (34, 54, 70). In Big Smoky and Steptoe valleys of eastern Nevada, zones of greasewood are underlain by watertables seldom at more than 10.5 m. (35 ft.), but in some places at 15 m. (50 ft.)(42). Attempts to establish grasses by clearing greasewood and irrigating from shallow wells have not succeeded (56).

Nevada research revealed annual evapotranspiration of 3650 to 4260 m^3/ha.(1.2-1.4 acre ft./acre) near Winnemucca with the watertable adjusted at 1.8-2.3m.(6-7½ ft.)(55). In Escalante Valley, Utah, the E/T between May and October was 61cm.(24 in.) from a watertable 71 cm.(28 in.) below the surface (75). Elsewhere seasonal transpiration alone was recorded as 6.6. cm.(2.6 in.)(70).

Range Forage. Generally greasewood alone or with codominant rubber rabbitbrush is regarded as of slight or no value as forage (56). Among California browses its value for sheep and goats is good, for deer poor, for cattle fair to poor, and useless for horses (59). Utilization is restricted by the presence of strong, sharp thorns. Nevertheless, in the Great Basin it is locally a valuable browse (35).

Laboratory analysis of summer and fall samples in Arizona showed protein 21%, nitrogen-free extract 39%, crude fiber 19% and ash 18% ((5). The leaf ash tends to be high in sodium and potassium, e.g. 24% and 22%. respectively (2). Leaf samples in summer in Nevada contained 15.4% crude protein and 0.83% extractable oil (39).

Utilization of greasewood on winter range in Montana was compared with that of sagebrush, winterfat and shadscale. Three intensities of utilization were studied. Under heavy utilization, the descending rank was winterfat, greasewood, shadscale, and sagebrush. Removal of greasewood twigs was 56% at 546 m.(600 yd.) from water and 10% at 1092 m.(1200 yd.)(33).

Chemical analysis of greasewood forage during winter in Montana revealed it to contain 8% to 9% crude protein, which was lower than that present in sagebrush, winterfat or shadscale. At the same time it ranked lowest in phosphorus, having declined to 5 mg./gm.(0.5%) by late winter (33). However, it is more heavily grazed in the winter when more inviting forage is less available.

In addition to a reduction in food value in the winter, greasewood also is potentially mechanically injurious to browsers. Protein supplementation on the range magnifies the danger. Hungry sheep are at particular risk in greasewood communities. If 0.68 kg. (1½ lb.) of leaves are consumed in a short time, depression, kidney lesions, and death may result. Bovines are relatively safe under the same conditions because of their lower preference (25, 32). Nevertheless, the oxalate content has resulted in death of cattle and horses as well as sheep. Oxalates tend to concentrate in the foliage as it matures. Soluble oxalates in leaves on a dry weight basis range from 10% to 22%(37, 41, 69).

Other Economic Uses. The wood is hard, fibrous and green. The Hopi Indians, despite the thorns, used greasewood for fuel and as dibbling sticks (31, 35).

Its potential for fuel is of interest. Using a sample collected by the author the University of Nevada, Reno, animal nutrition laboratory found that its dry wood yielded 5262 Kcal/kg.(9491 Btu/lb.). Ash was only 3.82%.

A growth ring technique for estimating the biomass of sagebrush-grass sites has been proposed (63). It may be applicable to greasewood sites.

An active research program seems warranted to learn the potential of greasewood and associated shrubs for generation of energy. Prime stands must be mapped and relation of cover to biomass and to energy content must be determined. Remote sensing techniques for mapping could be used (63).

A method has been reported whereby the green biomass of small desert trees can be estimated using linear regression. Stem diameter and height were entered in the cone equation. Factors were derived for conversion to dry biomass (23).

Greasewood on high yielding sites was included in a study of energy biomass in the intermountain United States. The average biomass of large greasewood plants was 44.8 kg.(98.6 lb.) which was higher than other species in the study. Energy value, was 4584 Kcal./m^2(15206 Btu/yd^2), higher than that of rubber rabbitbrush (Chrysothamnus nauseosus). Estimated potential yield was 97,395 kg./ha.(86780 lb./a.) The mature wood of greasewood was higher in energy and lower in ash and sulfur than the young twigs (73).

If harvesting equipment embodying mowers, conveyors, compactors and transport could be adapted or designed, using steam power, greasewood might be a valuable addition to a diversified energy base in the Intermountain West.

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NEW SPECIES OF *LEPANTHES* (ORCHIDACEAE)

*C. A. Luer**

In the following new descriptions of species of *Lepanthes*, the sheaths of the secondary stems are referred to as "lepanthiform," a concept derived from the peculiar morphology of the sheaths typical for the genus. The secondary stems are enclosed by a series of tubular, ribbed, more or less imbricating sheaths with oblique, more or less dilated, margined ostia, and the ribs and margined ostia are grossly or microscopically ciliate or scabrous, occasionally glabrous. Lepanthiform stems are also found exclusively in *Lepanthopsis* (Cogn.) Ames and *Trichosalpinx* Luer.

The flowers are described from the customary resupinate position, although the flowers are often looked upon by authors as non-resupinate. The position is purely arbitrary, depending upon from which perspective the flower is viewed on a pendent, horizontal, or erect rachis. When the flower reclines upon the leaf, either dorsally or ventrally, the lateral sepals are usually pointed toward the surface of the leaf, indicating a resupinate position, even though the leaf may stand erect, in which case the flower becomes non-resupinate if viewed from "behind," Therefore, the unpaired middle sepal is described as dorsal in the following descriptions of new species. The dorsal sepal is three-veined unless stated otherwise; the lateral sepals are two-veined unless stated otherwise.

The floral parts are often vividly multicolored, but these colors are not diagnostic. The colors vary greatly from population to population, and even among plants within a limited area. The colors given in the descriptions apply only to that particular plant. The degree of pubescence of the floral parts is also variable, depending upon the magnification. Even "glabrous" parts become cellular pubescent under strong magnification.

The petals are commonly transversely oblong or bilobed. The "upper" lobe is the lobe toward the dorsal sepal, the "lower" lobe is the lobe toward the lateral sepals. The "length" is the short distance from side to side; the "width" is the longer dimension from tip to tip.

The lip of most species is so highly specialized that certain features require descriptive terminology for standardization of descriptions. In section *Lepanthes*, by far the largest, the lip is divided into two halves, or lobes, each of which consists of a blade, or lamina, borne by a more or less wedge-shaped, erect "connective." The united bases of these connectives form the "body" with an anterior "sinus," the angle of junction; posteriorly the body is connate to the under surface of the footless column. The free limbs of the connectives, one to either side of the column, carry the blades to parallel positions beside or above the column. The "apex" of the blade is the end nearer the anther, or toward the lateral sepals; the "base" of the blade is the end toward the dorsal sepal. The "appendix," the extremely modified middle lobe of the lip, is a tiny organ, often intricately sculpted, somewhere on the under surface of the body of the joined connectives, or more often at the sinus. It commonly protrudes beyond the sinus, usually beneath the stigma, and sometimes in direct contact with it. The appendix seems to act as a lure for a pollinator.

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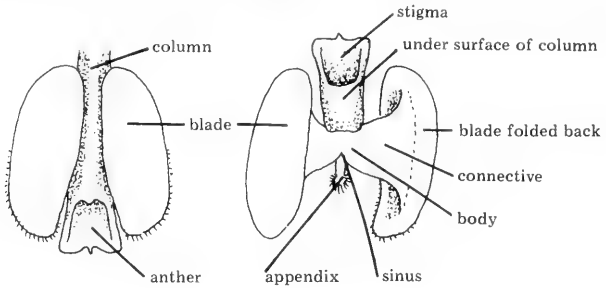
The column may be slender or stout. It is footless except on rare occasions when a rudimentary foot may develop. The anther lies dorsally or apically with an apical rostellum, or occasionally subapically with the rostellum pointed downward. The stigma may protrude apically or it may be completely ventral. It may be round, transverse, or rarely horseshoe-shaped as in *Pleurothallis* or *Stelis*. The two pollinia are separate from the viscidium of the rostellum.



Lepanthes acarina Luer, sp. nov.

Planta minuta caespitosa, inflorescentia folio ovato paulo longiore, flore rubro minimo, sepalis serrulatis acutis, petalis transverse oblongis, labelli laminis lunatis, appendice pubescenti sigmoidea.

Plant minute, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 10-25 mm long, enclosed by 3-6 close lepanthiform sheaths, microscopically scabrous. Leaf erect, coriaceous, elliptical-ovate, obtuse, 7-10 mm long, 4-6 mm wide, the rounded base contracted into a petiole ca. 1 mm long. Inflorescence a successively few-flowered raceme 3-4 mm long, borne by a capillary pedicel up to 10 mm long; floral bract and pedicel ca. 1 mm long; ovary 1.5 mm long; sepals red, minutely serrulate-ciliate on the margins and ribs externally, the dorsal sepal broadly triangular, subacute, 2.3 mm long, 2.5 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals ovate, oblique, acute, 2.5 mm long, 2.66 mm wide together, connate 1 mm; petals red, transversely oblong, 0.5 mm long, 1.75 mm wide, the upper lobe oblong, oblique, obtusely angled, the lower lobe smaller, narrowly oblong, obtuse; lip red, the blades of the lateral lobes lunate, glabrous, 1 mm long, the connectives cuneate, connate to the under surface of the lip, the appendix pubescent, constricted above the middle with the apical portion deflexed; column stout, 1 mm long, the anther dorsal, the stigma ventral.

ETYMOLOGY: From Acarina, the order of the mites, in reference to the little, red, prickly flowers.

TYPE: *ECUADOR:* PICHINCHA: epiphytic in cloud forest near Rio Silante, Finca Canchacato, alt. ca. 2000 m, 28 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4399* (Holotype: SEL); near Tandapi, alt. 1300 m, Oct. 1982, *A. Hirtz 372* (SEL); MORONA-SANTIAGO: cloud forest between Gualaceo and Limon, alt. 2650 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8220* (SEL); *BOLIVIA:* COCHABAMBA: Prov. of Charasco: Monte Puncu along Rio Lope Mendoza, alt. 2400-2600 m, 1 Feb. 1981, *C. Luer, J. Luer, R. Vásquez & E. Besse 5819* (SEL); LA PAZ: Prov. of Nor Yungas: west of Coroico, alt. 2550 m, 27 Jan. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8611* (SEL); *COLOMBIA:* ANTIOQUIA: Munic. of Cocorná: forest in quebrada near Rio Cocorná, alt. 1600 m, 24 April 1983, *C. Luer, R. Escobar et al. 8810* (SEL); Munic. of Frontino: Alto de Cuevas, alt. 2050 m, 14 May 1983, *R. Escobar 2602* (SEL); Munic. of Jardin: Alto de Ventanas, alt. 2800 m, 25 May 1983, *R. Escobar 2726* (SEL); Munic. of Sonson: Tres Cruces, alt. 2750 m, 30 April 1983, *C. Luer, R. Escobar et al. 8903* (SEL); Munic. of Yarumal: Alto de Ventanas, alt. 2100 m, 20 May 1983, *R. Escobar 2614* (SEL); NORTE DE SANTANDER: Munic. of Toledo: Alto de Santa Ines, alt. 2100 m, 23 May 1982, *C. Luer, R. Escobar & D. Portillo 7962* (SEL).

This species is distinguished by the little, red, prickly flower held above the little ovate leaf. The sepals are minutely serrulate, the dorsal broadly triangular, the blades of the lip are lunate and between them the appendix is proportionately large, pubescent, and deflexed upon itself above the middle.

Lepanthes aculeata Luer, sp. nov.

Planta parva caespitosa, foliis ovatis acutis superficie scrobiculata et aculeata, racemo congesto folio breviore, sepalis subaequalibus ovatis obtusis ciliatis, petalis transverse bilobatis lobis inaequalibus, labelli laminis falcatis, appendice loriformi pubescenti.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 3-9.5 cm long, enclosed by 7-17 close, ciliated lepanthiform sheaths with widely dilated ostia. Leaf erect, coriaceous, ovate, acuminate, acute, 17-27 mm long, 10-14 mm wide, the under surface covered by numerous small depressions and excavations with the elevated ridges echinate-pubescent, the margins erose-scabrous, the rounded base abruptly contracted into a petiole 1-2 mm long. Inflorescence a congested, successively flowered raceme up to 8 mm long, borne by a filiform peduncle ca. 5 mm long along the back surface of the leaf; floral bract 0.75 mm long; pedicel 1.25 mm long; ovary 1.5 mm long; sepals green, suffused with red, subequal, broadly ovate, obtuse, shortly ciliate, connate basally, the dorsal sepal 2 mm long, 1.75 mm wide, the lateral sepals 1.5 mm long, 1.75 mm wide; petals redorange, transversely bilobed, 0.8 mm long, 2.66 mm wide, the upper lobe oblong, obtuse, the lower lobe smaller, narrowly oblong, oblique, obtuse; lip redorange, the blades oblong, 1.3 mm long, the apices uncinate, acute, the bases rounded, the connectives broadly cuneate, lifting the blades above the column, connate to the under surface of the column above the base, the appendix strap-shaped, pubescent, hinged to the sinus; column 0.75 mm long, the anther dorsal, the stigma ventral.

ETYMOLOGY: From the Latin *aculeatus*, "covered with prickles," in reference to the under surface of the leaf.

TYPE: *ECUADOR:* NAPO: epiphytic in cloud forest north of Baeza, alt. ca. 1500 m, 10 Aug. 1978, *C. Luer, J. Luer, A. Hirtz & A. Andreetta 3203* (Holotype: SEL); same area, alt. 1650 m, 30 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4482* (SEL); MORONA-SANTIAGO: near Rio Calagrás, alt. 1650 m, 4 Nov. 1982, *C. Luer, R. Escobar & D. D'Alessandro 8279* (SEL).

The under surfaces of the leaves of this species are minutely but deeply rugose with the elevated ridges erose and spiculate. The sepals are broadly ovate, about equal in size and shape and shortly ciliate. The connectives of the lip lift the blades well above the column, and the hinged appendix protrudes from the sinus.

Lepanthes agglutinata Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio ovato acuminato breviore, racemo congestissimo, sepalis late ovatis breviter acuminatis minute denticulatis, petalis transverse oblongis pubescentibus cum processo mediano, labelli laminis lunatis diaphanis agglutinatis, connectivis anticis, corpore angusto, appendice grandi oblonga ciliata cum glande apicali.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 11-16 cm long, enclosed by 13-16 microscopically ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, purple beneath, ovate, long-acuminate, 6-8.5 cm long, 1.8-2.7 cm wide, the rounded base contracted into a petiole 3-4 mm long. Inflorescence a very congested raceme up to 25 mm long of successive flowers, borne by a filiform peduncle up to 25 mm long along the back of the leaf; floral bract 1.5 mm long; pedicel 3.5 mm long; ovary 2 mm long, winged; sepals translucent, carinate, with minutely denticulate margins, acute, shortly acuminate, the dorsal sepal broadly ovate-triangular, 5.5 mm long, 5 mm wide, connate 1.5 mm basally to the lateral sepals, the lateral sepals oblique, the apices diverging, 5.5 mm long, 3 mm wide, connate 1.5 mm; petals green with purple margin, shortly pubescent, transversely oblong, 1.5 mm long, 4.75 mm wide, with a 1 mm long process from the outer margin at the midvein, the lobes oblong, obtuse, the lower lobe smaller; lip green, the blades lunate, 1.75 mm long, membranous, glabrous, adherent medially over the column, the connectives narrow, attached to the apical portions of the blades, the body narrow, connate to the base of the column, the appendix 1 mm long, oblong, ciliate, concave, truncate-retuse, with a ciliated, apical gland; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *agglutinatus*, "glued together," referring to the blades of the lip.

Type: *ECUADOR:* ZAMORA-CHINCHIPE: epiphytic in cloud forest near the river above Valladolid, alt. ca. 2000 m, 21 Feb. 1982, *D. D'Alessandro 165* (Holotype: SEL) C. Luer illustr. 9075.

This species is another relative of the common and widespread *L. mucronata* Lindl., but *L. agglutinata* is distinguished by the larger habit, diverging lateral sepals, narrow connectives attached near the apice of the membranous blades of the lip, a narrow body, and a large appendix with an apical gland.

The lunate, membranous blades of the lip are agglutinated medially over the column to form a flat, elliptical surface, a set of characters found in *L. mucronata* and its relatives.

Lepanthes allector Luer & Escobar, sp. nov.

Planta parva debilis caespitosa, racemo congesto paucifloro folio ovato acuminato breviore, sepalis glabris, petalis transverse oblongis pubescentibus, labelli laminis oblongis ciliatis, appendice loriformi cum glande bi-alata pubescenti.

Plant small, epiphytic, caespitose. roots slender. Secondary stems slender, suberect, 2.5-5 cm long, enclosed by 6-9 close, minutely scabrous lepanthiform sheaths. Leaf suberect, thinly coriaceous, ovate, acuminate, acute, 20-30 mm long, 8-12 mm wide, the rounded base contracted into a petiole 2 mm long. Inflorescence a densely few-flowered raceme ca. 2 mm long, borne by a filiform peduncle 5-9 mm long up the back side of the leaf; floral bract 1.3 mm long, pedicel 1.5 mm long; ovary 2.5 mm long; sepals yellow, suffused with purple basally, glabrous, the dorsal sepal ovate, obtuse, 3.1 mm long, 2.75 mm wide, the lateral sepals ovate, oblique, acute, 3 mm long, 2 mm wide, connate 1 mm; petals yellow-orange, suffused with red, transversely oblong, long-pubescent, 0.66 mm long, 2.66 mm wide, the apices rounded; lip white with red margin, the blades ovate, 1.3 mm long, the apices acute, incurved, ciliate, the bases rounded, the connectives broadly cuneate with an obtuse angle on the anterior margin, connate to the under surface of the column at the base, the appendix a 2-winged, pubescent gland carried by an S-curved, straplike band from the sinus; column 1 mm long, the anther dorsal, the stigma ventral.

ETYMOLOGY: From the Latin *allector*, "an enticer," in reference to the intricate appendix.

TYPE: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest between Gualaceo and Limon, alt. 2050 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8229* (Holotype: SEL).

This little species with an inflorescence shorter than the ovate, acuminate leaf is most notable for the angled margins of the connectives of the lip between which the appendix protrudes. The appendix consists of a pubescent, bi-alate gland borne by an S-shaped strap.

Lepanthes amabilis Luer, sp. nov.

Planta mediocris amabilis, vaginis caulium longiciliatis ostiis valde dilatatis, racemis paucis subdensis folio elliptico brevioribus, sepalis denticulatis ovatis brevicaudatis, petalis oblique bilobis, labelli laminis lunatis convexis, appendice parva pubescenti in sinu fisso.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems relatively stout, erect, 7-14 cm long, enclosed by 9-10 long-ciliate lepanthiform sheaths with widely dilated ostia. Leaf erect, coriaceous, elliptical, acute, 4.5-6.5 cm long including the 0.5 cm long petiole, 2-2.5 cm wide, the base cuneate into the petiole. Inflorescence a subdense, successively flowered raceme up to 35 mm long, borne behind the leaf by a filiform peduncle 10-15 mm long; floral bract 2.5 mm long, echinate; pedicel 2.5 mm long; ovary 2.5 mm long; sepals cream-colored, suffused with purple along the midveins, carinate-spiculate, ovate, acute, shortly caudate, the dorsal sepal 8 mm long, 4 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals oblique, denticulate, connate 3 mm, 8 mm long, 6 mm wide together; petals cream, edged in red, glabrous or cellular, obliquely bilobed, 1 mm long, 3.75 mm wide, the lobes about equal, oblong with rounded ends; lip cream, edged in red, glabrous or cellular, the blades lunate, convex, 2.5 mm long, the apices narrowly obtuse and incurved beneath the apex of the column, the bases rounded, the connectives broadly cuneate, connate to the column above the middle, the sinus cleft, with a small, round, pubescent appendix; column 2.5 mm long, the anther and stigma apical.

Etymology: From the Latin *amabilis*, "lovely," referring to the pleasing qualities of the species.

Type: *PERU:* AMAZONAS: epiphytic in cloud forest between Leimebamba and Balsas, alt. 3050 m, 25 Aug. 1980, *C. Luer, J. Luer, W. Koeniger & H. Koeniger 5426* (Holotype: SEL).

This pretty species may be distinguished by the unusually hirsute and unusually dilated lepanthiform sheaths; the ovate leaves with shorter racemes; the relatively large, purple-striped flowers; denticulate sepals; and convex, lunate blades of the lip with a small appendix in a cleft sinus.

Lepanthes antiopa Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio ovato acuminato breviore, racemo congesto, sepalis purpureis flavolimbatis acuminatis, petalis transverse oblongis, labelli laminis oblongis glabris, appendice vestigiali.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 4-8.5 cm long, enclosed by 10-12 close, ciliate, lepanthiform sheaths with widely dilated ostia. Leaf erect, coriaceous, ovate, acuminate, acute, 3-5.5 cm long, 1-2 cm wide, ciliate along the veins beneath, the base broadly cuneate into a petiole 1 mm long. Inflorescence a congested, successively flowered raceme up to 8 mm long, borne by a filiform peduncle 5-13 mm long behind the leaf, floral bract 1 mm long; pedicel 2.5 mm long, ovary 3 mm long, sparsely papillose; sepals dark purple, edged in yellow, the margins entire, spiculate along the veins externally, the dorsal sepal ovate, concave, obtuse, acuminate, 6 mm long, 3 mm wide, the lateral sepals ovate, oblong, acute, acuminate, 6.25 mm long, 2 mm wide, connate 1.5 mm; petals purple, transversely oblong, 1 mm long, 3.75 mm wide, the upper lobe subtruncate, the lower lobe narrowly triangular, narrowly obtuse; lip purple, the blade oblong, convex, 2.2 mm long, the ends rounded, the connectives cuneate, connate to the under surface of the base of the column, the appendix reduced to a small, shallowly concave, rounded prominence; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: Names for *Nymphalis antiopa* L., The Mourning Cloak, a butterfly familiar to all who have ventured into the temperate forests.

Type: *ECUADOR*: COTOPAXI: epiphytic in cloud forest west of El Corazon, alt. 1200 m, 18 Feb. 1979, *C. Luer, J. Luer & A. Hirtz 4020* (Holotype: SEL).

In spite of the fact that the colors of the flowers of *Lepanthes* are extremely variable, the sepals of this particular plant are purple with broad, yellow margins, reminiscent of the color pattern of the Mourning Cloak. Otherwise, the species may be identified by the short racemes of flowers with acuminate sepals, obtuse petals and lip, and a vestigial appendix.

Lepanthes aries Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio oblongo acuminato subaequilonga, racemo congesto disticho, sepalis ovatis acuminatis serrulatis pubescentibus, petalis transverse oblongis acuminatis ciliatis, labelli laminis oblongis basibus elongatis obtusis recurvatis, appendice minuta trilobata pubescenti.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems slender, erect, 8-15 cm tall, enclosed by 8-11 minutely ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, oblong, acute, acuminate, 5-6.5 cm long, 1.5-1.8 cm wide, the base cuneate into a petiole 5 mm long. Inflorescence a congested, distichous raceme up to 23 mm long, borne by a filiform peduncle up to 45 mm long along the back of the leaf; floral bract 1.5 mm long; pedicel 2.5-3.5 mm long; ovary 2 mm long; sepals orange-brown with thin yellow margins, serrulate, shortly pubescent, ovate, acute, acuminate, the dorsal sepal 7.5 mm long, 3.75 mm wide, connate basally to the lateral sepals for 1 mm, the lateral sepals connate 4 mm, 7.25 mm long, 4.5 mm wide together; petals red-brown, ciliate, transversely oblong, bilobed, 1.5 mm long, 5 mm wide, the lobes elliptical, acuminate, acute, the lower lobe smaller; lip rosy brown, the blades oblong, 3 mm long, the apices short, obtuse, ciliate, the bases long, obtuse, recurved, the connectives broadly cuneate, connate to the column above the middle, the appendix minutely pubescent, 3-lobed, one lobe beneath 2 lobes above at the sinus; column 2.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *aries*, "a ram," referring to the recurved bases of the blades of the lip.

Type: *ECUADOR*: IMBABURA: epiphytic in cloud forest, Selva Alegre west of Otavalo, alt. 2730 m, 1 May 1981, *C. Luer, J. Luer, A. Hirtz et al. 6044* (Holotype: SEL).

This species is characterized by the congested inflorescence nearly as long as the ovate, acuminate leaf; the serrulate, pubescent sepals; the petals acuminate at both ends; and the blades of the lip with elongated, recurved bases.

Lepanthes auriculata Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio elliptico longi-acuminato breviore, racemo densifloro longi-pedunculato, sepalis glabris acuminatis, petalis transverse bicuneatis, labelli laminis ellipticis auriculatis, corpore protrudenti, appendice oblonga pubescenti.

Plant large, epiphytic, caespitose; roots coarse. Secondary stems erect, slender, 20-30 cm tall, enclosed by 12-16 minutely ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, elliptical, acute, long-acuminate, 11-13 cm long, 4.5-5 cm wide, minutely ciliate along the veins beneath, the rounded base contracted into a petiole 5 mm long. Inflorescence a dense, successively flowered raceme at least to 5 mm long, borne by a filiform peduncle up to 40 mm long behind the leaf; floral bract 1.5 mm long; pedicel 1.25 mm long; ovary 4 mm long, narrowly winged; sepals yellow, glabrous, the dorsal sepal triangular, acute, acuminate, 9 mm long, 4 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals ovate, oblique, 9 mm long, 4 mm wide, connate 3 mm, the apices acute, acuminate, diverging; petals yellow, suffused with purple, transversely bilobed, 1.25 mm long, 5 mm wide, the upper lobe cuneate with the apex subtruncate-rounded, the lower lobe similar but smaller and narrower; lip yellow, edged in purple, the blades elliptical, longitudinally concave, 2 mm long, the apex narrowly rounded, the base rounded, the connectives broad, short, oblique, connate to the midpart of the under surface of the column, the body protruding and rounded, the appendix short, oblong, pubescent; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *auriculatus*, "shaped like an ear," in reference to the appearance of the blades of the lip.

Type: *ECUADOR:* ZAMORA-CHINCHIPE: epiphytic near the river above Valladolid, alt. ca. 1800 m, 21 Feb. 1983, *D. D'Alessandro 164* (Holotype: SEL), C. Luer illustr. 9076.

This large species may be distinguished from its numerous relatives by the large, long-acuminate leaves; the glabrous, acuminate sepals; the cuneate, bilobed petals; the auriculate lobes of the lip, and a protruding appendix. The last feature, however, is visible only when the column is lifted from between the lobes of the lip.

Lepanthes aurita Luer & Escobar, sp. nov.

Planta perparva caespitosa, inflorescentia folio ovato obtuso breviore, racimo congestissimo, sepalis glabris ovatis acutis, petalis grandibus transverse oblongis, labello laminis anguste oblongis, appendice late oblonga cum glande terminali parva.

Plant very small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 15-20 mm long, enclosed by 3-4 close, microscopically scabrous lepanthiform sheaths. Leaf erect, coriaceous, convex, elliptical-ovate, obtuse, 10-12 mm long, 6-9 mm wide, the base broadly cuneate into a petiole 1 mm long. Inflorescence a congested, distichous, successively flowered raceme up to 4 mm long by a filiform peduncle up to 4 mm long behind the leaf; floral bract 0.5 mm long, minutely spiculate; pedicel 0.3 mm long; ovary 1.5 mm long; sepals yellow-orange, glabrous, ovate, acute, 3.2 mm long, 1.8 mm wide, the lateral sepals ovate, acute, 3 mm long, 1.5 mm wide, connate only at the base; petals orange, transversely oblong, 1.2 mm long, 2.5 mm wide, the apices rounded, with a minute apiculum on the outer margin at the midvein; lip rose, the blades narrowly oblong, 2 mm long, the apex acute incurved with a few hairs, the base rounded, the connectives short, connate to the base of the column, the appendix broadly oblong, pubescent, with a small, terminal gland; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *auritus*, "a rabbit, or one with large ears," referrring to the petals.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 2400 m, 1 Nov. 1982, *C. Luer & R. Escobar 8254* (Holotype: SEL).

Distribution: Southern Ecuador.

This little species with congested racemes shorter than the ovate leaf is distinguished by the proportionately large petals with broad, rounded apices, narrow blades of the lip, and a broadly oblong appendix with a small apical gland.

Lepanthes ballatrix Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio anguste ovato acuminato breviore, racemo congestissimo disticho, sepalo dorsali triangulari, sepalis lateralibus ovatis subacutis, petalis transverse bilobatis, labelli laminis lunatis breviter pubescentibus, appendice late triangulari ciliata.

Plant medium to large in size, epiphytic, caespitose; roots coarse. Secondary stems slender to stout, 10-30 cm long, enclosed by 8-15 lepanthiform sheaths, glabrous to microscopically scabrous on the upper sheaths, more or less microscopically ciliate on some of the stomata of the lower sheaths. Leaf erect, thinly coriaceous, glabrous beneath, narrowly ovate-elliptical, acute, acuminate, 6-12 cm long, 2.5-4 cm wide, the base rounded, abruptly contracted into a petiole 3-4 mm long. Inflorescence a very congested, distichous, short-pedicellate, successively flowered raceme up to 4 cm long, borne by a filiform peduncle up to 3 cm long behind the leaf; floral bract 1-1.5 mm long; pedicel 1-1.5 mm long; ovary 2 mm long; sepals yellow, glabrous, carinate, the dorsal sepal triangular, acute, 7-9 mm long, 3.5-4.5 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals ovate, subacute, connate 2.5-3 mm, 7-8.5 mm long, 5-7 mm wide together; petals yellow to orange with red to purple margins, transversely bilobed, 1.5-2 mm long, 4-5 mm wide, the lobes suborbicular to broadly elliptical; lip orange to red, more or less suffused with purple, the blades oblong-lunate, 2 mm long, obtuse, minutely pubescent, connate to the under surface of the column below the middle, the appendix triangular, concave, ciliate; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *ballatrix*, "a dancer," in reference to the fancied illusion of the flower.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest between Tandayapa and Mindo, alt. 2320 m, 13 March 1982, *C. Luer, A. Hirtz & S. Dalström 7294* (Holotype: SEL); IMBABURA: above Apuella, alt. 2500 m, 24 Aug. 1978, *C. Luer, J. Luer & A. Hirtz 3349* (SEL); Selva Alegre, alt. 2430 m, 1 May 1981, *C. Luer, A. Hirtz et al. 6048* (SEL); LOJA: west of the pass between Loja and Zamora, alt. 2700 m, 21 Sept. 1980, *C. Luer, C. H. Dodson et al. 5525* (SEL); east of Yangana, alt. 2850 m, 4 March 1982, *C. Luer, D. D'Alessandro et al. 7156* (SEL); MORONA-SANTIAGO: between Gualaceo and Limon, alt. 2600 m, 26 Dec. 1982, *S. Dalström 384* SEL).

This large species is very similar to *L. elata* Rchb. f. and *L. monitor*, but *L. ballatrix* may be distinguished by the narrower dorsal sepal and suborbicular lobes of the petals. The lip is essentially the same as that of *L. monitor*.

Lepanthes benzingii Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio suborbiculari breviter acuminato breviore, racemo congestissimo disticho, sepalis acutis glabris, petalis transverse bilobatis sepalis longioribus, labelli laminis oblongis super columnam, appendice quadrilobata pubescenti, stigmate hippocrepiformi.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 6-9 cm long, enclosed by 7-8 close, microscopically ciliate lepanthiform sheaths. Leaf erect, coriaceous, broadly elliptical, 3.5-4.5 cm long, 2.2-3 cm wide, the apex shortly acuminate, abruptly acute, the base cuneate into a 2 mm long petiole. Inflorescence an extremely congested, distichous, successively flowered raceme up to 8 mm long, borne by a filiform peduncle 7-15 mm long, usually behind the leaf; floral bract 1 mm long, pubescent; pedicel 2 mm long; ovary 3.5 mm long; sepals yellow-orange, glabrous, the dorsal sepal ovate, acute, 3 mm long, 1.9 mm wide, the lateral sepals ovate, oblique, subacute, connate 1 mm, 2 mm long, 2.25 mm wide together; petals yellow, suffused with red, microscopically pubescent, transversely bilobed, 1.3 mm long, 3.2 mm wide, the lobes ovate, obtuse, the lower lobe smaller; lip red, the lobes oblong with rounded ends, 1.66 mm long, microscopically ciliate, in apposition over the column, the connectives cuneate, connate to the base of the column, the appendix pedunculate, 4-lobed, ciliate; column 1 mm long, the anther apical, the stigma subapical, horseshoe-shaped.

Etymology: Named in honor of Dr. David Benzing, professor of botany, Oberlin College, Oberlin, Ohio, co-discoverer of this species.

Type: *ECUADOR:* NAPO: epiphytic in wet forest north of Tena, "Cotundo," alt. 1130 m, 19 June 1983, *C. H. Dodson, D. Benzing & A. Hirtz 14120A* (Holotype: SEL), C. Luer illustr. 9091.

This species is closely related to the concept presently called *L. rotundifolia* L. O. Wms. which is common on the western declivity of the Andes of Ecuador. *Lepanthes benzingii* is apparently rare at relatively low altitudes on the eastern declivity. The apices of the round leaves of *L. benzingii* are shortly acuminate instead of obtuse, and the bases are broadly cuneate instead of rounded. The oblong blades of the lip lie in apposition over the column. The anther is apical with the horseshoe-shaped stigma subapical, in close association with the appendix. In *L. rotundifolia* the anther and apical stigma protrude between the blades of the lip, a considerable distance from the appendix.

Lepanthes bifalcis Luer, sp. nov.

Planta parva caespitosa, racemo subdensifloro folio anguste ovato acuminato breviore, sepalo dorsali synsepaloque subaequalibus, petalis transverse bifalcatis, labello ciliato suborbiculari-bilobato.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, suberect, 3-8 cm long, enclosed by 6-8 minutely scabrous lepanthiform sheaths. Leaf suberect, thinly coriaceous, narrowly ovate, acuminate, acute, 25-40 mm long, 7-11 mm wide, the base cuneate into a petiole 3-4 mm long. Inflorescence a weak, subdensely successively flowered raceme up to 25 mm long including the capillary peduncle, along the back of the leaf; floral bract 1.5 mm long; pedicel 1.5 mm long; ovary 0.75 mm long; sepals light yellow, glabrous, the dorsal sepal ovate, subacute, convex, 2.5 mm long, 1.5 mm wide, the lateral sepals connate into an ovate lamina 2.3 mm long, 2 mm wide, the subacute apex minutely bifid; petals dark yellow, transversely bilobed, forked, 0.5 mm long, 2.3 mm wide, the lobes equal, falcate, narrowly obtuse; lip orange, minutely ciliate, suborbicular, 0.75 mm long, 0.75 mm wide, incised at the apex into two rounded lobes, the base cuneate, connate to the base of the column; column 0.8 mm long, the anther apical, the stigma subapical.

Etymology: From the Latin *bi-*, "two-" and *falx, falcis*, "a sickle," in reference to the forked, bifalcate petals.

Type: *ECUADOR:* NAPO: epiphytic in cloud forest south of Baeza, alt. 1900 m, 20 Feb. 1982. *C. Luer & A. Hirtz 6864* (Holotype: SEL).

This small-flowered species is notable for the bifalcate petals and a bilobed, suborbicular lip connate to the base of the column.

Lepanthes brachypogon Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio longissime acuminato breviore, racemo congesto secundo, sepalis acutis lateralibus denticulatis, petalis transverse oblongis pubescentibus, labello laminis lunatis ciliatis connectivis latissimis, appendice late obtusa ciliata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 5-11 cm long, enclosed by 8-16 lepanthiform sheaths with microscopically ciliate stomal margins. Leaf suberect to horizontal, coriaceous, narrowly elliptical, 2.5-6 cm long, 0.7-1.3 cm wide, the apex acute, long-acuminate, mucronate, the base cuneate into a petiole 1-2 mm long. Inflorescence a congested, secund, successively flowered raceme up to 15 mm long, borne by a filiform peduncle 12-25 mm long on top of the leaf; floral bract 1 mm long; pedicel and ovary each 1.5 mm long; sepals green, suffused with brown, the veins denticulate externally, the dorsal sepal ovate, acute, concave, 4.75 mm long, 3 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals narrowly ovate, acute, denticulate, 5 mm long, 1.6 mm wide, connate 1 mm; petals brown, transversely oblong, pubescent, 0.6 mm long, 2.8 mm wide, the ends obtuse, the lobes nearly equal; lip brown, the blades lunate, 1.8 mm long, ciliate, the ends acute, the connectives broadly cuneate, the wide body connate to the column above the base, the sinus prolonged downward with a broadly rounded, ciliate appendix; column 1.5 mm long, the anther apical, the stigma ventral.

Etymology: From the Greek *brachys* "short," and *pogon*, "a beard," referring to the shortly ciliate, chinlike labellar body and appendix.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest between Tandayapa and Mindo, alt. 2320 m, 13 March 1982, *C. Luer, A. Hirtz & S. Dalström 7301* (Holotype: SEL).

Vegetatively this species looks like a form of the common and widespread *L. mucronata* Lindl., but the flowers prove no close relationship.

Lepanthes branchifera Luer & Vásquez, sp. nov.

Planta parva, racemo flexuoso folio late elliptico obtuso multilongiore, sepalo dorsali synsepaloque concavis acutis cum carinis et marginibus anguste revolutis leviter erosis, petalis inaequaliter bilobis, lobo superiore setiformi, lobo inferiore longi-ciliato, labelli laminis anguste oblongis, columna angustissima elongata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 2.5-4.5 cm long, enclosed by 5-6 long-ciliate lepanthiform sheaths with markedly dilated ostia. Leaf erect, coriaceous, broadly elliptical, obtuse, 12-15 mm long, 8-10 mm wide, the base broadly cuneate into the petiole 2-3 mm long. Inflorescence a weak, lightly flexuous, successively flowered raceme up to 5 cm long including the filiform peduncle 1-2.5 cm long; floral bract 1 mm long; pedicel 1.25 mm long; ovary 1.25 mm long; dorsal sepal peach colored, ovate, acute, shortly acuminate, deeply concave, 4 mm long, 2 mm wide unspread, the carinae and the narrowly everted margins lightly erose, connate to the lateral sepals for 1 mm; lateral sepals yellow, suffused with red centrally, completely connate into a cymbiform, ovate, acute lamina 3.5 mm long, 2.5 mm wide unexpanded, the carinae and margins similarly narrowly revolute and lightly erose; petals yellow, transversely bilobed, 1 mm long, 4 mm wide, connate to the column between the basal and middle thirds, the upper lobe setiform, the lower lobe much larger, narrowly triangular, attenuate, long-ciliate along the inner margin; lip bright rose, the blades thin, translucent, glabrous, narrowly oblong, 1.25 mm long, the ends obtuse, the connectives cuneate, connate to the column between the distal and middle thirds, the appendix a membranous triangle in the sinus; column very slender, 2 mm long, minutely pubescent, the anther dorsal, the stigma ventral.

Etymology: From the Latin *branchiae*, "the gills of a fish," and *-fer*, "bearing," referring to the appearance of the lower lobes of the petals.

Type: *BOLIVIA*: COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1950 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3506* (Holotype: SEL).

The dorsal sepal and synsepal gape to expose long-ciliate petals hanging to either side of the lip like gills while the narrow, pointed upper lobes crisscross above. Both the petals and the lip are connected to the very long, slender shaft of the column.

Lepanthes brenneri Luer, sp. nov.

Planta minuta caespitosa, caulibus secondariis brevissimis, folio elliptico racemo flexuoso breviore, sepalis spiculatis acuminatis, petalis pubescentibus transverse bilobatis lobo inferiore uncinato, labelli laminis ovatis pubescentibus, appendice triangulari apice biglanduloso.

Plant minute, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 1.5-2 mm long, enclosed by 2-3 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, subacute, apiculate, 6-8 mm long, 2.5-3.5 mm wide, the base cuneate into a petiole 1-1.5 mm long. Inflorescence a successively flowered, subdense, flexuous raceme up to 13 mm long including the filiform peduncle 7-9 mm long; floral bract 1 mm long, pubescent; pedicel 1.25 mm long; ovary 1 mm long, spiculate; sepals red-purple with yellow apices, carinate-spiculate, sparsely ciliate, triangular-ovate, acute, acuminate, the dorsal sepal 7 mm long, 3 mm wide, the lateral sepals 7 mm long, 2 mm wide, connate 1 mm; petals red-orange, transversely oblong, 0.6 mm long, 3 mm wide, minutely pubescent, the upper lobe oblong, obtuse, the lower lobe uncinate, acute; lip red-orange, the blades ovate, obtuse, 1 mm long, minutely pubescent, the connectives narrowly cuneate, connate to the under surface of the column, the appendix triangular with the apex ciliate, minutely biglandular; column 1 mm long, the anther apical, the stigma transverse, ventral.

Etymology: Named in honor of Joe Brenner, formerly of Puyo, Ecuador, who discovered this species.

Type: *ECUADOR*: PASTAZA: epiphytic in wet forest ca. 10 km north of Puyo, alt. 750 m, 21 March 1976, *C. Luer, J. Luer, P. Taylor & J. Brenner 931* (Holotype: SEL).

This tiny plant produces flowers larger than the leaves on racemes just surpassing the leaves in length. The sepals are acuminate and spiculate, and the lower lobes of the petals are conspicuously uncinate.

Lepanthes ciliolata Luer & Vásquez, sp. nov.

Planta parva, racemo subdenso flexuoso plurifloro folio elliptico subaequilongo, sepalis ovatis ciliolatis marginibus sepalorum lateralium anguste incurvis, petalis transverse oblongis, labelli laminis oblongis, appendice minute bilobulata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 2.5-5 cm long, enclosed by 6-7 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, acute, 15-24 mm long including the petiole 2 mm long, 7-9 mm wide, the base cuneate into the petiole. Inflorescence a successive, subdense, flexuous, several-flowered raceme up to 15 mm long including the short, filiform peduncle; floral bract 1 mm long; pedicel 0.5 mm long; ovary 1.5 mm long; sepals purple-brown, ovate, acute, shortly acuminate, carinate, ciliate pubescent near the margins, the dorsal sepal 4.5 mm long, 2.5 mm wide, connate nearly 1 mm to the lateral sepals, the lateral sepals connate 1.5 mm, 5.25 mm long, 3.5 mm wide together, each 1-veined, the lateral margins narrowly incurved; petals yellow with brown margins, microscopically cellular-pubescent, transversely oblong, 1 mm long, 2.75 mm wide, the lobes oblong with rounded ends, the lower lobe slightly smaller; lip red-brown, microscopically pubescent, the blades oblong, 2 mm long, subacute at the apices, rounded at the bases, the connectives broadly cuneate, connate to the column above the base, the appendix minute, bilobulate; column 2 mm long, the anther dorsal, the stigma subapical.

Etymology: From the Latin *ciliolatus*, "minutely ciliate," referring to the sepals.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2500 m, 4 Feb. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8684* (Holotype: SEL).

This species is a member of the "complicata" group as indicated by the narrowly incurved margins of the 1-veined lateral sepals. Instead of coarsely toothed, the margins are finely ciliate. Otherwise this species is distinct with the minute, bilobulate appendix.

Lepanthes columbar Luer, sp. nov.

Planta parva caespitosa, foliis anguste lineari-ovatis racemo debili triplolongioribus, flore minuto, sepalo dorsali elliptico, uninervi, synsepalo late ovato, petalis transverse oblongis, labello transverse ovato ciliato apice rotundato leviter bilobato.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 4-7 cm long, enclosed by 6-8 close lepanthiform sheaths, microscopically scabrous. Leaf erect, coriaceous, narrowly linear-ovate, acute, 24-27 mm long, 5 mm wide, the base cuneate into a petiole 3-4 mm long. Inflorescence a successively few-flowered raceme up to 6 mm long, borne by a capillary peduncle up to 6 mm long behind the leaf; floral bract 0.8 mm long; pedicel 0.75 mm long; ovary 1 mm long; sepals yellow, glabrous, the dorsal sepal elliptical, obtuse, 1.8 mm long, 1.2 mm wide, 1-nerved, the lateral sepals connate into a broadly ovate lamina 1.75 mm long and wide, 2-nerved, the obtuse apex minutely notched; petals orange, transversely oblong-bilobed, 0.4 mm long, 1.66 mm wide, the lobes about equal with the ends obtuse; lip red-orange, transversely ovate-oblong, 0.75 mm long, 1 mm wide, ciliate, the apex broadly rounded, shallowly bilobed, the basal lobes rounded, to either side of the column, the base connate to the under surface of the column; column 0.8 mm long, the anther and stigma apical.

Etymology: From the Latin *columbar,* "a pillory-like yoke," in reference to the collarlike lip.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest between Quito and Santo Domingo, alt. ca. 3000 m, 28 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4396* (Holotype: SEL); NAPO: epiphytic in cloud forest near Papallacta, alt. 2500 m, 29 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4444* (SEL).

This species is notable for the narrow, little leaf, a short inflorescence of very small flowers, an elliptical, 1-veined dorsal sepal, and a ciliated, transversely ovate lip attached like a bib beneath the column.

Lepanthes complicata Luer & Vásquez, sp. nov.

Planta mediocris, inflorescentia foliis ellipticis breviter acuminatis breviore, racemo disticho densifloro, sepalis laciniatis acutis, lateribus sepalorum lateralium complicatis, petalis transverse late falcatis, labelli laminis anguste oblongis sinu protuberanti appendice parva.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems relatively stout, erect, 3-7 mm long, enclosed by 5-8 long-ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, acute, shortly acuminate, 3-4 cm long, 1.5-1.8 cm wide, the base cuneate into a 2 mm long petiole. Inflorescence a dense, distichous, successively flowered raceme up to 15 mm long, borne behind the leaf by a filiform peduncle up to 10 mm long; floral bract 1.5 mm long, lightly verrucose; pedicel 1.5 mm long; ovary 1.25 mm long; sepals translucent light yellow, suffused with purple along the veins, with margins and carinate veins laciniate, triangular with short, thickened, acuminate apices, the dorsal sepal 5.5 mm long, 4 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals with the lateral half to one-third sharply folded over onto the anterior surface, 5.5 mm long, 2.25 mm wide unexpanded, connate 1 mm; petals lemon yellow, essentially glabrous, at most microscopically pubescent, transversely bilobed, 1.5 mm long, 2.3 mm wide, the upper lobe transversely falcate, obtuse, the lower lobe obliquely triangular; lip dull white with a purple stripe, at most microscopically pubescent, the blades narrowly oblong, 2.1 mm long, the ends rounded, the apex narrowly incurved, the connectives short, broadly cuneate, connate to the column near the middle, the sinus protuberant and rounded, with a minute, round appendix; column 2.5 mm long, the anther and stigma apical.

Etymology: From the Latin *complicatus*, "folded together," referring to the sides of the lateral sepals.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1900 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3531* (Holotype: SEL).

This species is remarkable for the laciniate sepals. The lateral thirds, or nearly the lateral halves, are folded inward onto the surface of the medial halves. A laciniate, ribbed vein assumes the lateral margin of the blade, while the true margin lies folded inward reaching near the inner margin. Other newly described species from Bolivia also exhibit this character but to a less marked degree.

Lepanthes contingens Luer, sp. nov.

Planta mediocris caespitosa, foliis heteromorphis late ovatis vel anguste ellipticis, racemo brevi, sepalis glabris acutis, petalis transverse oblongis, labelli laminis anguste oblongis diaphanis ad apicem intus angulatis, connectivis erectis, corpore longi-unguiculato, appendice oblonga pubescenti cum glande terminali processo stigmatis contingenti.

Plant medium in size, epiphytic, casepitose; roots slender. Secondary stems slender, erect to suberect, 5-11 cm long, enclosed by 9-11 ciliate lepanthiform sheaths with broadly dilated ostia. Leaf erect, coriaceous, variable in size and shape, from broadly ovate to narrowly elliptical, from 3.5 cm long, 2 cm wide, to 5.5 cm long, 1 cm wide, the apex obtuse to acute, the base cuneate or rounded, contracted into a petiole 2-3 mm long. Inflorescence a congested, successively flowered raceme up to 12 mm long, borne by a filiform peduncle up to 10 mm long up the back of the leaf; floral bract 2 mm long; pedicel 1.25 mm long; ovary 2 mm long; sepals yellow with purple stripes along the veins, glabrous, the dorsal sepal triangular, 5 mm long, 3.75 mm wide, connate to the lateral sepals for 1 mm, the subacute apex shortly acuminate, the lateral sepals connate 2 mm into an ovate, acute synsepal, 5 mm long, 4 mm wide, the acuminate apices approximate; petals yellow, suffused with red-brown, transversely oblong, 1.1 mm long, 4 mm wide, with a small, obtuse angle on the margin at the midvein, the upper lobe oblong, truncate, the lower lobe smaller, triangular, acute; lip red-brown, the blades narrowly oblong, thin, membranous, transparent, 2.2 mm long, acutely angled on the inner margin near the narrowly obtuse apex, the connectives oblong, erect, lifting the blades above the column, the body with a slender, basal claw connate to the base of the column, the appendix oblong, pubescent, terminated by a small gland which is in contact with a strap-shaped process from the cavity of the stigma; column slender, clavate, 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *contingens*, "in contact with," in reference to the process from the stigma in contact with the apical gland of the sppendix.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest east of Yangana, alt. 2850 m, 4 March 1982, *C. Luer, D. D'Alessandro & S. Dalström 7152* (Holotype: SEL); NAPO: epiphytic in cloud forest near Papallacta, alt. 2500 m, 29 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4448* (SEL); *COLOMBIA:* NARINO: epiphytic in cloud forest east of La Victoria, alt. 3200 m, 4 Nov. 1979, *C. Luer, J. Luer & A. Hirtz 4637* (SEL).

The leaves of this species are unusually variable in size and shape, but most remarkable is the appendix which is in contact with a process from the stigmatic cavity, a phenomenon also seen in *L. transparens*. The lips of both species are attached to the base of the column by a long, slender claw.

Lepanthes cosmos Luer & Escobar, sp. nov.

Planta parva, caespitosa, inflorescentia folio ovato longi-acuminato breviore vel paulo excedenti, racemo congesto, sepalis glabris acutis, petalis transverse oblongis, labelli laminis ovatis acutis, connectivis erectis corpore extus dense pubescenti, appendice pubescenti decorata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, suberect, 3-6.5 cm long, enclosed by 7-9 close, minutely scabrous lepanthiform sheaths. Leaf suberect, coriaceous, ovate, 2.5-4 cm long, 1.3-1.9 cm wide, the apex long-acuminate, the base rounded, abruptly contracted into a petiole 1-2 mm long. Inflorescence a very congested, successively flowered raceme up to 15 mm long borne by a filiform peduncle 12-32 mm long up the back of the leaf, the inflorescence often surpassing the leaf; floral bract 1 mm long, minutely pubescent; pedicel 1 mm long; ovary 1.5 mm long; sepals yellow, glabrous, the dorsal sepal triangular, acute, 4.25 mm long, 3.5 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals connate 2.5 mm into a broadly ovate, bifid lamina 4.25 mm long, 4.25 mm wide, the apices subacute; petals rose, transversely oblong, 1 mm long, 3.25 mm wide, with a minute marginal angle at the level of the midvein, the upper lobe oblong, oblique, subacute, the lower lobes shorter, triangular, acute; lip deep red, the lobes ovate, 1 mm long, minutely ciliate, the apices acute, the bases rounded, the connectives broadly cuneate, erect, the body densely pubescent externally, connate to the under surface of the middle of the column, the appendix broadly strap-shaped, decurved-sigmoid, pubescent, with a terminal pair of adjacent processes; column 1.5 mm long, the shaft slender, the anther dorsal, the stigma ventral.

Etymology: From the Greek *kosmos*, "an ornament," referring to the intricately decorated appendix of the lip.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest between Gualaceo and Limon, alt. 2650 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8219* (Holotype: SEL).

This species resembles the larger *L. vespertilio* Rchb. f., but *L. cosmos* may be distinguished by the glabrous sepals, a densely pubescent body of the connectives of the lip, and a remarkably decorated "bait," (the appendix beneath the stigma).

Lepanthes cotyledon Luer, sp. nov.

Planta mediocris caespitosa, racemo congestissimo secundo folio elliptico purpureo longi-acuminato breviore, sepalo dorsali late ovato lateralibus semiconnatis acutis, petalis transverse oblongis cum processo filiformi e medio, labelli laminis tenuibus adhaerentibus lunatis, basi connectivorum latorum concava, appendice pubescenti ligulata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 7-12 cm long, enclosed by 8-11 close, minutely ciliate lepanthiform sheaths. Leaf suberect, thinly coriaceous, purple beneath, reticulate veined, elliptical, 6-7 cm long, 2.5-3.5 cm wide, the apex long-acuminate, the bases rounded, abruptly contracted into a petiole 2 mm long. Inflorescence an extremely congested, secund raceme of successive, long-pedicellate flowers, up to 10 mm long, borne by a filiform peduncle up to 30 mm long along the back of the leaf; floral bract 1.5 mm long; pedicel 5-6 mm long; ovary 2.5 mm long; sepals brown, minutely ciliate, the dorsal sepal broadly ovate, acute, 4.75 mm long, 4.5 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals ovate, oblique, lightly acuminate, acute, 5 mm long, 2.5 mm wide, connate 2 mm; petals greenish brown, transversely oblong, bilobed, 1 mm long, 4 mm wide, with a filament 0.5 mm long from the margin near the middle, the dorsal lobe dolabriform, the lower lobe oblong, rounded; lip brown, the blades thin, glabrous, lunate, adherent medially over the column, 2 mm long, the connective broadly cuneate, the united body with a central, cup-shaped cavity, connate posteriorly to the under surface of the column above the base, the appendix ciliate, ligulate, concave, acute, nearly 1 mm long, the column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *cotyledon,* "a cup-shaped cavity," referring to the cavity of the lip.

Type: *ECUADOR:* NAPO: epiphytic in wet forest between Tena and Baeza, alt. 1000 m, 23 Feb. 1982, *C. Luer & A. Hirtz 6975* (Holotype: SEL).

The flowers of this broad-leaved relative of the common *L. mucronata* Lindl. are distinguished by the semiconnate lateral sepals, and the broad base of the united connectives with a large, cup-shaped cavity.

Lepanthes craticia Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio elliptico acuminato breviore, racemo congesto, sepalis glabris acuminatis, petalis reniformibus, labelli laminis ellipticis convexis, appendice oblonga cum glande apicali truncata.

Plant large, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 12-25 cm long, enclosed by 10-18 close, glabrous lepanthiform sheaths. Leaf erect, thinly coriaceous, elliptical, acuminate, acute, 5-8 cm long, 1.8-2.6 cm wide, the base cuneate into a petiole 3 mm long. Inflorescence a congested, successively flowered raceme up to 35 mm long, borne by a filiform peduncle up to 25 mm long behind the leaf; floral bract and pedicel each 1.25 mm long, ovary 2 mm long; sepals yellow, glabrous, the dorsal sepal ovate, acuminate, acute, 11 mm long, 4.75 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals oblong, oblique, 11 mm long, connate 4 mm, 8 mm wide together, the apices acuminate acute; petals yellow with red margins, transversely bilobed, reniform, 2.5 mm long, 5.5 mm wide, the lobes equal, oblong with rounded apices; lip orange with red-orange margins, the blades glabrous, elliptical with rounded ends, 2 mm long, the connectives short, broad, connate to the under surface of the column above the base, the appendix broadly oblong with a short, truncate, terminal gland; column 2.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *craticius*, "latticed," in reference to the appearance of the densely flowered rachis.

Type: *ECUADOR*: ZAMORA-CHIHCHIPE: epiphytic in scrub vegetation between Loja and Zamora, alt. 2700 m, 21 Sept. 1980, *C. Luer, J. Luer, C. Dodson et al. 5523* (Holotype: SEL); same area, alt. 2700 m, 30 Dec. 1980, *M. Madison et al. 7445* (SEL); MORONA-SANTIAGO: between Gualaceo and Limon, alt. 2650 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8215* (SEL).

This large species, one of a large group of similar species, is distinguished by the glabrous, acuminate sepals, reniform petals, glabrous blades of the lip, and an oblong appendix with a truncate, apical gland.

Lepanthes crista-piscis Luer & Vásquez, sp. nov.

Planta parva, folio elliptico inflorescentia subdensa successiviflora longiore, sepalis ovatis breviter acuminatis, sepalis lateralibus cristatis, petalis transverse oblongis, labelli laminis oblongis apice incurvatis, appendice microscopica.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 10-35 mm long, enclosed by 4-6 shortly ciliate lepanthiform sheaths. Leaf erect, coriaceous, suffused with purple beneath, elliptical, subacute, 14-22 mm long including the 2 mm long petiole, 6-9 mm wide, the base cuneate into the petiole. Inflorescence a subdense, distichous, successively flowered raceme up to 7 mm long, borne behind the leaf by a filiform peduncle up to 6 mm long; floral bract 0.75-1 mm long, verrucose; pedicel 1-1.5 mm long; ovary 1.75 mm long; dorsal sepal purple, lightly spiculate externally, ovate, 3 mm long, 2 mm wide, the apex acute, acuminate; lateral sepals yellow, spiculate externally especially along the veins, with a membranous crest along the narrowly infolded lateral margins, ovate, oblique, concave, connate 1 mm, 3.75 mm long, 2.5 mm wide together unexpanded, the apices acute, shortly acuminate; petals transversely oblong, the apices rounded, microscopically pubescent, 0.5 mm long, 2.3 mm wide, the upper lobe purple, the lower lobes shorter, yellow-orange; lip yellow-orange, microscopically pubescent, the blades oblong with acute apices incurved beneath the apex of the column, the connectives broadly cuneate, connate to the column above the base, the appendix a microscopic lobule, pubescent; column 1.5 mm long, the anther and stigma apical.

Etymology: From the Latin *crista-piscis*, "crest of a fish," in reference to the crests along the margins of the lateral sepals.

Type: *BOLIVIA*: LA PAZ: Prov. of Nor Yungas; epiphytic in cloud forest east of Unduavi, alt. 2400 m, 22 Jan. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8548* (Holotype: SEL).

By virtue of the folded margins of the lateral sepals a member of the "complicata" group, this species is most remarkable for the finlike, laciniate membrane that runs the length of the margins of the lateral sepals.

Lepanthes crista-pulli Luer & Escobar, sp. nov.

Planta parva caespitosa, racemo laxe paucifloro folio anguste elliptico breviore, sepalis acutis pubescentibus, petalis transverse oblongis, labelli laminis oblongis appendice extus cristata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-3.5 cm tall, enclosed by 3-4 minutely scabrous lepanthiform sheaths. Leaf erect, coriaceous, narrowly elliptical-ovate, acute, 3.5-4 cm long, 0.6-0.8 cm wide, the base narrowly cuneate into a petiole ca. 5 mm long. Inflorescence a loose, few-flowered, flexuous raceme up to 2 cm long including the filiform peduncle along the back of the leaf; floral bract and pedicel each 1.5 mm long; ovary 1 mm long; sepals yellow, suffused with brown toward the base, minutely pubescent, the dorsal sepal ovate, acute, 3 mm long, 2.33 mm wide, the lateral sepals ovate, oblique, acute, 3 mm long, 1.25 mm wide, connate 1 mm; petals purple, transversely oblong, 0.5 mm long, 2.33 mm wide, the upper lobe oblong, obtusely angled on the inner margin, the apex rounded, the lower lobe smaller, narrowly oblong, obtuse; lip purple, the blades oblong, glabrous, 1 mm long, the apex acute, the base round, the connectives broadly cuneate, connate to the under surface of the column near the base, the body with a forked crest externally, only slightly protruding beyond the sinus; column 1 mm long, the anther and stigma apical.

Etymology: From the Latin *cristapulli*, "the comb of a chick," referring to the small crest on the under surface of the lip.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in wet forest north of Gualaquiza, alt. 1650 m, 4 Nov. 1982, *C. Luer, R. Escobar & D. D'Alessandro 8280* (Holotype: SEL).

This small species may be identified by the narrowly elliptical leaf with a short, loose inflorescence; minutely pubescent sepals; and a forked crest on the outside of the body of the united connectives of the lip.

Lepanthes dalessandroi Luer, sp. nov.

Planta mediocris caespitosa, foliis anguste oblongis, racemo longissimo, floribus grandibus, sepalis acuminatis, petalis transverse oblongis, labelli laminis late lunatis pubescentibus, appendice membranacea pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems erect, slender to comparatively stout, 3-8 cm long, enclosed by 3-6 close lepanthiform sheaths, microscopically scabrous. Leaf erect, coriaceous, narrowly oblong, subacute to obtuse, 1.5-4 cm long, 0.7-10 mm wide, the base narrowly cuneate into a petiole 3-5 mm long. Inflorescence a progressively lengthening, subflexuous, loosely flowered raceme up to 33 cm long including the peduncle 9-12.5 cm long; flowers large, orange-brown, 2-3 open simultaneously; floral bract 2.5 mm long; pedicel 4-5 mm long; ovary 1.5 mm long; sepals glabrous, the dorsal sepal triangular, 13-15 mm long, 8-9 mm wide, connate to the lateral sepals for 3 mm, the acute apex attenuated into a 4 mm long tail, the lateral sepals ovate, oblique, connate 7 mm into an ovate, bifurcated lamina 14-15 mm long, 9-10 mm wide, the attenuated apices curved outward; petals microscopically pubescent, transversely oblong, bilobed, 1 mm long, 3 mm wide, the lobes equal, oblong, obtuse; laminae of the lip broadly lunate, convex, pubescent, 1 mm long, 0.5 mm wide, the connective cuneate, connate to the under surface of the column above the base, the appendix a membranous, pubescent web in the sinus, with a minute apiculum; column 1.5 mm long, stout, the anther and stigma apical.

Etymology: Named in honor of Dennis D'Alessandro of Vilcabamba, Ecuador, who originally discovered this species.

Type; *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 2400 m, 3 March 1982, *C. Luer, D. O'Alessandro & S. Dalström 7087* (Holotype: SEL).

The exceptionally large, orange-brown flowers of this species are borne, two or three simultaneously, in a very long raceme. The blades of the lip are lunate, convex, and pubescent.

Lepanthes deleastes Luer, sp. nov.

Planta parva caespitosa, folio ovato acuto racemo congesto longiore, sepalis subacutis minute ciliatis, petalis transverse oblongis, labello laminis oblongis, connectivis brevibus, appendice pubescenti oblonga cum glande ovoidea.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 2-6 cm long, enclosed by 6-8 close, minutely ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, ovate, 2.5-3.5 cm long, 1.6-1.8 cm wide, the apex acute to shortly acuminate, the rounded base abruptly contracted into a petiole 2 mm long. Inflorescence a congested, successively flowered raceme up to 5 mm long, borne by a filiform peduncle up to 12 mm long along the back of the leaf; floral bract 1 mm long; pedicel 0.5 mm long; ovary 1.5 mm long; sepals purple with a yellow border, microscopically ciliate, the dorsal sepal ovate, subacute, 3 mm long, 2.1 mm wide, connate 0.5 mm to the lateral sepals, the lateral sepals ovate, oblique, acute, 3.1 mm long, 1.5 mm wide, connate 0.5 mm; petals orange with a red border, transversely oblong, 1 mm long, 2.5 mm wide, the apices round, with a small, obtuse angle on the outer margin at the midvein, the upper lobe larger; lip purple, the blades oblong with obtuse ends, 1.5 mm long, ciliate on inner margin, the connectives short, cuneate, connate to the under surface of the column above the base, the appendix pubescent, oblong, with an ovoid gland below the apex; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *deleastes*, "a baiter," alluding to the presumed function of the appendix of the lip.

Type: *ECUADOR:* NAPO: epiphytic in wet forest north of Tena, alt. 1100 m, 22 Feb. 1982, *C. Luer & A. Hirtz 6937* (Holotype: SEL); MORONA-SANTIAGO: north of Gualaquiza, alt. 1700 m, 29 Dec. 1982, *S. Dalström 399* (SEL); ZAMORA-CHINCHIPE: Quebrada Honda, alt. 1100 m, 18 Jan. 1982, *D. D'Alessandro 122* (SEL).

This not-too-remarkable species may be identified by the ovate leaves; the short, congested raceme of flowers with subacute sepals; comparatively large, transversely oblong petals; and a lip with oblong blades, short connectives, and an oblong appendix with an ovoid gland extending to the apex from the under surface of the appendix.

Lepanthes delphax Luer, sp. nov.

Planta mediocris caespitosa, racemo laxo folio oblongo breviter acuminato subaequilongo, sepalis glabris, sepalo dorsali late ovato lateralibus falcatis, petalis transverse oblongis, labelli laminis ovatis apicibus incurvatis acutis ciliatis, appendice brevi rotundata pubescenti.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems slender, erect, 5-12 cm long, enclosed by 6-10 close lepanthiform sheaths, microscopically ciliate. Leaf erect, coriaceous, oblong, 3-5 cm long, 1-1.5 cm wide, the subacute to obtuse apex abruptly contracted into a 5-10 mm long acumen, the base cuneate into a petiole 4-5 mm long. Inflorescence a loose, successively flowered raceme up to 4 cm long including the filiform peduncle; floral bract and pedicel each 1.25 mm long; ovary 2 mm long; sepals light yellow, glabrous, the dorsal sepal broadly ovate, concave, obtuse, 3.25 mm long, 3 mm wide expanded, connate 1 mm to the lateral sepals, the lateral sepals broadly oblong, falcate, acute, 3 mm long, 2 mm wide, connate 1 mm, 1-veined; petals orange, edged in purple, transversely oblong, 0.9 mm long, 2.9 mm wide, the upper lobe oblong with the apex rounded, the lower lobe smaller, oblong, oblique, obtuse; lip orange, the blades ovate, 1.5 mm long, the apices acute, incurved, ciliate, the connectives broadly cuneate, connate to the under surface of the column below the middle, the appendix a short, rounded, pubescent organ protruding from the sinus; column 1.25 mm long, stout, the anther and stigma apical.

Etymology: From the Greek *delphax*, "a little pig," in reference to the apical stigma looking like the nose of a pig.

Type: *ECUADOR:* COTOPAXI: epiphytic in cloud forest between Angamarca and Corazon, alt. 3000 m, 17 Feb. 1979, *C. Luer, J. Luer & A. Hirtz 3986* (Holotype: SEL).

This species is characterized by a loose raceme about as long as the oblong, abruptly acuminate leaf, a broadly ovate dorsal sepal, broadly falcate lateral sepals, ovate blades of the lip with falcate, ciliate apices and a short, rounded, pubescent appendix. Common to the members of this group, the anther and stigma are apical. In this species the large, rounded, stigmatic cavity protrudes from between the apices of the blades of the lip.

Lepanthes dictyota Luer & Vásquez, sp. nov.

Planta mediocris plus minusve horizontalis vel pendens, foliis ovatis acuminatis valde reticulatis racemo subdense flexuoso longioribus, sepalo dorsali late ovato obtuso, sepalis lateralibus anguste ovatis obliquis acutis, petalis transverse oblongis, labelli laminis oblongis, appendice scopiformi.

Plant medium in size, epiphytic, densely caespitose; roots slender. Secondary stems slender, erect, horizontal to pendent, 4-8 cm long, enclosed by 8-10 minutely ciliate lepanthiform sheaths with thin dilated ostia. Leaf erect with the stem, thinly coriaceous, with purple reticulations on both surfaces, suffused with purple beneath, ovate, acute, acuminate, 4-5.5 cm long including the 2-4 mm long petiole, 1.6-2.1 cm wide, the rounded base contracted into the petiole. Inflorescence a subdense, distichous, flexuous, successively flowered raceme up to 20 mm long, borne behind the leaf by a filiform peduncle 9-11 mm long; floral bract 1.5-2 mm long, echinate; pedicel 2 mm long; ovary 2 mm long, crested; sepals yellow, suffused with purple centrally, the veins and margins minutely denticulate, the dorsal sepal broadly ovate, obtuse, 3.5 mm long, 2.5-3 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals narrowly ovate, oblique, acute, connate 1 mm, 3.5 mm long, 3.25 mm wide together; petals red-orange, minutely pubescent, transversely oblong, 1 mm long, 2.5 mm wide, the ends rounded; lip yellow, suffused with red-orange, glabrous, narrowly oblong, 1.75 mm long, the ends rounded, the connectives short, cuneate, connate to the column above the base, the appendix ligulate, hinged at the acute sinus, pubescent, with a brushlike apical segment; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From from the Greek *diktyotos*, "reticulated," referring to the purple-netted veins.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Charasco: epiphytic in cloud forest below Monte Puncu along Rio Lope Mendoza, alt. 2400 m, 1 Feb. 1981, *C. Luer, J. Luer, R. Vásquez & E. Besse 5820* (Holotype: SEL).

This handsome species may be recognized by the purple-reticulated, ovate, acuminate leaves; short, flexuous inflorescences; narrowly oblong blades of the lip; and a brushlike appendix.

Lepanthes dodsonii Luer, sp. nov.

Planta parvula caespitosa, inflorescentia folio cordato obtuso reticulato pubescenti breviore, racemo congesto, sepalis denticulatis breviacuminatis, petalis transverse oblongis pubescentibus, labelli laminis oblongis, connectivis posticis brevibus, appendice plana oblonga ciliata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 15-30 mm long, enclosed by 8-12 ciliate lepanthiform sheaths, widely dilated at the ostia. Leaf erect, coriaceous, pubescent-ciliate, reticulate-rugose, the elevated veins red on green, ovate-cordate, obtuse, 15-18 mm long, 13-17 mm wide, the base broadly cordate, abruptly contracted into a petiole 1 mm long. Inflorescence a congested, successively flowered raceme up to 5 mm long, borne by a filiform peduncle 6 mm long, on the dorsum of the leaf; floral bract 1 mm long; pedicel 1.5 mm long; ovary 1 mm long, ciliate on the ribs; sepals green, suffused with red centrally, denticulate, carinate-ciliate along the veins externally, the dorsal sepal ovate, obtuse, shortly acuminate, 5 mm long, 3.25 mm wide, connate 1 mm to the lateral sepals, the lateral sepals ovate, oblique, connate 2 mm, 6 mm long, 4 mm wide together, the acute apices attenuate; petals green, pubescent, transversely oblong, 0.8 mm long, 4.5 mm wide, the ends acute, the lower lobe smaller, narrower; lip red, the blades narrowly oblong, 1.75 mm long, angled on the inner margin below the apex, minutely ciliate, the connectives narrowly cuneate, from the posterior portion of the blade, connate to the base of the column, the appendix flat, oblong, ciliate; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: Named in honor of Calaway H. Dodson, investigator of the flora of Ecuador, who discovered this species.

Type: *ECUADOR:* EL ORO: eplphytic in an orange tree 10 km west of Pinas, alt. 900 m, 19 July 1979, *C. H. Dodson et al. 8475* (Holotype: SEL), C. Luer illustr. 9085.

This species is remarkable for the small, bluntly cordate, rugose-pubescent leaves with red veins. Borne on top of the leaf is the green flower with denticulate sepals with acuminate apices, pubescent petals, narrow blades of the lip, and an oblong, ciliate appendix.

Lepanthes doloma Luer & Vásquez, sp. nov.

Planta mediocris, folio ovato leviter acuminato racemis pluribus congestis longiore, sepalis late ovatis denticulatis, petalis transverse oblongis, labelli laminis late oblongis apice longiciliatis, connectivis longissimis, appendice grandi loriformi ciliata.

Plant medium in size, epiphytic, caespitose, roots slender. Secondary stems slender, erect, 2-9 cm long, enclosed by 5-8 ciliate lepanthiform sheaths. Leaf erect, coriaceous, suffused with purple beneath, ovate, acute, lightly acuminate, apiculate, 3.5-4.5 cm long, 1-1.7 cm wide, the broadly cuneate base contracted into a 2 mm long petiole. Inflorescence racemose, several congested, distichous, successively flowered racemes up to 12 mm long, borne behind the leaf by filiform peduncles 8-15 mm long; floral bract 1.25 mm long, sparsely ciliate; pedicel 2 mm long; ovary 2 mm long, sparsely papillose; sepals translucent orange, broadly ovate, shortly acuminate, carinate, the carinae and margins conspicuously denticulate, the dorsal sepal 5 mm long, 4 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals connate 2.5 mm, 5 mm long, 5 mm wide together; petals orange, edged in red-orange, microscopically pubescent, transversely oblong, 1.4 mm long, 3.75 mm wide, the upper lobe obtuse, the lower lobe acute, smaller; lip bright rose, edged in orange, the blades broadly oblong, 1.25 mm long, slightly concave with rounded ends, the anterior margins long-ciliate, otherwise microscopically pubescent, the connectives long, oblong, elevating the blades above the column, connate to the base of the column, the appendix large, straplike, concave at the attachment to the sinus, convex and ciliate above with an apical lobule; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *doloma*, "a bait, a decoy," referring to the probable role of the appendix.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest along the road to Tablas, alt. 2500 m, 9 Feb. 1980, *C. Luer, J. Luer & R. Vásquez 5171* (Holotype: SEL); between Cochabamba and Villa Tunari, alt. 1900 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3534* (SEL).

The sepals of this species with racemes shorter than the ovate, acuminate leaves are broadly ovate and conspicuously denticulate; the petals are large and transverse; the oblong blades of the lip, borne above the column by long connectives, are ciliate apically; and the appendix is large, straplike, and ciliate.

Lepanthes electilis Luer, sp. nov.

Species haec *L. elegantulae* Schltr. affinis sed foliis angustis acuminatis, floribus minoribus, labelli laminis glabris et appendice late triangulari ciliata differt.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, enclosed by 5-9 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, narrowly elliptical, acute, acuminate, 5-7.5 cm long, 2-2.8 cm wide, the base broadly cuneate into a pedicel 5 mm long. Inflorescence a progressively lengthening, loose, lightly flexuous raceme up to 15 cm long, 1-2 flowers open simultaneously, 1-2 racemes produced simultaneously; sepals rosy white, glabrous, triangular, acute, the dorsal sepal 5.5 mm long, 3.25 mm wide, connate basally for 1 mm to the lateral sepals, the lateral sepals connate 3 mm into a triangular, bifid lamina 5.5 mm long, 4 mm wide together, the apices acute; petals transversely oblong, bilobed, 1 mm long, 3.5 mm wide, the upper lobe dark purple, ovate, obtuse, the lower lobe yellow, smaller, triangular, acute; lip dark rose, the blades lunate, convex, 1.66 mm long, glabrous, the ends rounded, the connectives short, cuneate, connate to the under surface of the column near the middle, the appendix triangular, ciliate; column 1.5 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *electilis*, "choice," alluding to the attractive qualities of the plant.

Type: *ECUADOR:* NAPO: epiphytic in cloud forest east of Salcedo, alt. 3000 m, 12 Nov. 1979, *C. Luer, J. Luer & A. Hirtz 4766* (Holotype: SEL).

This species with long, subflexuous racemes is related to *L. elegantula*, but the leaves of *L. electilis* are narrow and acuminate, the flowers are half the size, and the appendix of the lip is short, broadly triangular and ciliate.

Lepanthes eumeces Luer, sp. nov.

Planta perpusilla caespitosa, caulibus secundariis abbreviatis folio elliptico obtuso brevioribus, racemo longissimo flexibili flexuoso, sepalis apiculatis spiculatis, petalis transverse anguste oblongis, labelli laminis oblongis antice longiciliatis.

Plant very small, epiphytic, caespitose; roots slender. Secondary stems abbreviated, 2-4 mm long, enclosed by 2-3 microscopically ciliate, ribbed sheaths. Leaf erect, coriaceous, elliptical, obtuse, 8-15 mm long including a petiole 1-5 mm long, 5-7 mm wide, the base cuneate. Inflorescence a progressively lengthening, flexible, lightly flexuous raceme up to 17 cm long including the filiform peduncle, 2-3 flowers open simultaneously; floral bract 1-1.5 mm long; pedicel 1.5-2 mm long; ovary 0.75 mm long, spiculate; sepals dull red-brown, the margins and carinae along the veins irregularly spiculate, the dorsal sepal ovate, obtuse, apiculate, connate 2 mm, 3.75 mm long, 3.75 mm wide together, each 1-veined; petals transversely narrowly oblong, 0.5 mm long, 3.5 mm wide, the lobes subequal, lightly curved, obtuse; blades of the lip narrowly oblong with rounded ends, the apical end sparsely long-ciliate, the connectives short, cuneate, connate to the under surface of the basal third of the column, the appendix minute, double, pubescent, the anterior of the two parts clavate, protruding beyond the sinus; column 0.75 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *eumekes*, "of good length," referring to the exceedingly long inflorescence.

Type: *ECUADOR:* NAPO: epiphytic in wet forest between Tena and Baeza, alt. 1000 m, 23 Feb. 1982, *C. Luer & A. Hirtz 6974* (Holotype: SEL).

This tiny species produces a long, flexible, lightly flexuous (zigzag) raceme of small, spiculate flowers.

Lepanthes falcata Luer & Vásquez, sp. nov.

Planta parva, racemo laxo folio elliptico subaequilongo, sepalis libris attenuatis spiculatis, petalis anguste transverse oblongis, labelli lobis falcatis columnam amplectentibus, appendice minuta.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 10-30 mm long, enclosed by 4-6 ciliate lepanthiform sheaths. Leaf erect, coriaceous, suffused with purple beneath, elliptical, subacute to obtuse, 11-18 mm long including a petiole 2-3 mm long, 5-11 mm wide, the base cuneate into the petiole. Inflorescence a loose, fractiflex, successively flowered raceme up to 13 mm long including the peduncle, often with 2 flowers open simultaneously; floral bract 1-1.5 mm long; pedicel 1-1.5 mm long; ovary 1 mm long, more or less minutely papillose; sepals brown, widely spread, free nearly to the base, spiculate externally along the thickened veins, the dorsal sepal narrowly ovate, acute, acuminate, 4.5 mm long, 1-1.5 mm wide, the lateral sepals narrowly triangular, acute, curved upward, 4.5-5 mm long, 0.8-1 mm wide, 1-veined, the outer margins narrowly and lightly incurved; petals brown, microscopically pubescent, transversely oblong, 0.2-0.3 mm long, 1.5-2.75 mm wide, the lobes narrowly obtuse; lip brown, bilobed, 1.3 mm long, the lobes falcate, surrounding the column, the acute apices incurved beneath the apex of the column, minutely pubescent along the inner margins, the sinus acute with a minute, triangular appendix; column 1.5 mm long, the anther and stigma apical.

Etymology: From the Latin *falcatus*, "sickle-shaped," in reference to the lobes of the lip.

Type: *BOLIVIA:* LA PAZ: Prov. of Nor Yungas: epiphytic in cloud forest west of Coroico, alt. 2800 m, 4 Feb. 1980, *C. Luer, J. Luer, R. Vásquez & R. Lara 5113* (Holotype: SEL);

COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1500 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3582* (SEL).

The sepals of this small species are attenuate and widely spread, the petals are slender and transverse, and the falcate lobes of the lip embrace the column.

Lepanthes flexuosa Luer, sp. nov.

Planta perpusilla ceaspitosa, racemo fractiflexo crasso foliis ellipticis multilongiore, flore grandi, sepalis rubris spiculatis acuminatis, petalis transverse bilobatis, labelli laminis subfalcatis pro flore grandibus, appendice extus oblonga pubescenti.

Plant very small, epiphytic to terrestrial, caespitose; roots proportionately coarse. Secondary stem erect, stout, 5-15 mm long, enclosed by 3-4 close lepanthiform sheaths, minutely scabrous. Leaf erect, coriaceous, purple beneath, the blade elliptical, obtuse, 6-11 mm long, 5-9 mm wide, the base abruptly contracted into a petiole 3-4 mm long. Inflorescence a gradually lengthening, successively flowered, fractiflex raceme up to 7 cm long including the peduncle, the rachis and peduncle comparatively stout; floral bract 1.5-2 mm long; pedicel 1 5 mm long; ovary 1.25 mm long; flowers red, comparatively large for the plant; sepals narrowly triangular, acuminate, acute, minutely spiculate along the margins and carinate nerves externally, the dorsal sepal 6.5 mm long, 3 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals 6.5 mm long, 2.25 mm wide, connate 1 mm; petals transversely oblong, bilobed, 1 mm long, 3.5 mm wide, the lobes equal, lightly recurved with rounded ends; blades of the lip oblong-subfalcate, 3.5 mm long, surrounding the column just below its apex with the rounded apices overlapping, the bases also rounded, the connectives short, cuneate, connate to the under surface of the column above the middle, the appendix a longitudinal, oblong body beneath the united connectives, the pubescent apex barely protruding beyond the sinus; column 2.5 mm long, the anther and stigma apical.

Etymology: From the Latin *flexuosus*, "zigzag," referring to the fractiflex rachis.

Type: *ECUADOR:* MORONA-SANTIAGO: terrestrial on the road cut east of Sigsig, alt. 2850 m, 6 May 1981, *C. Luer, J. Luer et al. 6110* (Holotype: SEL).

This very small species is notable for the comparatively stout, fractiflex raceme much longer than the leaves. The red flowers are comparatively large for the size of the plant, and the lip is comparatively large for the size of the flower.

Lepanthes focalis Luer, sp. nov.

Planta mediocris caespitosa, folio oblongo apice in acumen angustum abrupte constricto, racemo congestissimo folio dimidio breviore, sepalis glabris acuminatis, petalis transverse longi-oblongis, labello pubescenti transverse cordato columnam aplectenti apice rotundato.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems stout, erect, 4-11.5 cm long, enclosed by 7-12 ciliated lepanthiform sheaths. Leaf erect, coriaceous, oblong, 3.5-6.5 cm long, 1.6-3.2 cm wide, the rounded apex abruptly constricted into a narrow acumen ca. 1 cm long, the rounded base abruptly contracted into a petiole ca. 4 mm long. Inflorescence a successively flowered, markedly congested raceme up to 8 mm long, borne by a slender peduncle up to 15 mm long, the peduncles in a fascicle along the back of the leaf; floral bract 1.25 mm long; pedicel 1 mm long; ovary 1.25 mm long; sepals glabrous (color notes lost), the dorsal sepal ovate, acuminate, acute, 7 mm long, 3.5 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals connate 3 mm into a broadly ovate bifid lamina, 6.5 mm long, 5.75 mm wide, the acute apices oblique, diverging; petals transversely oblong, bilobed, 1.25 mm long, 5 mm wide, the upper lobe ovate, obtuse, the lower lobe longer, narrowly linear, obtuse, minutely pubescent; lip fleshy, pubescent, transversely cordate, 1.5 mm long, 1.75 mm wide, the broadly rounded apex minutely apiculate, the obtuse, concave basal lobes embracing the column, the base connate to the under surface of the column near the middle; column cylindrical, 1.75 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *focale*, "a muffler to keep the neck warm," referring to the appearance of the lip.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest west of the pass between Loja and Zamora, alt. 2700 m, 21 Sept. 1980, *C. Luer, J. Luer, C. H. Dodson et al. 5524* (Holotype: SEL).

An abruptly constricted apex of an oblong leaf is seen in several other species, but the transversely cordate, pubescent lip embracing the column is unusual.

Lepanthes fusiformis Luer, sp. nov.

Planta parva caespitosa, foliis linearifusiformibus crassissimis vel anguste teretibus racemo fractiflexo congesto duplolongioribus, sepalis ovatis acutis ciliatis, petalis transverse oblongis, labelli laminis oblongis acutis, appendice spathulata.

Plant small, epiphytic, caespitose; roots very slender. Secondary stems slender, erect, 3-7 cm long, enclosed by 4-6 close lepanthiform sheaths, minutely ciliate. Leaf erect, narrowly ovate, fleshy-thickened to terete, acute, 20-43 mm long, 5-6 mm wide, 4-5 mm thick, the base narrowly cuneate into a 2-3 mm long petiole. Inflorescence a congested, lightly zigzag, successively flowered raceme up to 10 mm long, borne by a filiform peduncle up to 18 mm long; floral bract 1 mm long; pedicel 1.5 mm long; ovary 2.5 mm long; sepals red with yellow margins, ciliate, ovate, acute, the dorsal sepal 3.66 mm long, 2 mm wide, the lateral sepals oblique, 3 mm long, 1.6 mm wide, connate to about the middle; petals red, edged in yellow, transversely oblong, 0.66 mm long, 2.66 mm wide, the upper lobe longer, the apices rounded; lip red-orange, the blades of the lateral lobes oblong, 1.2 mm long, the apices acute, the bases rounded, the connectives cuneate, connate to the under surface of the column, the appendix spathulate, 0.5 mm long, protruding beyond the sinus; column 1 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *fusiformis*, "narrowly ellipsoid," referring to the leaf.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 2450 m, 12 May 1981, *C. Luer, J. Luer. D. D'Alessandro et al. 6210* (Holotype: SEL); same area, 3 March 1982, *C. Luer et al. 7086* (SEL).

Lepanthes fusiformis grows locally abundantly near the locality where *L. teres* was found. They are the only two known species in the genus with terete leaves. This species is distinguished by the ciliated dorsal sepal, narrow petals, and the proportionately large, spathulate appendix.

Lepanthes glaberrima Luer & Vásquez, sp. nov.

Planta mediocris, racemo disticho densifloro foliis anguste ovatis multibreviore, floribus parvis longipedicellatis, ovario longissimo sepalis ovatis obtusis, petalis grandibus glaberrimis transverse bilobis incisis, labelli laminis glaberrimis ellipticis, appendice pubescenti cum glande apicali.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2.5-6.5 cm long, enclosed by 5-6 close, minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, narrowly ovate, acute, lightly acuminate, 2-4 cm long, 0.9-1.2 cm wide, the base cuneate into the petiole 1.5 mm long. Inflorescence a congested, distichous, successively flowered raceme up to 6 mm long, borne behind the leaf by a filiform peduncle 4-7 mm long; floral bract 1 mm long; pedicel 2 mm long; ovary slender, 4 mm long; sepals red-orange, edged in yellow, glabrous, the dorsal sepal broadly ovate, 2.5 mm long, 2.25 mm wide, the apex obtuse to rounded, the base connate to the lateral sepals for 0.5 mm, the lateral sepals ovate, oblique, subacute, connate 1.5 mm, 2.2 mm long, 2.5 mm wide together; petals orange, glabrous, transversely oblong, bilobed, 1 mm long, 2.75 mm wide, the outer margin incised near the middle, the lobes triangular-oblong with rounded ends, the lower lobe smaller; lip purple, tinged with orange, the blades elliptical, glabrous, 1.75 mm long, the ends rounded, the connectives narrowly cuneate, connate to the column above the base, the appendix ovoid, pubescent, hinged at the sinus, with an ovoid apical gland; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *glaberrimus*, "very smooth, without hair," referring to the petals and blades of the lip.

Type; *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest on the road to Tablas, alt. 2500 m, 9 Feb. 1980, *C. Luer, J. Luer & R. Vásquez 5181* (Holotype: SEL).

This species is notable for the small, long-pedicellate flowers produced in a congested, distichous raceme. The petals and blades of the lip are proportionately large and completely glabrous. The petals are incised on the outer margin between the upper and middle lobes.

Lepanthes grypha Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio anguste elliptico acuminato breviore, racemo congesto, sepalis glabris breviter acuminatis, petalis grandibus transverse oblongis, labelli laminis oblongis planis ciliatis, connectivis angustis erectis, corpore subsphaerico pubescenti appendice antice conica pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, weak, 5-11.5 cm long, enclosed by 9-11 microscopically scabrous lepanthiform sheaths. Leaf suberect to horizontal, thinly coriaceous, narrowly elliptical-ovate, acute, acuminate, 4.5-7 cm long, 1-1.5 cm wide, the base cuneate into a petiole 2 mm long. Inflorescence a very congested, successively flowered raceme to 15 mm long, borne by a filiform peduncle 10-25 mm long on top of the leaf; floral bract 1.5 mm long, pedicel 2 mm long, ovary 2 mm long; sepals light green, glabrous, the dorsal sepal triangular, 4 mm long, 2.75 mm wide, the apex acute, shortly acuminate, the lateral sepals ovate, oblique, connate 1.5 mm, 3.5 mm long, 3.75 mm wide together, the margins minutely sub-irregular, the acute, acuminate apices close; petals greenish brown, transversely oblong, bilobed, 1.25 mm long, 3.5 mm wide, shortly pubescent, the lobes oblong, obtuse, the lower lobe smaller; lip greenish brown, the blades flat, oblong, 1.66 mm long, ciliate, adherent to each other medially over the column, the ends rounded, the connectives narrowly cuneate, erect, lifting the blades above the column, connate to the column at the base, the body thickened, subspherical, pubescent, the appendix conical, pubescent, protruding from the front of the body; column 2 mm long, the anther dorsal, the stigma ventral.

Etmology: Named for a *grypha*, a mythological creature, half lion and half eagle, referring to the appearance of the central apparatus.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest between San Juan and Chiriboga, alt.ca. 2000 m, 7 March 1982, *A. Hirtz and X. Leon 210* (Holotype: SEL), C. Luer illustr. 9073.

This species with a short, congested inflorescence lying upon the narrowly acuminate leaf is notable for the large pubescent petals, flat, winglike blades of the lip elevated over the column by narrow connectives from a pubescent, subspherical body with the conical appendix protruding from the front surface.

Lepanthes hirtzii Luer, sp. nov.

Planta grandis caespitosa, racemo subdenso multifloro folio elliptico acuminato aequilongo vel paulo longiore, floribus grandibus, sepalis in cupulam non profundam connatis, petalis transverse rhomboideis, labelli laminis ellipticis ciliatis, appendice minutissima triglandulosa glabra.

Plant large, epiphytic, caespitose; roots slender; secondary stems erect, slender to stout, 7-30 cm long, enclosed by 8-15 close, glabrous to microscopically scabrous lepanthiform sheaths. Leaf erect, thinly coriaceous, elliptical 8-12 cm long, 2-4.5 cm wide, the apex long-acuminate, the base broadly cuneate into a petiole 5-7 mm long. Inflorescence a densely to subdensely flowered raceme 8-10 cm long, rarely to 14 cm long, including the peduncle 5-8 cm long, 2-3 flowers open simultaneously; floral bract 2 mm long; pedicel 3 mm long; ovary 1.5 mm long, curved, narrowly winged; sepals orange with brown or purple veins, carinate, ovate, acute, acuminate, minutely ciliate or glabrous, the dorsal sepal 11 mm long, 9 mm wide, connate to the lateral sepals for 4 mm to form a shallow cup, the margins of all 3 sepals more or less erose and dilated above the angles of connation, the lateral sepals oblique, 11 mm long, 6 mm wide, connate 3 mm; petals yellow, more or less suffused with brown or purple, transversely elliptical, 1.25 mm long, 2.75 mm wide, minutely pubescent, the lobes about equal, subtriangular, obtuse; lip orange to brown, the blades elliptical, 2 mm long, minutely ciliate, the ends rounded, the connectives broadly cuneate, connate to the column above the base, the appendix very small with a rounded gland bearing a pair of even smaller terminal rounded glands, glabrous; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: Named in honor of Alexander C. Hirtz of Quito, Ecuador, who has discovered innumerable species of orchids new to science.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest between Quito and Tandapi, alt. ca. 3000 m, 28 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4394* (Holotype: SEL); LOJA: epiphytic in cloud forest at the pass north of Loja, alt. 3100 m, 30 Oct. 1982, *C. Luer & R. Escobar 8246* (SEL); cloud forest east of Yangana, alt. 2650 m, 4 Mar. 1982, *C. Luer et al. 7145* (SEL); *COLOMBIA:* PUTUMAYO: cloud forest between La Cocha and Sibundoy, alt. ca. 2700 m, 30 July 1978, *C. Luer et al. 3118* (SEL).

This large species may be distinguished from *L. nanegalensis* Rchb. f. and *L. rhombipetala* Schltr. by the larger flowers with the sepals connate into a shallow cup. The sepals are more or less erose and dilated above their connation. The petals are without the minute appendages on the outer margin as in *L. rhombipetala*. Differing from both, the appendix of *L. hirtzii* is a minute glabrous gland bearing a pair of even more minute rounded terminal glands.

Lepanthes homotaxis Luer & Escobar, sp. nov.

Planta perparva caespitosa, racemo subdensifloro folio elliptico acuto subaequilongo, flore minuto, sepalo dorsali synsepaloque ovatis similibus, petalis bifurcatis lobis triangularibus similibus, labello pubescenti transverse bilobato rotundato.

Plant very small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2-3 cm long, enclosed by 6-9 close, microscopically scabrous lepanthiform sheaths. Leaf erect, thinly coriaceous, elliptical, acute, 13-18 mm long, 7-9 mm wide, the base obtuse to rounded, contracted into a petiole 1 mm long. Inflorescence a subdense, successively flowered raceme up to 16 mm long including the filiform peduncle, along the back side of the leaf; flowers very small, light yellow-green, glabrous; floral bract less than 1 mm long; pedicel 1 mm long; ovary 1 mm long; dorsal sepal ovate, acute, 1.75 mm long, 1.2 mm wide, 1-veined, the lateral sepals connate into a synsepal similar to the dorsal sepal, ovate, the acute apex minutely notched, 1.75 mm long, 1.25 mm wide; petals forked, bilobed, 0.6 mm long, 1 mm wide, the lobes equal, oblong-triangular, subacute, spreading 90°; lip transversely cordate-bilobed, 0.6 mm long, 0.9 mm wide, pubescent, the apex cleft with a minute apiculum in the sinus, the apices and bases of the lobes rounded, the lower lobes flanking the column, the base connate to the under surface of the middle of the column; column 0.8 mm long, cylindrical, the anther and stigma apical.

Etymology: From the Greek *homo-*, "similar," and *taxis*, "an arrangement," referring to the similarity of the halves of the floral parts.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest between Gualaceo and Limon, alt. 2050 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8228* (Holotype: SEL).

This tiny species is characterized by the minute flowers with a similar dorsal sepal and synsepal, similar upper and lower lobes of the forked petals, and a pubescent, transversely bilobed lip joined to the middle of a cylindrical column.

Lepanthes ictalurus Luer, sp. nov.

Planta pusilla caespitosa, caulibus secondariis foliis orbicularibus multilongioribus, racemo elongato fractiflexo, sepalis anguste triangularibus spiculatis, lobo inferiore petalorum attenuato pubescenti, lobo superiore brevi truncato, labelli laminis ellipticis apice in caudam filiformem abrupte attenuato.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, suberect, 2.5-6 cm long, enclosed by 5-8 ciliate lepanthiform sheaths. Leaf erect, coriaceous, broadly elliptical to suborbicular, 12-15 mm long, 8-11 mm wide, the apex obtuse to rounded, the rounded base abruptly contracted into a petiole ca. 2 mm long. Inflorescence a progressively lengthening, successively flowered, fractiflex raceme up to 7 cm long including the filiform peduncle; floral bract 1.5 mm long; pedicel 2.5 mm long; ovary 1.5 mm long, with serrulate wings; sepals purple with yellow margins, spiculate along the edges and carinate nerves externally, the dorsal sepal narrowly triangular, concave, 7 mm long, 2.5 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals connate 5 mm into an ovate, bifid lamina 7 mm long, 3.5 mm wide, the apices approximate, acute; petals yellow, suffused with rose, pubescent, markedly unequally transversely bilobed, 0.75 mm long, 4.5 mm wide, the upper lobes short, more or less truncate, incurved into apposition over the column, the lower lobes attenuate, linear triangular; lip yellow, suffused with rose, the blades elliptical, glabrous, 2 mm long, the apex of each abruptly contracted into a filiform appendage 2 mm long, the connectives short, broadly rectangular, connate to the under surface of the column above the middle, the sinus pubescent with the appendix reduced to a minute apiculum; column slender, 2.5 mm long, the anther dorsal, the stigma ventral.

Etymology: Named for the genus *Ictalurus*, the genus of the common catfish.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest east of Yangana, alt. 2650 m, 4 March 1982, *C. Luer, D. D'Alessandro & S. Dalström 7151* (Holotype: SEL); south of Yangana, alt. 2400 m, 22 Sept. 1980, *C. Luer, J. Luer & H. H. Morgan 5530* (SEL).

The column of this species is long and slender. Between the middle and lower thirds the petals are attached; between the middle and upper thirds the lip is attached. The short upper lobes of the petals meet over the column while the attenuated lower lobes descend behind the lip and protrude below. The apices of the blades of the lip are contracted into equally long, filiform appendages. These four descending tails of the petals and lip resemble the barbels of a catfish.

Lepanthes illex Luer, sp. nov.

Planta mediocris caespitosa, racemo sublaxo folio anguste elliptico acuminato breviore, sepalo dorsali synsepaloque anguste ovatis acutis similibus minute pubescentibus ciliatis, petalis transverse panduriformibus parvulis, labelli laminis ovatis glabris appendice pedunculata ovata ciliata.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems slender, erect, 6-10 cm long, enclosed by 7-8 glabrous to microscopically scabrous lepanthiform sheaths. Leaf thinly coriaceous, erect, narrowly elliptical, acute, acuminate, 4.5-7.5 cm long, 1.5-1.8 cm wide, the base cuneate into the petiole 4 mm long. Inflorescence a successive, sublaxly flowered raceme up to 6 cm long including the filiform peduncle behind the leaf; floral bract 2 mm long; pedicel 1.5 mm long; ovary 2 mm long, irregularly erose-winged; sepals yellow, suffused with purple centrally, carinate-ciliate externally, the margins microscopically ciliate, microscopically pubescent within, the dorsal sepal triangular, acute, 10 mm long, 4 mm wide, connate basally for 1.5 mm to the lateral sepals, the lateral sepals connate 6 mm into an ovate, shortly bifid lamina 9.5 mm long, 5 mm wide, the apices acute; petals orange, suffused with purple medially, transversely panduriform, 0.6 mm long, 2 mm wide, the lobes ovate, obtuse, the lower lobe slightly smaller; lip bright purple, the blades oblong-ovate, 1.5 mm long, glabrous, the apices subacute, the bases rounded, the connectives broadly cuneate, connate to the column above the base, the appendix ovate, ciliate, pedunculate; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *illex*, "seductive," in allusion to the presumed attractive function of the appendix.

Type: *ECUADOR:* CARCHI: epiphytic in cloud forest above El Carmelo, alt. 3200 m, 17 May 1981, *C. Luer, J. Luer A. Hirtz et al. 6263* (Holotype: SEL).

This species may be recognized by the sublax raceme of large, succesive flowers shorter than the acuminate leaf. The petals and lip are comparatively small, the petals transversely pandurate, the appendix of the lip is a small, ovate, ciliate, pedunculated gland.

Lepanthes inamoena Luer, sp. nov.

Planta parva caespitosa, racemo gracili folio ovato breviore, flore parvo flavo, sepalo dorsali et synsepalo ovatis aequalibus, petalis transverse bilobatis, labelli lobis falcatis minute ciliatis, appendice minuta acuta pubescenti.

Plant small or nearly medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-7.5 cm long, enclosed by 6-10 close, minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, narrowly ovate, acute, 2.5-4.5 cm long, 1-1.5 cm wide, the base cuneate into a 3-4 mm long petiole. Inflorescence a weak, successively flowered, subdense raceme, up to 3 cm long, erect behind the leaf, the filiform peduncle from a node near the apex of the secondary stem; floral bract 1 mm long; pedicel 0.75 mm long; ovary 0.75 mm long; sepals translucent yellow, glabrous, the dorsal sepal ovate, acute, 2.5 mm long, 1.75 mm wide, the lateral sepals connate into an ovate, narrowly obtuse lamina 2.25 mm long, 1.75 mm wide; petals transversely oblong bilobed, 0.75 mm long, 2 mm wide, the apices rounded, the upper lobe slightly larger than the lower; blades of the lip falcate, 1 mm long, minutely ciliate, the apices acute, the bases rounded, the connectives narrowly cuneate, the attachment near the base of the lobes, connate to the under surface of the column, the appendix a minute, pubescent apiculum in the sinus; column scarcely 1 mm long, the anther and stigma apical.

Etymology: From the Latin *inamoenus*, "not pretty," referring to the drab, little flower.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in tall forest near Rio Calagrás, alt. 1600 m, 19 Sept. 1980, *C. Luer, J. Luer, C. H. Dodson et al. 5501* (Holotype: SEL).

Vegetatively this species is not remarkable, bordering between medium and small in size. The bilabiate, yellow flowers are among the smallest and least showy of the genus noted for its intricate flowers. The dorsal sepal and synsepal are similar and the two lobes of the petals are also similar in size and shape.

Lepanthes incisa Luer & Vásquez, sp. nov.

Planta mediocris, folio anguste ovato acuminato racemis congestis distichis duplo-longiore, floribus parvis, sepalis ovatis obtusis, petalis grandibus pubescentibus transverse bilobis incisis, labelli laminis oblongis, connectivis angustis elongatis, appendice pubescenti quadrilobata.

Plant medium in size, epiphytic, densely caespitose; roots slender. Secondary stems slender, erect, 4.9 cm long, enclosed by 5-8 close, minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, narrowly ovate-elliptic, acute, acuminate, 3-5 cm long, 1-1.3 cm wide, the base cuneate into a 3 mm long petiole. Inflorescence a congested, distichous, successively many-flowered raceme up to 13 mm long, borne behind the leaf by a filiform peduncle 6-10 mm long; floral bract 1.5-2 mm long; pedicel 2 mm long; ovary 2.5 mm long; sepals yellow-orange, suffused with purple basally, glabrous, the dorsal sepal broadly ovate, subacute, 2.8 mm long, 2 mm wide, connate to the lateral sepals for 0.5 mm, the lateral sepals ovate, connate to above the middle, 2.2 mm long, 2.4 mm wide together, the apices obtuse; petals yellow-orange, suffused with purple at the base, minutely pubescent, transversely elliptical, bilobed, 1 mm long, 4 mm wide, the outer margin incised near the middle, the lobes obtusely triangular with rounded ends, the lower lobe smaller; lip red-orange, cellular pubescent, the blades oblong with rounded ends, 1.5 mm long, the connectives narrow, lifting the blades above the column, the narrow body connate to the column above the base, the appendix pubescent, 4-lobed, hinged at the sinus in contact with the rostellum; column 1 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *incisus*, "cut into," referring to the incision on the petals.

Type: *BOLIVIA:* LA PAZ: Prov. of Inquisivi: epiphytic in cloud forest between Inquisivi and Circuata, alt. 2550 m, 27 Jan. 1981, *C. Luer, J. Luer, R. Vásquez & E. Besse 5796* (Holotype: SEL).

The species seems superficially similar to *L. glaberrima*, even the petals being similar in size and shape with the incision on the outer margin. However, the petals of *L. incisa* are pubescent; the connectives of the lip are long, elevating the blades above a short column; and the appendix is four-lobed.

Lepanthes intonsa Luer, sp. nov.

Planta parva caespitosa, foliis ovatis acuminatis racemo congesto longioribus, sepalis minute ciliatis ovatis obtusis, petalis grandibus transverse bilobatis, labelli lobis oblongis apice sparsim longiciliatis, connectivis oblongis elongatis, appendice loriformi sigmoidea.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2.5-4.5 mm long, enclosed by 5-6 close, minutely ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, ovate, acuminate, acute, 2.5-3 cm long, 1.2-1.7 cm wide, the rounded base abruptly contracted into a petiole 2 mm long. Inflorescence a congested, successively flowered raceme up to 10 mm long, borne by a filiform peduncle up to 8 mm long along the back side of the leaf; floral bract 1-1.25 mm long, pedicel 1.5-2 mm long; ovary 2.5 mm long; sepals yellow, suffused with rose, minutely ciliate, broadly ovate, obtuse, the dorsal sepal 3.5 mm long, 3.1 mm wide, connate 0.5 mm to the lateral sepals, the lateral sepals oblique, 3 mm long, 2.25 mm wide, connate 1 mm; petals yellow, suffused with orange, transversely oblong, bilobed, 1.25 mm long, 3.75 mm wide, the outer margin acutely angled at the junction between the oblong, apically rounded upper lobe and the smaller oblique, obtuse lower lobe; lip yellow, suffused with rose, the blades oblong, 1.3 mm long, both ends obtuse, the apical margin with a few, very long cilia, the connectives oblong, elongated, lifting the blades above the column, connate to the under surface of the column near the middle, the appendix straplike, terminating in a small gland, S-shaped, shortly pubescent, hinged to the sinus; column 1.5 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *intonsus*, "unshaven," referring to the long hairs on the lip.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 2450 m, 12 May 1981, *C. Luer, J. Luer, D. D'Alessandro et al. 6212* (Holotype: SEL); same area, 3 March 1982, *C. Luer et al. 7088* (SEL).

The most distinguishing feature of this species is the lip with the pair of oblong lobes long-ciliate anteriorly, held high above the column by elongated connectives.

Lepanthes intricata Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio ovato acuminato breviore, racemo congesto, sepalis acutis, petalis tranversale oblongis, labelli laminis subfalcatis, connectivis anguste cuneatis, appendice intricata glande pedunculata multilobata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 4.5-7.5 cm long, enclosed by 8-11 minutely ciliate lepanthiform sheaths, the ostia markedly dilated. Leaf erect, thinly coriaceous, ovate, lightly acuminate, acute, 4-5 cm long, 1-1.5 cm wide, the rounded base contracted into a petiole 2 mm long. Inflorescence a congested, fractiflex, successively flowered raceme up to 8 mm long, borne by a filiform peduncle up to 12 mm long behind the leaf; floral bract 1 mm long; pedicel 1 mm long; ovary 1.5 mm long; sepals greenish white, suffused with rose centrally, carinate externally along the veins, the dorsal sepal ovate, shortly acuminate, acute, 4 mm long, 2.3 mm wide, the lateral sepals ovate, oblique, acute, 4 mm long, 1.75 mm wide, connate 0.5 mm; petals yellow-orange, transversely oblong, bilobed, 1 mm long, 2.75 mm wide, the upper lobe oblong, obtuse, the lower lobe half as large, triangular, obtuse; lip rose-purple, the laminae narrowly subfalcate, 1.5 mm long, the connectives short, narrowly cuneate, connate to the under surface of the column in the lower third, the appendix proportionately large, pubescent, ligulate, with a more or less 4-lobed, pedunculated, apical gland; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *intricatus*, "intricate," referring to the appendix of the lip.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 2450 m, 12 May 1981, *C. Luer, J. Luer, D. D'Alessandro et al. 6209* (Holotype: SEL).

This species is distinguished by the narrow, subfalcate blades of the lip with short, narrow connectives, and the intricately sculptured appendix. From the apex of a pubescent, tonguelike stalk, the terminal, more or less 4-lobed gland is delicately attached by a nearly invisible thread.

Lepanthes iricolor Luer, sp. nov.

Planta perparva caespitosa, inflorescentia folio ovato reticulato breviore, racemo congesto, floribus parvis multicoloribus, sepalis ovatis breviter acuminatis denticulatis, petalis grandibus transverse oblongis, labelli laminis ovatis appendice parva triangulari ciliata.

Plant very small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 0.5-2.5 cm long, enclosed by 4-6 ciliate lepanthiform sheaths. Leaf erect, coriaceous, purple-reticulate, ovate, subacute, 7-14 mm long, 5-9 mm wide, the broadly cuneate base contracted into a twisted petiole 1 mm long. Inflorescence a congested raceme of successive flowers,up to 3 mm long, borne by a filiform peduncle up to 3 mm long, along the back of the leaf; floral bract 1 mm long; pedicel 0.75 mm long; ovary 1 mm long, narrowly winged; sepals ovate, acute, shortly acuminate, denticulate, connate basally, the dorsal sepal purple with green margins, 2.1 mm long, 1.3 mm wide, the lateral sepals oblique, yellow with the midvein red, 2 mm long, 1.1 mm wide; petals orange, transversely oblong, 0.6 mm long, 2 mm wide, obtusely angled on the outer margin at the midvein, the upper lobe oblong, truncate, the lower lobe triangular, obtuse; lip orange, the blades ovate, 1.25 mm long, the apices acute, the bases rounded, glabrous, the connectives broadly cuneate, ciliate, connate to the column above the base, the appendix small, triangular, ciliate; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *iricolor*, "with the colors of the rainbow," referring to the multiple colors of the flowers.

Type: *ECUADOR:* NAPO: epiphytic in wet forest near Rio Jatunyacu west of Tena, alt. 600 m, 21 Feb. 1982, *C. Luer & A. Hirtz 6895* (Holotype: SEL).

The multiple, brilliant colors of the flowers of this little species with purple-reticulated leaves are probably variable as they are in other species. The flowers are tiny with denticulate sepals and proportionately large petals.

Lepanthes jubata Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio acuminato breviore, racemo congesto, sepalis breviter laciniatis ovatis breviter acuminatis, petalis transverse oblongis, labelli laminis longiciliatis super columnam, appendice minute bilobata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, suberect, 2-5.5 cm long, enclosed by 5-8 minutely ciliate lepanthiform sheaths. Leaf suberect, coriaceous, ovate, acuminate, acute, 10-28 mm long, 7-9 mm wide, the margins smooth or minutely undulate, the rounded base abruptly contracted into a petiole ca. 2 mm long. Inflorescence a congested, successively flowered raceme up to 5 mm long, borne by a filiform peduncle up to 12 mm long up the back of the leaf; floral bract 1-1.25 mm long, minutely spiculate; pedicel 0.5-1 mm long; ovary 0.5-1.5 mm long, echinate; flower parts red to yellow; sepals ovate, shortly acuminate, the margins shortly laciniate, the carinae along the nerves spiculate, the dorsal sepal acute, 3-4 mm long, 1.8-2.25 mm wide, connate basally, the lateral sepals oblique, obtuse, connate to about the middle, 3-4 mm long, 3.5-4 mm wide together; petals transversely oblong, bilobed, 1 mm long, 3.25-4.25 mm long, both lobes obtuse, the upper longer; laminae of the lip oblong, oblique, the margins with long, straight hairs, the connectives broad, rectangular, erect, lifting the laminae above the column, connate to the base of the column, the sinus broadly rounded and protruding with a minute, pedunculated, bilobed appendix; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *jubatus*, "crested with hairs," referring to the long hairs on the margins of the laminae of the lip.

Type: *ECUADOR:* NAPO; epiphytic in cloud forest near Papallacta, alt. 2500 m, 29 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4447* (Holotype: SEL); southeast of El Carmelo, alt. 2050 m, 17 May 1981, *C. Luer, J. Luer, A. Hirtz et al. 6309* (SEL).

This species may be distinguished by the minutely laciniate sepals, large petals, and the long-ciliate borders of the blades of the lip which are lifted over the column by erect connectives. The margins of the leaves of *4447* are smooth, the margins of the leaves of *6309* are minutely undulate.

Lepanthes lloënsis Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio oblongo acuminato breviore, racemo congesto, sepalo dorsali triangulari acuto, synsepalo transverse ovato apicibus obtusis, labelli laminis lunatis convexis, appendice minutissima.

Plant large, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 9-22 cm long, enclosed by 8-15 minutely scabrous lepanthiform sheaths. Leaf erect, thinly coriaceous, ovate-oblong, acuminate, acute, 8-11 cm long, 2.2-3.4 cm wide, the base rounded or lightly cordate, abruptly contracted into a petiole 3-4 mm long. Inflorescence an extremely congested, successively flowered raceme up to 10 mm long, borne by a filiform peduncle up to 20 mm long, along the back of the leaf; floral bract 1.5 mm long; pedicel 1 mm long, ovary 1.5 mm long; sepals translucent light yellow, glabrous, the dorsal sepal triangular, acute, 8 mm long, 5.75 mm wide, connate 1.5 mm to the lateral sepals, the lateral sepals ovate, oblique, connate 4.5 mm into a transversely ovate lamina 8 mm long, 9.5 mm wide expanded, the obtuse apices distant; petals bright yellow with purple margins, transversely oblong, bilobed, 1.66 mm long, 3.5 mm wide, the upper lobe triangular with the apex rounded, the lower lobe falcate, acute; lip yellow, suffused with purple, the blades ovate-lunate, convex, 2 mm long, the apices acute, minutely ciliate, the connectives broadly cuneate, connate to the under surface of the column below the middle, the appendix a minute, slender filament from a minutely pubescent membrane in the sinus; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: Named for the community of Lloa, near Quito, where the species was discovered.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest remnant below Lloa, alt. 2700 m, 27 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4363* (Holotype: SEL).

This large species is recognized by the short, congested raceme of rather large flowers with a broad synsepal with distant, obtuse apices. The blades of the lip are convex and the appendix is reduced to a microscopic filament.

Lepanthes lophius Luer & Escobar, sp. nov.

Planta mediocris caespitosa pulchra, inflorescentia folio anguste ovato breviore, racemo congesto fractiflexo, sepalis anguste attenuatis, petalis transverse oblongis, labelli laminis oblongis, appendice spathulata pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-8.5 cm long, enclosed by a 10-14 ciliated lepanthiform sheaths with markedly dilated ostia. Leaf erect, coriaceous, purple beneath, narrowly ovate, acute, 3-5 cm long, 1.2-1.5 cm wide, cuneate below into a petiole 3-4 mm long. Inflorescence a congested, flexuous, successively flowered raceme up to 2 cm long, borne by a filiform peduncle up to 2.5 cm long, up the back of the leaf; floral bract 1.5 mm long; pedicel 1.25 mm long; ovary 2 mm long, papillose; sepals purple with the outer thirds cream, carinate-spiculate, the dorsal sepal triangular, slightly concave, acute, attenuate, 11 mm long, 5 mm wide, connate 1.5 mm to the lateral sepals, the margins distantly subserrulate, the lateral sepals narrowly ovate, oblique, acute, attenuate, 11 mm long, 3 mm wide, connate 1.5 mm, the margins serrulate; petals orange, suffused with red-purple, transversely oblong, 2 mm long, 5 mm wide, the upper lobe more or less quadrate, truncate, the lower lobe shorter, narrowly oblong, obtuse; lip rose, the blades oblong with rounded ends, 2.66 mm long, ciliate anteriorly, the connectives cuneate, connate to the under surface of the column above the base, the appendix spathulate, pubescent; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: Named for the genus of common anglers (Lophius) becasue of the similarity of the appendix to the pedunculated "bait" peculiar to these fish.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest between Gualaceo and Limon, alt. 2650 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8212* (Holotype; SEL).

This species is notable for the congested raceme of pretty flowers with attenuated sepals and truncate petals. The blades of the lip are oblong, and the appendix is spathulate and pubescent. The appendix undoubtedly acts as a lure for pollinators, much the same as the pedunculated "bait" of an agler acts as a lure for a meal.

Lepanthes magnifica Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio magno ovato acuminato breviore, racemo congestissimo disticho multifloro, sepalis albis apicibus breviter acuminatis lateralibus pubescentibus, petalis transverse bilobatis, labelli laminis anguste oblongis glabris, appendice oblonga ciliata cum glandibus duobus terminalibus.

Plant large, epiphytic, caespitose; roots coarse. Secondary stems stout, erect, 20-30 cm long, enclosed by 15-19 ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, ciliate along the veins beneath, ovate, acute, acuminate, 12-15 cm long, 5-6.5 cm wide, the base rounded to subcordate, abruptly contracted into a twisted petiole 3-4 mm long. Inflorescence a very congested, distichous, successively many-flowered raceme up to 3 cm long, borne by a filiform peduncle up to 4 cm long along the back of the leaf; floral bract 1.5 mm long; pedicel 2 mm long; ovary 3 mm long; sepals white, the dorsal sepal glabrous, triangular, the acute apex shortly acuminate, 12 mm long, 5.5 mm wide, connate basally to the lateral sepals for 2 mm, the lateral sepals oblong, pubescent, concave basally, 10-5 mm long, 5 mm wide, connate 3.5 mm, the obtuse apices abruptly contracted into recurved, setiform tails 1.5 mm long; petals white with a broad red margin, transversely oblong, oblique, obtuse, the lower lobe smaller; lip rose, the blades narrowly oblong, obtuse, glabrous, 2.25 mm long, the connectives short-cuneate, connate to the column above the base, the appendix oblong, ciliate, with a pair of terminal lobules; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *magnificus*, "magnificent," referring to the large plant with large white and purple flowers.

Type: *ECUADOR:* PINCHINCHA: epiphytic in cloud forest between Mindo and Puerto Quito, alt. 1600 m, 13 March 1982, *C. Luer, A. Hirtz & S. Dalström 7333* (Holotype: SEL); above Mindo, alt. 2200 m, 15 Oct. 1979, *A. Hirtz s.n.* (SEL).

This huge, spectacular species is notable for the large white flower produced successively in a congested raceme behind the leaf. The lateral sepals are pubescent with the obtuse apices contracted into short tails; the small petals are rimmed in purple; the blades of the lip are glabrous and narrow; and the appendix is oblong and ciliate with a pair of apical lobules.

Lepanthes mastodon Luer, sp. nov.

Planta mediocris caespitosa vaginis caulium secondariorum dilatatis ciliolatisque, folio ovato acuto coriaceo purpureo inflorescentia longiore, flore super folium, sepalis ciliatis carinatis caudatis, caudis sepalorum lateralium longis attenuatis incurvis, petalis transverse oblongis, labelli lobis oblongis appendice vestigiali.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems suberect, slender, 3-10 cm long, enclosed by 8-12 lepanthiform sheaths markedly dilated at the ostia, ciliate along the margins and ribs. Leaf dark green, purple beneath, suberect to horizontal, coriaceous, more or less sulcate dorsally between convex halves, ovate, 2.5-4 cm long, 1.5-2.2 cm wide expanded, the apex acuminate, acute, the base broadly cuneate or rounded, sessile. Inflorescence a congested, successively flowerred raceme up to 15 mm long lying in the sulcus of the dorsum of the leaf, the filiform peduncle from a node at the apex of the secondary stem; floral bract 1 mm long; pedicel 1.5 mm long; ovary 2.5 mm long; sepals purple-black or red-brown, with yellow or green margins, carinate-spiculate along the veins, the margins ciliate, the dorsal sepal concave, ovate, 6 mm long, 3.5 mm wide expanded, the apex acuminate, acute, the lateral sepals ovate, oblique, connate 2 mm, 4 mm wide together, the acute apices attenuated into incurved tails, the entire length of the lateral sepal 10 mm; petals green, yellow or purple, minutely pubescent, transversely oblong-bilobed, 1.25 mm long, 4.25 mm wide, the upper lobe oblong, obtuse, the lower lobe narrowly triangular, oblique, obtuse; lip with the blades flat, oblong, 2 mm long, minutely ciliate, the connectives narrow, cuneate, the appendix reduced to an obtuse angle in the sinus; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: Named for the elephantlike Mastodon, referring to the tusklike tails of the lateral sepals.

Type: *ECUADOR:* CARCHI: epiphytic in cloud forest above Maldonado, alt. ca. 2000 m, 25 Aug. 1978, *C. Luer, J. Luer & A. Hirtz 3381* (Holotype: SEL). Additional material examined: same area, 20 May 1973, *L. Holm-Nielsen, S. Jeppesen, B. Løjtnant & B. Ollgaard 6145* (AAU, SEL); IMBABURA: epiphytic in cloud forest, Selva Alegre, west of Otavalo, alt. 1900 m, 2 May 1981, *C. Luer, J. Luer A. Hirtz et al. 6085* (SEL); *COLOMBIA:* NARINO: epiphytic in cloud forest east of Ricuarte, alt. 1800 m, 1 Nov. 1979, *C. Luer, J. Luer & A. Hirtz 4521* (SEL).

The flower of this unusual species lies in the midline groove on the dorsum of the leaf. The color varies remarkably among the three collections, but morphologically the flowers are identical. Most remarkable are the long, upcurved tails of the lateral sepals which resemble a pair of tiny tusks.

Lepanthes megalostele Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio elliptico breviore, racemo congesto disticho, sepalis glabris subacutis quam petalis transverse oblongis brevioribus, labello laminis ellipticis ciliatis columna minoribus, appendice grossa pubescenti apice incurvato.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 5-8 cm long, enclosed by 7-8 blackish, close, microscopically ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, acute, 3-4 cm long, 1.5-1.8 cm wide, the base cuneate into a petiole 3 mm long. Inflorescence a congested, distichous, successively flowered raceme up to 7 mm long, borne by a filiform pedicel 10-22 mm behind the leaf; floral bract 1 mm long, spiculate; pedicel 1.75 mm long; ovary 2 mm long; sepals light yellow, glabrous, carinate, subacute, the dorsal sepal ovate-triangular, 2.66 mm long, 1.9 mm wide, connate 0.66 mm basally to the lateral sepals, the lateral sepals ovate, connate 1.5 mm, 2.66 mm long, 2.5 mm wide together; petals orange, suffused with red, transversely oblong, 0.8 mm long, 3.33 mm wide, microscopically pubescent, the upper lobe elliptical, obtuse, the lower lobe smaller, oblong, obtuse; lip red, the blades elliptical, 1 mm long, the apices acute, ciliate, the bases rounded, the connectives and body narrow, connate to the base of the column, the appendix thick, broadly triangular, pubescent, with an acute, incurved apex; column proportionately large, 1.5 mm long, the anther and stigma apical.

Etymology: From the Greek *megalo-*, "large," and *stele*, "column," in reference to the large column of the species.

Type: *ECUADOR:* NAPO: epiphytic in wet forest north of Tena, "Cotundo," alt. 1100 m, June 1983, *A. Hirtz 917B* (Holotype: SEL), C. Luer illustr. 9090.

This species is notable for the congested, distichous inflorescence shorter than the elliptical leaf; the small flowers with petals longer than the sepals; the column larger than the blades of the lip; and the thick, pubescent appendix with an incurved apex.

Lepanthes micropogon Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio elliptico breviore, racemo congesto disticho, sepalis glabris ovatis acutis, petalis transverse oblongis sepalis longioribus, labelli laminis ellipticis apicibus ciliatis connectivis anguste cuneatis cum sinu rotundato pubescenti et appendice minuta pedunculata ciliata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2-3 cm long, enclosed by 5-7 close, microscopically ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, subacute, 20-22 mm long, 9-11 mm wide, the base cuneate into a twisted petiole ca. 2 mm long. Inflorescence a congested, distichous, successively flowered raceme up to 4 mm long, borne by a filiform peduncle up to 10 mm long behind the leaf; floral bract 1 mm long, ciliate; pedicel 2 mm long; ovary 1.5 mm long; sepals glabrous, light yellow, ovate, acute, the dorsal sepal 2.5 mm long, 1.5 mm wide, connate basally to the lateral sepals, the lateral sepals connate 1.5 mm, 2.5 mm long, 2.25 mm wide together; petals bright yellow, transversely oblong, bilobed, 1 mm long, 3.5 mm wide, the lobes oblong, obtuse, the lower lobe smaller; lip rose, the blades elliptical with rounded ends, 1.2 mm long, the apices ciliate, the connectives narrowly cuneate, connate to the column above the base, the sinus protruding forward, rounded, pubescent, with a small, rounded, ciliate, pedunculated appendix; column 1.3 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *micros*, "small," and *pogon*, "a beard," referring to the protruding sinus of the lip with the little, ciliate appendix.

Type: *ECUADOR:* NAPO: epiphytic in wet forest north of Tena along the new road to Coca, alt. 1100 m, 22 Feb. 1982, *C. Luer & A. Hirtz 6952* (Holotype: SEL).

This small species with a congested, distichous inflorescence shorter than the elliptical leaf is notable for the proportionately large petals, and the pubescent sinus of the lip that bulges forward with a small, pedunculated, ciliate appendix.

Lepanthes miraculum Luer & Vásquez, sp. nov.

Planta mediocris, racemo laxe plurifloro foliis ellipticis multilongiore, floribus grandibus, sepalis erosis breviter acuminatis, petalis bilobatis ciliatis, lobo superiore minimo acuto reflexo, lobo inferiore grandi falcato acuto, labelli laminis breviter ciliatis oblongis, sinu obtuso cum appendice lata membranacea retusa.

Plant medium in size, epiphytic, caespitose; roots relatively coarse. Secondary stems slender, erect to suberect, 3-9.5 cm long, enclosed by 6-9 ciliate lepanthiform sheaths with markedly dilated ostia. Leaf erect, coriaceous, suffused with purple beneath, elliptical, acute, 2-3 cm long, 0.9-1.1 cm wide, the base cuneate into a petiole 2-4 mm long. Inflorescence a loose, subflexuous, distantly successively flowered raceme up to 10 cm long including the slender peduncle 2.5-4 cm long; floral bract 1.5 mm long, ciliate; pedicel 2.5 mm long; ovary 1.5 mm long, papillose-winged; sepals dark red, the margins erose, the carinae serrate, the dorsal sepal triangular, acute, acuminate, 10.5 mm long, 6.5 mm wide, connate to the lateral sepals for 3 mm; the lateral sepals connate 5 mm into a bifid lamina 11.5 mm long, 8.5 mm wide, shortly pubescent, concave basally, the apices ovate, acute, shortly acuminate; petals red, ciliate, bilobed, the upper lobe 1 mm long, acute, reflexed, the lower lobe falcate, acute, 3 mm long, 1 mm wide, long-ciliate; lip bright purple, the blades oblong, 1.75 mm long, glabrous except for short cilia at the narrowly obtuse apices, the bases rounded and continuous with the cuneate connectives connate to the column near the middle below the stigma, the sinus obtuse with a broad, membranous, retuse, ciliate appendix in contact with a clavate appendage from the stigma; column 2 mm long, the apical half dilated with the dorsal anther and ventral stigma, the shaft extremely slender.

Etymology: From the Latin *miraculum*, "a marvel," referring to the grotesque features of the flowers.

Type; *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2500 m, 22 Jan. 1980, *C. Luer, J. Luer & R. Vásquez 4906* (Holotype: SEL); same area, alt. 2600 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3490* (SEL); same area, collected by B. Wuerstle, alt. 2700 m, 13 Jan. 1981, *C. Luer 5662* (SEL); Pampa Tambo, alt. 2800 m, 24 Dec. 1979, *R. Vásquez 234* (SEL).

This remarkable species produces large, dark red flowers in loose racemes. The sepals are erose, shortly pubescent and shortly acuminate. The lower lobes of the ciliate petals flank the column, while the minute upper lobes twist behind. The lobes of the lip are narrowly oblong and cover the column, the shaft of which is very slender like that of *L. vespa*. The weblike appendix is in contact with a clavate process from the stigma like that seen in the Ecuadorian *L. contingens*.

Lepanthes monitor Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio oblongo acuminato breviore, racemo congesto, sepalis glabris acutis, petalis transverse bilobatis, labelli laminis ovatis convexis glabris, appendice parvula pubescenti.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems slender, erect, 8-25 cm long, enclosed by 9-14 close, minutely ciliate lepanthform sheaths. Leaf erect, thinly coriaceous, oblong-ovate, acute, acuminate, 6.5-12 cm long, 1.9-3 cm wide, the rounded base contracted into a petiole 3 mm long. Inflorescence a congested, successively flowered raceme up to 30 mm long, borne by a filiform peduncle up to 25 mm long behind the leaf; floral bract 1.5 mm long; pedicel 1 mm long; ovary 2 mm long; sepals yellow-white, glabrous, the dorsal sepal triangular, acute, 5 mm long, 2.6 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals 5 mm long, connate 2.5 mm into an ovate, bifid lamina 4 mm wide, the acute apices shortly acuminate; petals white with purple margins, transversely bilobed, 1.25 mm long, 3.5 mm wide, the upper lobe broadly oblong-falcate, obtuse, the lower lobe smaller, narrowed to an oblong, rounded apex; lip white with purple margins, the blades ovate, convex, 1.5 mm long, glabrous, the apices narrowly rounded, the bases rounded, the connectives short, cuneate, connate to the base of the column, the sinus rounded with a small, rounded, pubescent appendix; column 1.5 mm long, protruding from between the blades of the lip, the anther dorsal, the stigma ventral.

Etymology: From the Latin *monitor,* "a reminder," referring to the morphological features reminiscent of *L. elata* Rchb. f. and its relatives.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 1400 m, 3 March 1982, *C. Luer, D. D'Alessandro & S. Dalström 7096* (Holotype: SEL); NAPO: south of Baeza, alt. 1900 m, 20 Feb. 1982, *C. Luer & A. Hirtz 6863* (SEL); ZAMORA-CHINCHIPE: near Km 41 between Loja and Zamora, alt. 1500 m, 3 Nov. 1982, *C. Luer, R. Escobar & D. D'Alessandro 8275* (SEL).

This large species seems to be the austral counterpart of *L. elata* Rchb. f. from Central America and northern Colombia. The leaves of large specimens of *L. monitor* are oblong-ovate, not broadly cordate as they are in large specimens of *L. elata.* Small specimens of both species have similar leaves. The flowers of the two species are also similar in size, shape and colors, but the appendix is pedunculate and narrowly hinged in the sinus of the lip in *L. elata,* while the appendix in *L. monitor* is a broad, triangular membrane across the sinus.

Lepanthes muscula Luer & Escobar, sp. nov.

Planta grandis caespitosa, caulibus secondariis folio elliptico acuminato multilongioribus, racemis paucis laxe multifloris subflexuousis folio multilongioribus, sepalis ovatis acutis, petalis transverse bilobatis, labelli laminis oblongis minute ciliatis, appendice triglandulosa.

Plant medium in size to large, epiphytic, caespitose; roots coarse. Secondary stems erect, slender to stout, 7-22 cm long, enclosed by 10-14 close, minutely ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, elliptical, acute, acuminate, 5-7 cm long, 1.5-1.5-2 cm wide, the base cuneate into the petiole 2-3 mm long. Inflorescence a progressively lengthening, loose, lightly flexuous raceme to 20 cm long, 2-3 flowers open simultaneously; floral bract 1.5 mm long; pedicel 0.75 mm long; ovary 2 mm long; sepals purple-brown, glabrous, narrowly ovate, acute, acuminate, the dorsal sepal 7.5 mm long, 3 mm wide, connate basally 1 mm to the lateral sepals, the lateral sepals 7 mm long, 2.25 mm wide, connate 2 mm; petals dark red, microscopically cellular, transversely oblong, bilobulate, 1.25 mm long, 3.75 mm wide, the upper lobe oblong, the apex obliquely narrowed, obtuse, the lower lobe similar but smaller; lip dark red, the blades oblong with rounded ends, 1.75 mm long, minutely ciliate, the connectives cuneate, connate to the under surface of the column, the appendix minute, pubescent, orbicular with a pair of rounded, terminal glands; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *musculus,* "a little mouse," in reference to the appearance of the trilobed appendix.

Type: *ECUADOR:* CARCHI: epiphytic in cloud forest above San Gabriel, alt. 3400 m, 8 Nov. 1982, *C. Luer & R. Escobar 8300* (Holotype: SEL).

This species may be recognized by the long stems and long, flexible, subflexuous racemes with several flowers open simultaneously. The appendix is a small, spherical, pubescent organ with a pair of rounded, terminal glands.

Lepanthes mystax Luer & Escobar, sp. nov.

Planta mediocris, foliis suborbiculatis breviter acuminatis patentibus racemo congestissimo longioribus, sepalis ovatis, petalis grandibus ciliatis transverse bilobis, labelli laminis ellipticis divergentibus marginibus interioribus longissime ciliatis, appendice ligulata, stigmate bi-auriculata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 4-12 cm long, enclosed by 5-10 close lepanthiform sheaths, minutely ciliate on the narrow ostia. Leaf more or less spreading, thinly coriaceous, broadly ovate to suborbicular, 2.5-4.5 cm long, 1.5-2.7 cm wide, the apex abruptly acuminate, acute, the rounded base abruptly contracted into a twisted petiole 2-3 mm long. Inflorescence an extremely congested, distichous, successively flowered raceme up to 10 mm long, borne below the leaf by a filiform peduncle 10-12 mm long; floral bract 1.5 mm long; pedicel 2.5 mm long; ovary 2 mm long; sepals yellow, glabrous, the dorsal sepal ovate, subacute, 5 mm long, 3 mm wide, connate 0.5 mm to the lateral sepals, the lateral sepals ovate, oblique, connate 1 mm, the subacute apices in apposition, together forming a synsepal 3 mm long, 3.75 mm wide; petals orange, ciliate, minutely pubescent, transversely oblong, bilobed, 1.75 mm long, 5 mm wide, the upper lobe suborbicular, the lower lobes obliquely triangular, obtuse; lip red, the blades elliptical, 1.25 mm long, with rounded ends, the apices diverging, the inner margins with long, straight, lavender hairs over the column, the connectives broadly cuneate, connate to the column above the base, the appendix pubescent, ligulate; column 1.25 mm long, the anther dorsal, the stigma transversely bilobed, the lobes auriculate, lateral.

Etymology: From the Greek *mystax*, "a moustache," in reference to the long-ciliated lobes of the lip.

Type: *COSTA RICA:* SAN JOSE: epiphytic in cloud forest below La Georgina, alt. 2850 m, 20 Sept. 1979, *C. Luer, J. Luer & K. Walter 4237* (Holotype: SEL); CARTAGO: forest along road to Cerro de la Muerte, alt. 2530 m, 10 July 1983, *R. Escobar & K. Anderson 2759* (SEL).

This species with round, shortly acuminate leaves is remarkable for the small flowers with seemingly over-sized petals, and a lip with diverging, long-ciliate blades. The straight, purple hairs point diagonally inward, the longest toward the apex, together forming a screenlike cover for the column. The stigma is transversely bilobed with the lobes projecting laterally, reminiscent of the genus *Stelis* Sw.

Lepanthes nebulina Luer & Vásquez, sp. nov.

Planta mediocris, racemo laxe multifloro foliis ellipticis acutis multilongiore, sepalis acuminatis, petalis transverse bilobis lobo superiore oblongo majore, labelli laminis oblongis, appendice parva gracili incurvata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3.5-9 cm long, enclosed by 7-9 ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, acute, 2.5-4 cm long including the petiole 2-3 mm long, 10-17 mm wide, the base cuneate into the petiole. Inflorescence a loose, subflexuous, successively several- to many-flowered raceme up to 15 cm long including the filiform peduncle, 2-3 flowers open simultaneously; floral bract 1.5 mm long, spiculate; pedicel 1 mm long; ovary 1 mm long; sepals purple to yellow suffused with purple, minutely ciliate, otherwise glabrous, ovate, acute, acuminate, the dorsal sepal concave, 7 mm long, 3.25 mm wide unexpanded, connate to the lateral sepals for 1 mm, the lateral sepals connate 2 mm, 7 mm long, 3.75 mm wide together; petals orange, suffused with purple or brown, transversely oblong, microscopically pubescent, 1 mm long, 2.75 mm wide, the upper lobe oblong, rounded, the lower lobe much smaller, triangular, curved, narrowly obtuse; lip red, minutely pubescent, the blades oblong with rounded ends, 1.6 mm long, the connectives broadly cuneate above the middle of the blades, connate to the column above the base, the sinus obtuse with a small, thin, slender, incurved appendix; column 1.5 mm long, the anther and stigma apical.

Etymology: From the Latin *nebulinis*, "belonging to fog," referring to the cool, wet, foggy habitat.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2650 m, 9 Feb. 1980, *C. Luer, J. Luer & R. Vásquez 5185* (Holotype: SEL); same area, alt. 2600 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3494* (SEL); same area, alt. 2500 m, 4 Feb. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8679* (SEL).

This species may be identified by the long raceme of flowers with acuminate, minutely ciliate sepals, obtuse petals, and oblong blades of the lip with a tiny, slender, incurved appendix.

Lepanthes nivea Luer, sp. nov.

Planta grandis caulibus gracilibus, inflorescentia folio tenui acuminato purpurascenti breviore, racemo congestissimo, sepalis niveis breviter pubescentibus caudatis, petalis parvis transverse oblongis; labelli lobis lateralibus oblongis et appendice minuta pubescenti.

Plant large, epiphytic, densely caespitose; roots numerous, coarse. Secondary stems erect, slender, 20-30 cm long, enclosed by 15-17 close lepanthiform sheaths, microscopically ciliate along the ribs and ostia. Leaf erect, thinly coriaceous, purple beneath, oblong, 7-11 cm long, 2.5-3.5 cm wide, the apex acuminate, acute, the base rounded, abruptly contracted into a petiole 3-4 mm long. Inflorescence a successively flowered, congested raceme up to 3.5 cm long, borne by a filiform peduncle up to 2.5 cm long behind the leaf; floral bract 1.5 mm long; pedicel 2 mm long; ovary 5 mm long; sepals snow white, microscopically pubescent within, the dorsal sepal triangular, 13 mm long including the attenuate apex ca. 5 mm long, 7.25 mm wide, connate to the lateral sepals for 3 mm, the lateral sepals ovate, oblique, 14 mm long, 9.5 mm wide together, connate 5 mm, with a pair of rounded convexities at the base below the central apparatus; petals white, edged in purple, transversely oblong-bilobed, 1.75 mm long, 2.75 mm wide, the upper lobe oblong, the lower shorter, subfalcate; lip cream, the blades oblong, glabrous, 2 mm long, the apices narrowly obtuse, the bases rounded, the connectives broad, connate to the ventral surface of the column, the appendix triangular, pubescent, with a minute, terminal, pubescent gland; column flat, 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *niveus*, "snow-white," in allusion to the sepals.

Type: *ECUADOR:* ZAMORA-CHINCHIPE: epiphytic in cloud forest near the pass south of Yangana, alt. 2730 m, 12 May 1981, *C. Luer, J. Luer, D. D'Alessandro et al. 6205* (Holotype: SEL).

The secondary stems of this species are proportionately slender for their length. The comparatively large, snow-white flowers with an edge of purple on the tiny petals contrasts with the thin, purple leaves. *Lepanthes nivea* is locally abundant at high altitudes in cold cloud forests in southern Ecuador.

Lepanthes nontecta Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio ovato subacuto breviore, racemo congesto, sepalis glabris diaphanis ovatis subacutis, petalis transverse oblongis, labelli laminis ovatis apicibus acutis nontectis, appendice membranacea rotundata ciliata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 20-35 mm tall, enclosed by 5-6 close, microscopically ciliate lepanthiform sheaths. Leaf erect, coriaceous, purple beneath, ovate, subacute to obtuse, 12-18 mm long, 10-15 mm wide, the rounded base contracted into a twisted petiole ca. 1 mm long. Inflorescence a congested, successively flowered raceme up to 5 mm long, borne by a filiform peduncle 3-6 mm long behind the leaf; floral bract and pedicel each 1 mm long; ovary 1.5 mm long; sepals glabrous, translucent light rose, ovate, subacute, connate basally, the dorsal sepal 3.5 mm long, 2 mm wide, the lateral sepals 3 mm long, 1.9 mm wide; petals red-orange, transversely oblong, 1 mm long, 3 mm wide, the upper lobe oblong, truncate, the lower lobe triangular, acute; lip red, the blades ovate, 1.6 mm long, the apical third minutely ciliate on the inner margin, not covered by the more or less involute surface of the blade, the bases rounded, the connectives cuneate to a narrow body, connate to the column above the base, the appendix membranous, round, ciliate; column 1.25 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *nontectus*, "uncovered," referring to the apices of the blades of the lip.

Type: *ECUADOR:* NAPO: epiphytic in wet forest near Rio Jatunyacu west of Tena, alt. 600 m, 21 Feb. 1982, *C. Luer & A. Hirtz 6887* (Holotype: SEL).

This small species with translucent flowers (not really unusual in the genus) is most notable for the apices of the blades of the lip which are uncovered extensions of the connectives. The more or less flattened top surface of the blade is lacking in the apical third. The appendix is a rounded, ciliate, shallowly concave membrane across the sinus.

Lepanthes nycteris Luer and Vásquez, sp. nov.

Planta parva, caulibus secondariis folio subrotundato multilongioribus, racemo flaccido laxifloro longissimo, sepalis laceratis, sepalo dorsali orbiculato, synsepalo angustiore infra medium concavo ad medium convexo pubescenti apice bifido acuminato, petalis transverse bilobatis lunatis, labello bilobato lobis bilobatis erectis falcatis pubescentibus.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, 4-7 cm long, enclosed by 7-9 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, broadly elliptical to suborbicular, 10-23 mm long including a 2-4 mm long petiole, 8-14 mm wide, the rounded apex minutely notched, the rounded base abruptly contracted into the slender petiole. Inflorescence a loose, flexible, successively flowered raceme 4-10 cm long including the filiform peduncle; floral bract and pedicel each 1.5 mm long; ovary 1-1.5 mm long, the ribs long-papillose; sepals light rose suffused with purple, the margins and carinate veins conspicuously lacerate externally, the dorsal sepal suborbicular, shallowly concave, 13 mm long, 9 mm wide, 7-veined, the rounded apex abruptly contracted into a fine apiculum 2-3 mm long, the lateral sepals connate ca. 10 mm into a multiangular, more or less ovate, bifid lamina 15 mm long, 7 mm wide, abruptly and deeply concave in the basal third, forming a pair of convexities below the middle, narrowed and pubescent in the middle third with revolute margins, the pair of apices attenuate, acute, approximate, 5 mm long; petals purple, microscopically pubescent, transversely bilobed, lunate, 0.8 mm long, 4 mm wide, the upper lobe oblong-sigmoid, obtuse, the lower lobe falcate, acute; lip purple, pubescent, transversely bilobed, 1.5 mm long, 5.5 mm wide expanded, the lobes falcate, acute, bilobed, erect to either side of the column, with the acute angle or lobe on the anterior margin meeting with the angle from the other petal above the column, the base connate near the base of the column, the sinus with a short, obtuse, pubescent appendix; column slender, 2.5 mm long, the anther dorsal, the stigma subapical.

Etymology: From the Greek *nykteris*, "a bat," referring to the resemblance of the central apparatus to a star-nosed bat.

Type: *BOLIVIA*: COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1750 m, Nov. 1982, *R. Vásquez & N. Williams s.n.* (Holotype: SEL), C. Luer illustr. 8525.

Similarly shaped, peculiar sepals are seen in a few other species, but the erect, biangled, pubescent, lateral lobes of the lip are apparently unique. They are flanked by the narrowly lunate petals, and they surround the protruding column, altogether suggesting the face of some bats.

Lepanthes nymphalis Luer, sp. nov.

Species haec *L. chameleone* Ames similis, sed sepalo dorsali erecto leviter concavo, sepalis lateralibus glabris et labelli laminis longiciliatis differt.

Plant medium in size, epiphytic, densely caespitose; roots slender. Secondary stems ascending to erect, comparatively stout, 3-13.5 cm long, enclosed by 8-16 long-ciliate lepanthiform sheaths, occasionally producing a plantlet at the apex. Leaf erect, coriaceous, elliptical, acute, 2.5-4.5 cm long, 1.2-2.4 cm wide, the base cuneate into a petiole 2-4 mm long. Inflorescence a dense, distichous, successively flowered raceme up to 5 cm long, borne by a filiform peduncle 2.5-4 cm long; floral bract 2 mm long; pedicel 2.5 mm long; ovary 2 mm long, sparsely spiculate; dorsal sepal widespread, yellow, suffused with purple along the midvein, glabrous, denticulate, ovate, shallowly concave, acute, long-acuminate, 22 mm long, 4 mm wide, connate to the lateral sepals for 1 mm; lateral sepals red-brown, edged in yellow, glabrous, denticulate, narrowly ovate-triangular, attenuate, connate 4 mm, 23 mm long, 6.25 mm wide together; petals yellow, minutely pubescent, transversely oblong with rounded ends, 0.75 mm long, 3.5 mm wide, with a minute apiculum on the outer margin between the lobes, the upper lobe shorter and broader than the lower lobe; lip red-brown, the blades elliptical with narrowly rounded ends, 1.6 mm long, long-ciliate, the connectives cuneate, connate to the column near the middle, the appendix pubescent, slender, ligulate, with an apical gland; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *nymphalis*, "of a nymph, a mythological woodland deity," referring to the dark, mossy, wooded habitat.

Type: *COSTA RICA*: HEREDIA: epiphytic in cloud forest, Alto Gallito, alt. 2000 m, 21 June 1981, *C. Luer & A. Luer 6356* (Holotype: SEL).

This species is closely allied to *L. chameleon*, but the flowers of *L. nymphalis* are widely spread with a shallowly concave dorsal sepal. The flowers of *L. chameleon* are not widely spread, the deeply concave dorsal sepal curving over the pubescent lateral sepals. The lateral sepals of *L. nymphalis* are glabrous, but the sepals of both species are minutely denticulate. The blades of the lip are long-ciliate in *L. nymphalis*. Other minor differences exist in the sepaline tails and petals.

Lepanthes ophioglossa Luer, sp. nov.

Planta parva caespitosa, racemo laxo fractiflexo folio elliptico multilongiore, sepalo dorsali concavo caudato, synsepalo oblongo longiore bicaudato, petalis transverse bilobatis, labelli laminis anguste ovatis connectivis brevibus ex basibus, appendice sigmoidea apice pubescenti.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2.5-4.5 cm long, enclosed by 4-6 close, microscopically scabrous lepanthiform sheaths. Leaf erect, coriaceous, elliptical, obtuse, 2-2.5 cm long, 1 cm wide, the base cuneate into a 2-4 mm long petiole. Inflorescence a loose, successively flowered, flexuous raceme up to 7 cm long including the filiform peduncle; floral bract 1.5-2 mm long; pedicel 2-2.5 mm long; ovary 1.25 mm long; sepals light brown with darker brown veins, the dorsal sepal essentially free from the lateral sepals, ovate, concave, 5.5 mm long, 3.5 mm wide unexpanded, the acute apex contracted into a filiform tail 4 mm long, the lateral sepals connate into a more or less flat lamina 7 mm long, 3.25 mm wide, minutely ciliate, the approximate apices acute, contracted into tails 2 mm long; petals red-brown, transversely bilobed, 1 mm long, 3.5 mm wide, the upper lobe oblong, obtuse, the lower lobe smaller, narrowly oblong, incurved; lip red-brown, the laminae narrowly ovate, 2.25 mm long, glabrous, longitudinally channeled, the apices narrowly obtuse, the bases continuous with the short connectives, connate to the under surface of the column above the bsse, the appendix straplike, folded upon itself, with a pubescent apical gland; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *ophis*, "snake," and *glossa*, "tongue," in reference to the bilabiate flower with the forked apex of the synsepal resembling the tongue of a serpent.

Type: *ECUADOR:* CARCHI: epiphytic in cloud forest above Maldonado, alt. ca. 2000 m, 25 Aug. 1978, *C. Luer, J. Luer & A. Hirtz 3400* (Holotype: SEL).

This species with a loose raceme much longer than the leaf is characterized by the bilabiate flowers with an oblong "lower lip" ending in a pair of adjacent tails. The lobes of the lip are continuous at the base with the short connectives.

Lepanthes orchestris Luer & Vásquez, sp. nov.

Planta mediocris plus minusve horizontalis, foliis ellipticis acuminatis pendentibus racemo secundo densifloro duplolongioribus, sepalis ovatis caudatis, petalis transverse oblongis, labelli laminis oblongis, appendice apiculata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, more or less horizontal, 4-7 cm long, enclosed by 8-10 ciliate lepanthiform sheaths with thin, markedly dilated ostia. Leaf more or less pendent, coriaceous, suffused with purple beneath, elliptical, acute, acuminate, 4-5.5 cm long, 1.2-1.8 cm wide, the base cuneate into a petiole 2 mm long. Inflorescence a dense, secund, successively flowered raceme up to 15 mm long, borne behind the leaf by a filiform peduncle 5-15 mm long; floral bract 1 mm long; pedicel 2.5 mm long; ovary 2 mm long; sepals red-brown with yellow margins, the margins minutely and distantly denticulate, the blades ovate, carinate, acute, acuminate into short, slender tails, the dorsal sepal 6.25 mm long, 3.75 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals 7.5 mm long, 2.3 mm wide, connate 1.5 mm; petals yellow, suffused with red, transversely oblong with rounded ends, 1 mm long, 4.5 mm wide, broadly angled near the middle on the outer margin, the upper lobe narrowly oblong, 3 mm long, the ends rounded, microscopically ciliate at the apices, the connectives short, cuneate, connate to the column above the middle, the appendix small, subquadrate with an equally long apiculum in contact with a stigmatic process; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *orchestris*, "a dancer," referring to the dainty, tailed flowers.

Type: *BOLIVIA:* LA PAZ: Prov. of Nor Yungas: epiphytic in cloud forest west of Coroico, alt. 2550 m, 27 Jan. 1983, *C. Luer, J. Luer R. Vásquez & E. Besse 8610* (Holotype: SEL).

This pretty species may be recognized by the pendent, purple leaves with short racemes of graceful, caudate flowers; the narrowly transversely oblong petals; and the narrowly oblong blades of the lip with the apiculum of the small appendix in contact with a process from the stigma.

Lepanthes otara Luer, sp. nov.

Planta parva caespitosa, folio elliptico racemo laxe paucifloro longiore, sepalis brevicaudatis lateralibus serrulatis, petalis transverse bilobatis, labelli laminis late ellipticis columnam amplectentibus, appendice pubescenti conica.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 15-35 mm long, enclosed by 4-5 close, minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, oblong-elliptical, subacute, 17-34 mm long, 6-8 mm wide, the base cuneate into a petiole 2-3 mm long. Inflorescence a loose, successively few-flowered, flexuous raceme up to 2 cm long including the filiform peduncle; floral bract 2 mm long, pubescent; pedicel 1 mm long; ovary 1.5 mm long, irregularly carinate; sepals dull red-brown, carinate, the dorsal sepal ovate, concave, 7 mm long, 4.25 mm wide unexpanded, the acute apex attenuated into a 1.5 mm long tail, connate basally, the lateral sepals ovate, connate 4 mm into a bifid lamina 8 mm long, 5 mm wide, the margins serrulate, the apices attenuated into 1.5 mm long tails; petals bright rose, cellular pubescent, transversely oblong, 1.66 mm long, 2.33 mm wide, with a short, acute angle on the outer margin below the middle, the upper lobe slightly larger than the lower lobe, the ends rounded; lip bright rose, the blades broadly elliptical, rounded at the apex and base, 1.3 mm long, 1 mm broad, clasping the column, cellular pubescent, the connectives very short, connate to the under surface of the middle of the column, the appendix short, conical, pubescent; column 1.5 mm long, the anther apical, the stigma ventral.

Etymology: From the Greek *otaros*, "with large ears," in reference to the appearance of the lobes of the lip.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest east of Yangana, alt. 2850 m, 4 Mar. 1982, *C. Luer, D. D'Alessandro & S. Dalström 7163* (Holotype: SEL).

This little species is notable for the short setaceous tails of the sepals, the serrulate lateral sepals, and the braodly elliptical lobes of the lip that resemble a pair of large ears as they embrace the column.

Lepanthes oxyphylla Luer & Vásquez, sp. nov.

Planta mediocris, foliis angustissime ovatis racemo subdenso flexuoso longioribus, sepalis ovatis breviter acuminatis sparsim et minute denticulatis, petalis transverse oblongis plus minusve obliquis, labelli laminis anguste oblongis, appendice pubescenti biloba.

Plant medium in size, caespitose, epiphytic; roots slender. Secondary stems slender, erect, 3-7.5 cm long, enclosed by 6-10 minutely ciliate lepanthiform sheaths with dilated stomata. Leaf erect, coriaceous, suffused with purple beneath, very narrowly ovate, acute, 3-5.5 cm long including the petiole 2-3 mm long, 6-9 mm wide, the base cuneate into the petiole. Inflorescence a subdense, flexuous, successively several-flowered raceme up to 25 mm long, borne behind the leaf by a filiform peduncle 6-12 mm long; floral bract 1 mm long; pedicel 1.5 mm long; ovary 2.5 mm long; sepals bright purple, edged in white, sparsely and minutely denticulate, ovate, acute, acuminate, the dorsal sepal 4.5 mm long, 3.25 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals oblique, 4.5 mm long, 2 mm wide, connate 1 mm; petals yellow, suffused with purple, glabrous, at most microscopically cellular-pubescent, transversely oblong, 1 mm long, 2.8 mm wide, with a small obtuse angle on the outer margin near the middle, the lobes more or less oblique, obtuse; lip yellow, suffused with purple, glabrous, microscopically ciliate, the blades narrowly oblong, 1.75 mm long, the ends obtuse, the connectives narrowly cuneate, the body narrow, connate to the column above the base, the sinus deeply cleft, the appendix pubescent, ovoid basally, narrowed centrally, with a bilobed apical segment; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *oxys*, "pointed," and *phyllon*, "leaf," referring to the narrowly ovate leaf.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1900 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3533* (Holotype: SEL); LA PAZ: Prov. of Sud Yungas: cloud forest along the Rio Unduavi, alt. 2450 m, 6 Feb. 1980, *C. Luer, J. Luer, R. Vásquez & M. Manon 5150* (SEL).

This species is notable for the narrowly ovate blades of the leaves with shorter, flexuous, subdensely flowered racemes, sparsely and minutely denticulate sepals, narrowly oblong blades of the lip, and an appendix with a bilobed apical segment.

Lepanthes panicellus Luer & Vásquez, sp. nov.

Planta mediocris, inflorescentia foliis ovatis acuminatis breviore, racemo congesto disticho, sepalis niveis breviter acuminatis, petalis transverse bilobis lobo inferiore breviter falcato, labelli laminis lunatis obtusis convexis sulcatis, appendice ligulata pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems stout, erect, 6-10 cm long, enclosed by 7-9 ciliate lepanthiform sheaths. Leaf erect, coriaceous, ovate, acute, acuminate, apiculate, 4-6 cm long including a petiole 3-4 mm long, 2-2.8 cm wide, the base rounded to broadly cuneate into the petiole. Inflorescence a congested, distichous, successively flowered raceme up to 8 mm long, borne behind the leaf by a filiform peduncle up to 15 mm long; floral bract 1.5 mm long; pedicel 1 mm long; ovary 2 mm long; sepals white, glabrous, the dorsal sepal triangular, acute, shortly acuminate, 6 mm long, 3.5 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals ovate, acute, shortly acuminate, connate 3 mm, 6 mm long, 5 mm wide together; petals white with purple margins, microscopically pubescent, transversely oblong, 1 mm long, 2.2 mm wide, the upper lobe oblong, obtuse, the lower lobe smaller, broadly falcate, obtuse; lip white, microscopically pubescent, the blades lunate, convex, with rounded ends, 1 mm long, longitudinally sulcate, the connectives broad, connate to the column below the middle by a short claw, the obtuse sinus with a short, ligulate, pubescent appendix; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *panicellus*, "a roll, a small loaf of bread," referring to the appearance of the lobes of the lip.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2500 m, 4 Feb. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8673* (Holotype: SEL); LA PAZ: Prov. of Sud Yungas: epiphytic in cloud forest along the Rio Unduavi, alt. 2450 m, 6 Feb. 1980, *C. Luer, J. Luer, R. Vásquez & M. Manon 5139* (SEL).

Although closely related to a hoard of other species with a similar habit, this species may be distinguished by the snow-white flowers with purple-bordered petals, at least in the specimens we saw, and a lip with thick, convex, sulcate lobes that resemble bread rolls. The appendix is a small, pubescent flap beneath the stigma.

Lepanthes panisca Luer & Vásquez, sp. nov.

Planta parva, racemo laxifloro folium ellipticum paulo excedenti, sepalis concavis extus verrucosis intus pubescentibus, petalis transverse bilobis pubescentibus, labelli laminis oblongis longi-ciliatis, corpore lato, appendice triangulari protuberanti.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 5-6 cm long, enclosed by 7-8 ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, subacute, 22-25 mm long including the petiole 4-5 mm long, cuneate below into the petiole, 8-9 mm wide. Inflorescence an erect, loose, successively few-flowered raceme up to ca. 15 mm long, borne behind the leaf by a filiform peduncle up to 20 mm long; floral bract 2 mm long; pedicel 1.5 mm long; ovary 1.25 mm long; sepals yellow-green with purple veins, the veins thickened, verrucose externally, pubescent within, ovate, acute, acuminate, concave, the margins narrowly involute, the dorsal sepal 3.5 mm long, 2.25 mm wide, connate 0.75 to the lateral sepals, the lateral sepals oblique, diverging, 3.25 mm long, 1.5 mm wide, connate 1 mm; petals green, suffused with purple, transversely elliptical, 1.25 mm long, 3.5 mm wide, the upper lobe long-ciliate, triangular, the lower lobe short-ciliate, narrowly tringular, obtuse; lip green, suffused with purple, the blades oblong, 1.6 mm long, pubescent and long-ciliate, with obtuse ends, the connectives broadly rectangular, connate to the base of the column, the sinus protruding, subacute, triangular, shortly pubescent, shallowly cleft centrally, without an appendix; column 2 mm long, the anther dorsal, the stigma long-protruding, apical.

Etymology: Named for the diminutive of Pan, Paniskos, the Greek god of the satyrs.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1500 m, 26 Nov. 1978, *C. Luer, F. Fuchs, et al. 3526* (Holotype: SEL).

This species may be recognized by the loose raceme slightly topping the elliptical leaf, sepals verrucose externally and pubescent internally, pubescent transverse petals, and long-ciliate blades of the lip with a protruding, triangular sinus without an appendix.

Lepanthes papilio Luer & Vásquez, sp. nov.

Planta parva, folio anguste ovato racemo congesto disticho duplolongiore, floribus parvis vivide coloratis, sepalis ovatis, petalis grandibus transverse oblongis bilobis, labelli laminis obovatis, appendice grandi loriformi pubescenti.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-6 cm long, enclosed by 5-6 microscopically scabrous lepanthiform sheaths. Leaf erect, coriaceous, narrowly ovate, acute, 2-3 cm long, 0.7-0.8 cm wide, the base cuneate into a petiole 1.5 mm long. Inflorescence a congested, distichous, successively several-flowered raceme up to 7 mm long, borne behind the leaf by a filiform peduncle 8-10 mm long; floral bract 0.75 mm long, minutely muriculate; pedicel 1.25 mm long; ovary 2.5 mm long; sepals yellow-orange, glabrous, ovate, subacute, the dorsal sepal 3 mm long, 2 mm wide, connate to the lateral sepals for 0.5 mm, the lateral sepals connate 1 mm, 2.25 mm long, 2.5 mm wide together; petals proportionately large, bright orange, cellular-pubescent, transversely oblong, 1.25 mm long, 3 mm wide, the upper lobe oblong, subtruncate, the lower lobe obtusely triangular, smaller; lip bright rose, cellular-pubescent, the blades obovate, convex, 1.33 mm long, the ends rounded, the connectives narrow, the body narrow, verrucose, connate to the base of the lip, the appendix large, pubescent, flaplike, concave, hinged from the sinus; column 1.33 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *papilio*, "a butterfly," in allusion to the proportionately large pair of colorful petals flanking the colorful lip.

Type: *BOLIVIA*: COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 1900 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3532* (Holotype: SEL).

This narrowly-leaved species with short racemes is distinguished by the small, brightly colored flowers. The petals are proportionately very large, resembling the wings of a butterfly. The appendix of the lip is large, flaplike and pubescent.

Lepanthes paradoxa Luer, sp. nov.

Planta perpusilla caespitosa, caulibus secondariis abbreviatis, racemo laxe plurifloro folio elliptico triplolongiore, floribus pro planta grandissimis, sepalis ovatis setaceis, petalis nanis, labelli laminis antice elongatis, appendice anguste lineari.

Plant very small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-4 mm long, enclosed by 2 close, microscopically scabrous sheaths. Leaf erect, coriaceous, elliptical, obtuse, 6-11 mm long, 4-6 mm wide, the base cuneate into a petiole 1 mm long. Inflorescence a loose, flexuous raceme up to 35 mm long with up to 10 flowers, several (3-4) open simultaneously; floral bract 1.5 mm long, pubescent; pedicel 1.5 mm long; ovary winged, 1 mm long; sepals light red-brown, ovate, carinate, the acute apices setaceous, the dorsal sepal 7 mm long including the 2 mm long tail, 3.5 mm wide, connate basally to the lateral sepals for 1 mm, the lateral sepals connate 2.5 mm, 7.75 mm long including the 2.5 mm long tails, 5 mm wide together; petals red-brown, transversely oblong with rounded ends, 0.6 mm long, 1.5 mm wide, the lobes about equal; lip red-brown, the blades narrowly oblong, 2 mm long, the medial margins obtusely angled near the middle, prolonged beyond the column to rounded, ciliate apices, the connectives posterior, narrowly cuneate, connate to the column below the middle, the appendix small, narrowly linear; column 1 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *paradoxus*, "contrary to expectation," referring to the inflorescence, huge for the size of the plant.

Type: *ECUADOR*: NAPO: epiphytic in cloud forest, Cosanga, alt. 1850 m, 17 June 1983, *C. H. Dodson, P. Dodson, D. Benzing & A. Hirtz 14033A* (Holotype: SEL), C. Luer illustr. 9088.

This minute species produces a loose, flexuous raceme of seemingly over-sized flowers, often three simultaneously, each about as large as the leaf. The sepals are with short, slender tails; the petals are minute. The blades of the lip are prolonged beyond the column about an additional length. The appendix is a very slender organ beneath the stigma.

Lepanthes peniculus Luer, sp. nov.

Planta mediocris vel grandis caespitosa, racemo laxe flexuoso folio elliptico breviter acuminato duplolongiore, sepalis glabris breviter acuminatis, petalis transverse cuneatis, labelli laminis ellipticis oblongis convexis minute pubescentibus, appendice parva cum glande terminali.

Plant medium to large in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-17 cm long, enclosed by 5-10 ciliated lepanthiform sheaths. Leaf erect, coriaceous, elliptical, 3-6 cm long, 1-2 cm wide, the acute to obtuse apex shortly acuminate, the cuneate base contracted into a petiole 3-5 mm long. Inflorescence racemose, 2-5 loose, flexuous, flexible successively flowered racemes up to 15 cm long including the short, filiform peduncle; floral bract 1.5-2 mm long; pedicel 1-2 mm long; ovary 1.5 mm long; sepals yellow-green, obtuse, abruptly short-acuminate, glabrous, the dorsal sepal 5-5.5 mm long, 3.25 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals connate 2-3 mm into a broadly ovate, bifid lamina 4.5-5 mm long, 4.25 mm wide; petals bright purple, minutely pubescent, transversely cuneate-oblong, 1 mm long, 2.2 mm wide, the lobes triangular with rounded apices, the lower lobe smaller; lip bright purple, the blades elliptical convex with rounded ends, minutely pubescent, 1.5 mm long, the connectives broad, oblong, short, connate to the column above the base, the appendix short, oblong, pubescent, with a small, rounded, apical gland; column 1.5 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *peniculus*, "a small organ," in reference to the appearance of the appendix.

Type: *ECUADOR:* NAPO; epiphytic in cloud forest above El Playon, alt. 3200 m, 5 Nov. 1979, *C. Luer, J. Luer & A. Hirtz 4672* (Holotype: SEL); CARCHI: above San Gabriel, alt. 3340 m, 16 May 1981, *C. Luer, J. Luer, A. Hirtz et al. 6249* (SEL); same area, 8 Nov. 1982, *C. Luer & R. Escobar 8299* (SEL).

This species may be identified by the loose, flexuous racemes about twice longer than the shortly acuminate leaves; the transversely cuneate petals; the elliptical, convex blades of the lip; and the small appendix with a terminal gland.

Lepanthes pentoxys Luer, sp. nov.

Planta mediocris grandisve, inflorescentia folio tenui ovato longi-acuminato breviore, racemo congesto secundo, sepalo dorsali synsepaloque late ovatis, petalis quinquilobatis labelli laminis lunatis adhaerentibus, appendice loriformi glande apicali.

Plant medium to large in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 8-20 cm long, enclosed by 10-16 minutely scabrous lepanthiform sheaths. Leaf suberect, thinly coriaceous, purple beneath, ovate, 7-13 cm long, 2.5-5.5 cm wide, the apex long-acuminate, tridenticulate, the base obtuse to rounded, contracted into a petiole 2-5 mm long. Inflorescence an extremely congested, secund, successively flowered raceme up to 1.5 cm long, borne by a slender peduncle up to 5 cm long along the back of the leaf; floral bract 1.5 mm long; pedicel 4-4.5 mm long; ovary 2 mm long; flowers small for the size of the plant, glabrous; dorsal sepal orange-brown, broadly ovate, convex, obtuse, apiculate, 4 mm long, 3 mm wide; lateral sepals rose, connate 2.5 mm into a suborbicular, convex lamina 4 mm long, 3.5 mm wide, the apices close, shortly acuminate; petals yellow, transversely bilobed, 0.6 mm long, 2.8 mm wide, with a slender appendage 1 mm long from the middle, the upper lobe suboblong, acuminate, acute, with an obtuse angle midway on the inner margin, the lower lobe triangular, narrowly acute with an acute tooth about midway on the inner margin; lip bright rose, the laminae lunate, 2 mm long, glabrous, adherent medially over the column, the connectives short, broadly cuneate, connate to the under surface of the basal third of the column, the appendix pubescent, broadly strap-shaped, with a minute, apical gland; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *penta*, "five-," and *oxys*, "pointed," referring to the 5-lobed petals.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest above Mindo, alt. 2000 m, 11 Nov. 1979, *C. Luer, J. Luer & A. Hirtz 4730* (Holotype: SEL); same area, west of Mindo toward Puerto Quito, alt. 1600 m, 13 March 1982, *C. Luer, A. Hirtz & S. Dalström 7338* (SEL).

Vegetatively this species is similar to *L. rhodophylla* Schltr., but the five-lobed lip of *L. pentoxys* immediately distinguishes it. It is a relative of the ubiquitous, vegetatively variable *L. mucronata* Lindl.

Lepanthes pileata Luer & Vásquez, sp. nov.

Planta mediocris, racemo laxe plurifloro foliis ellipticis acutis multilongiore, floribus parvis, sepalo dorsali pileato acuminato, synsepalo triangulari pubescenti marginibus involutis, petalis transverse oblongis, labelli laminis oblongis, appendice minuta trilobulata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3.5-9 cm long, enclosed by 8-9 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, acute, 20-33 mm long including the 2-3 mm long petiole, 10-15 mm wide, the base cuneate into the petiole. Inflorescence a loose, subflexuous, several- to many-flowered raceme up to 20 cm long including the filiform peduncle, flowers small, 2-3 open simultaneously; floral bract 1.5 mm long; pedicel 0.5 mm long; ovary 1 mm long; sepals yellow, suffused with purple centrally, the dorsal sepal ovate, deeply concave, cucullate, acute, acuminate, 4.5 mm long, 2 mm wide unexpanded, connate to the lateral sepals for 0.5 mm, the margins cellular-erose, the lateral sepals connate 3 mm into a triangular lamina, 5 mm long, 2.25 mm wide, split at the acute apex into two approximate tails 1.5 mm long, the surface cellular-pubescent, the margins narrowly involute; petals red, transversely oblong, microscopically pubescent, 0.5 mm long, 1.75 mm wide, the upper lobe oblong, rounded, the lower lobe much smaller, triangular; lip red, microscopically pubescent, the blades oblong with rounded ends, the connectives cuneate, connate to the column near the middle, the appendix minutely pubescent, minutely bilobed at the sinus with a third lobule beneath; column 1.5 mm long, the anther and stigma apical.

Etymology: From the Latin *pileatus*, "with a cap," referring to the appearance of the concave dorsal sepal.

Type: *BOLOVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2650 m, 9 Feb. 1980, *C. Luer, J. Luer, R. Vásquez 5184* (Holotype: SEL); same area, alt. 2500 m, 26 Nov. 1978, *C. Luer, F. Fuchs et al. 3566* (SEL).

This species may be recognized by the long raceme of small flowers with a pointed, caplike dorsal sepal; a bifid synsepal with infolded margins; small, transverse, obtuse petals; and oblong blades of the lip with a minute trilobulate appendix.

Lepanthes pleurorachis Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio anguste ovato acuminato breviore, racemo congestissimo disticho, flore perparvo, sepalis aequalibus libris ovatis uninervibus, petalis transverse bilobatis, labello transverse cordato ciliato apice retuso.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2.5-6 cm long, enclosed by 6-8 close, minutely scabrous lepanthiform sheaths. Leaf suberect, thinly coriaceous, narrowly ovate, acuminate, acute, 18-28 mm long, 8-9 mm wide, the base obtuse to rounded, contracted into a petiole 1-2 mm long. Inflorescence an extremely congested, distichous, successively flowered raceme up to 5 mm long, borne by a slender peduncle up to 6 mm long along the back of the leaf; floral bract 0.5 mm long; pedicels 1 mm long, closely arranged in 2 rows; ovary 1 mm long; flowers very small; sepals yellow, glabrous, subequal, ovate, subacute, 1-veined, reflexed, the dorsal sepal 1.5 mm long, 0.8 mm wide, the lateral sepals 1.2 mm long, 0.8 mm wide, connate basally; petals orange, transversely bilobed, 0.3 mm long, 2 mm wide, the upper lobe triangular, oblique, acute, with a second point midway on the inner margin, the lower lobe equally long, falcate, acute; lip red-brown, ciliate, transversely cordate, 0.6 mm long, 0.6 mm wide, the apex retuse between 2 rounded lobes and with a minute apiculum in the sinus, the basal lobes rounded, to either side of the column, the base connate to the under surface of the basal third of the column; column 0.5 mm long, the anther and stigma apical.

Etymology: From the Greek *pleura*, "rib" and *rachis*, "the rachis or a backbone," in reference to the appearance of the inflorescence.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest, silver mine road above Toachi, alt. 1500 m, 14 March 1982, *C. Luer, A. Hirtz & S. Dalström 7373* (Holotype: SEL); same area, 27 Feb. 1982, *A. Hirtz & J. Leon 109* (SEL).

This species is remarkable for the closely distichous raceme producing successively a minute flower with a cordate, retuse, ciliate lip.

Lepanthes pollex Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio oblongo acuminato breviore, racemo congestissimo, sepalis denticulatis subacutis, petalis transverse oblongis, labelli laminis ovatis acutis, appendice grandi oblonga pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 7-12 cm long, enclosed by 9-12 long-pubescent lepanthiform sheaths. Leaf erect, coriaceous, oblong-ovate, acute, acuminate, 4.5-6 cm long, 1.2-1.8 cm wide, the base cuneate into a petiole 3-4 mm long. Inflorescence a very congested, distichous, successively flowered raceme up to 10 mm long, borne by a filiform peduncle 5-10 mm long along the back of the leaf; floral bract 1 mm long, minutely spiculate; pedicel 1.5 mm long; ovary 1.25 mm long; sepals pale yellow, ovate, subacute, the veins spiculate externally, the margins denticulate, the dorsal sepal 4 mm long, 2.2 mm wide, the lateral sepals 4 mm long, connate 2 mm, 3.75 mm wide together; petals yellow, suffused with bright purple, transversely oblong, 1 mm long, 2.9 mm wide, the apices rounded, obtusely angled on the outer margin at the midvein, the lower lobe smaller; lip yellow, suffused with bright purple, the blades ovate, 1.5 mm long, the apices narrow, acute, lightly short-ciliate, the bases rounded, the connectives broadly cuneate, connate to the base of the column, the appendix large, oblong, pubescent, ca. 0.5 mm long; column 1.25 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *pollex*, "a thumb," referring to the appearance of the appendix of the lip.

Type; *ECUADOR:* PICHINCHA: epiphytic in cloud forest below Lloa, alt. 2700 m, 27 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4360* (Holotype: SEL); same area, alt. 2800 m, Aug. 1982, *A. Hirtz 339* (SEL).

This species with long-pubescent lepanthiform sheaths bears its flowers in racemes shorter than the acuminate leaves. The sepals are denticulate, the petals are transversely oblong, and the appendix of the lip is large, oblong, and pubescent.

Lepanthes polytricha Luer, sp. nov.

Planta mediocris caespitosa, racemo foliis rotundatis superne verruculosis infra pubescentibus breviore, sepalis acutis pilosis, petalis quadrisetaceis, labelli laminis hispidis, appendice parva furcata.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems stout, erect, 3-9 cm long, enclosed by 4-13 loose lepanthiform sheaths with markedly dilated ostia, the margins and ribs ciliate. Leaf erect, coriaceous, pubescent beneath, minutely verrucose dorsally, transversely ovate, narrowly margined, 3-4 cm long, 3-4 cm wide, the apex obtuse to rounded, the cordate base abruptly contracted into a petiole 4 mm long. Inflorescence a successively few-flowered raceme up to 7 mm long, borne by a filiform peduncle up to 12 mm long, produced in a fascicle behind the leaf; floral bract 1.5 mm long; pedicel 1 mm long; ovary 2 mm long; sepals red-purple, pilose externally, the dorsal sepal ovate, concave, acuminate, acute, 4.5 mm long, 2.75 mm wide, the lateral sepals ovate, oblique, acute, 4 mm long, 1.75 mm wide, connate 1 mm; petals cream colored, transversely oblong, 4-pronged, 1 mm long, 2.5 mm wide unspread, both lobes terminating in a slender, recurved, tapering tail, each with a shorter process nearer the middle; lip purple, the blades stout, oblong, 2 mm long with rounded ends, the upper surface of the apical halves densely hispid, the connectives cuneate, short, connate to the under surface of the column above the base, the appendix small, pubescent, narrowly forked; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Greek *poly-*, "many-," and *thrix, trichos*, "hair," referring to the many kinds of hair found on the species.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. ca. 2500 m, D. D'Alessandro 81-104, flowered in cultivation at the Predesur Orquidearío at Vilcabamba, 10 May 1981, *C. Luer 6134* (Holotype: SEL).

This species is remarkable for the transversely cordate leaves pubescent on the under surface, pilose sepals, 4-setose petals, and densely hispid or brushlike blades of the lip.

Lepanthes porcula Luer, sp. nov.

Planta mediocris caespitosa, racemo laxo folio oblongo acuminato subaequilongo, sepalis glabris, sepalo dorsali orbiculato lateralibus ovatis obliquis breviter acuminatis, petalis transverse oblongis, labelli laminis ovatis apicibus incurvatis acutis, appendice vestigiali.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems slender, erect, 5-10 cm long, enclosed by 6-8 microscopically ciliate lepanthiform sheaths. Leaf erect, coriaceous, oblong, shortly acuminate, acute, 3.5-5.5 cm long, 1.3-2 cm wide, the base cuneate into the petiole 5-7 mm long. Inflorescence a loose, successively flowered, subflexuous raceme up to 5 cm long including the filiform peduncle; floral bract 1.5 mm long, inflated; pedicel 1 mm long; ovary 1.5 mm long; flowers yellow, glabrous; dorsal sepal orbicular, concave, 2.75 mm long. 2.5 mm wide, connate to the lateral sepals for 0.66 mm, the apex rounded; lateral sepals ovate, oblique, shortly acuminate, acute, 2.75 mm long, 1.75 mm wide, connate 1 mm, 1-veined; petals transversely oblong, 0.75 mm long, 2.25 mm wide, the lobes oblong with rounded apices, about equal in size and shape; blades of the lip ovate, 1.4 mm long, the apices acute, incurved, the connectives broadly oblong, connate to the under surface of the column at the base, the appendix reduced to a minute, acute angle in the sinus; column 1.25 mm long, stout, the anther and stigma apical.

Etymology: From the Latin *porculus*, "a little pig," in reference to the protruding apical stigma that resembles the nose of a pig.

Type: *ECUADOR*: PICHINCHA: epiphytic in cloud forest between Quito and Chiriboga, alt. 2700 m, 6 Feb. 1979, *C. Luer, J. Luer & R. Escobar 3852* (Holotype: SEL).

This species is closely allied to *L. delphax* Luer, but *L. porcula* may be distinguished by the ovate, oblique, shortly acuminate lateral sepals (instead of broadly falcate), petals with equal lobes, and glabrous lobes of the lip with a vestigial appendix.

Leptanthes ptyxis Luer & Vásquez, sp. nov.

Species haec *L. complicatae* Luer & Vásquez affinis, sed foliis non-acuminatis, petalis transverse oblongis et marginibus sepalorum lateralium circa quarta latitudine plicatis differt.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 2-7 cm long, enclosed by 4-7 long-ciliate lepanthiform sheaths. Leaf erect, coriaceous, suffused with purple beneath, elliptical, acute, 17-27 mm long including a petiole 2-3 mm long, 7-15 mm wide, the base broadly cuneate into the petiole. Inflorescence a congested, distichous, successively several-flowered raceme up to 10 mm long, borne behind the leaf by a filiform peduncle 3-7 mm long; floral bract 1.5 mm long, lightly muricate; pedicel 1.5-2 mm long; ovary 1.5 mm long, sparsely papillose; sepals red-orange to yellow suffused with purple, spiculate along the margins and externally, the dorsal sepal ovate, concave, acute, acuminate, 4.5-6 mm long, 2.5-3 mm wide unexpanded, connate to the lateral sepals for ca. 1 mm, the lateral sepals ovate, oblique, acute, acuminate, connate 1 mm, 4.5-6.5 mm long, 1.75-2 mm wide together, each 1-veined, the lateral margins sharply folded over the surface of the blades about one-fourth the width, the edges of the folds as well as the margins and carinae spiculate; petals yellow with red to purple margins, microscopically pubescent, transversely oblong, 1 mm long, 3.4 mm wide, the ends rounded, the lower lobe slightly smaller; lip red-purple, microscopically pubescent, the blades ovate-oblong, 2 mm long, the apices narrowly obtuse and incurved beneath the apex of the column, the bases rounded, the connectives broadly cuneate, connate to the base of the lip, the sinus protuberant and rounded with a minute, rounded appendix at the summit; column 2 mm long, the anther and stigma apical.

Etymology: From the Greek *ptyxis*, "a fold," referring to the folded margins of the lateral sepals.

Type: *BOLIVIA*: LA PAZ: Prov. of Sud Yungas: epiphytic in cloud forest along the Rio Unduavi, alt. 2450 m, 6 Feb. 1980, *C. Luer, J. Luer, R. Vásquez & M. Manon 5140* (Holotype: SEL); Prov. of Nor Yungas: epiphytic in cloud forest west of Coroico, alt. 2550 m, 27 Jan. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8612* (SEL).

The folded margins of the lateral sepals of this species reach only about a fourth of the distance to the inner margin as compared to the marked folding over for nearly the entire width in *L. complicata*. The upper lobe of the petals is oblong in *L. ptyxis* instead of broadly falcate as in *L. complicata*.

Lepanthes pubes Luer & Escobar, sp. nov.

Planta mediocris caespitosa, folio anguste ovato infra reticulato-ciliato racemo congesto longiore, sepalis serratis apiculatis, petalis grandibus transverse oblongis, labelli laminis carnosis ellipticis pubescentibus, appendice obovata pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2-7 cm long, enclosed by 7-12 ciliate lepanthiform sheaths with widely dilated ostia. Leaf erect, coriaceous, purple, reticulate-ciliate beneath, narrowly ovate, lightly acuminate, acute, 3-5 cm long, 1-1.2 cm wide, the base cuneate into a petiole 2 mm long. Inflorescence a congested, flexuous, successively flowered raceme up to 8 mm long, borne by a filiform peduncle up to 10 mm long, along the back of the leaf; floral bract and pedicel each 1 mm long; ovary 2 mm long, densely spiculate; sepals bright purple with white margins, carinate-spiculate, the margins serrate, ovate, shortly apiculate at the subacute apex, the dorsal sepal elliptic-ovate, 4 mm long, 2.5 mm wide, the lateral sepals 4 mm long, connate 2.3 mm, 3.5 mm wide together; petals orange with red margins, transversely oblong, 1.33 mm long, 3.33 mm wide, the upper lobe more or less obliquely carinate, obtuse, the lower lobe smaller, oblong with the apex rounded; lip rosy white, the blades thick, fleshy, oblong with rounded ends, convex, rather long-pubescent, the connectives oblong, erect, lifting the blades above the column, connate to the under surface of the column above the base, the appendix obovate, obtusely angled above the middle, pubescent, 0.3 mm long, hinged at the sinus; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *pubes*, "pubescent," referring to the pubescent lobes of the lip.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest between Gualaceo and Limon, alt. 2050 m, 29 Oct. 1982, *C. Luer, R. Escobar & A. Pozo 8230* (Holotype: SEL).

This pretty species is distinguished by the congested inflorescence shorter than the narrowly ovate leaf which is ciliate on the reticulated veins beneath. The ovaries are spiculate, the sepals are serrate, and the fleshy, convex blades of the lip are pubescent.

Lepanthes pubescens Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio elliptico acuto interdum pubescenti breviore, racemo congesto, sepalis ciliatis ovatis longi-attenuatis, petalis transverse oblongis, labelli laminis anguste oblongis, connectivis brevibus, appendice oblonga ciliata.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 3-7 cm long, enclosed by 8-10 ciliate, loose, markedly dilated lepanthiform sheaths. Leaf erect, elliptical, acute, lightly acuminate, about 20%of the leaves densely pubescent dorsally, 80% glabrous, suffused with purple beneath, 4-5 cm long, 1.6-2.4 cm wide, the base broadly cuneate into the petiole 2 mm long. Inflorescence a congested, secund, successively flowered raceme up to 10 mm long, borne by a filiform peduncle 15-20 mm long, on the dorsum of the leaf, the flowers red-brown; floral bract 1.5 mm long, sparsely ciliate; pedicel 2 mm long, ciliate at the junction with the ovary; ovary 1 mm long, ciliate along the ribs; sepals ciliate, carinate-ciliate externally along the veins, the dorsal sepal ovate, subacute, attenuate, 8 mm long including the subulate tail 2.5 mm long, connate to the lateral sepals for 1 mm, the lateral sepals ovate, oblique, acute, long-attenuate, 9 mm long including the 4 mm long tails in apposition, connate 2 mm, 4.5 mm wide together; petals transversely oblong, 1 mm long, 3.5 mm wide, the upper lobe oblong, obtuse, the lower lobe smaller, narrowly oblong, incurved, truncate; blades of the lip narrowly oblong, 2.5 mm long, angled on the inner margin below the apex, glabrous, the connectives short, narrowly cuneate, connate to the column above the base, the appendix flat, ciliate, oblong, obscurely 3-lobed at the apex; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *pubescens*, "becoming hairy," referring to the pubescent qualities of the species.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest near Rio Calagras, alt. 1600 m, 19 Sept. 1980, *C. H. Dodson, C. Luer et al. 10486* (Holotype: SEL), C. Luer illustr. 9086.

Only about 20%of the leaves of the plants examined are densely pubescent on the dorsum. The fellow leaves are glabrous, but this phenomenon could be an abnormality. The sepals are ciliate and long-acuminate, the petals are transversely oblong, the blades of the lip are narrowly oblong, and the appendix is oblong and ciliate associated with a straplike process from the stigmatic cavity.

Lepanthes puck Luer & Vásquez, sp. nov.

Planta parva, inflorescentia folio anguste elliptico breviore, racemo subdensifloro disticho, sepalis anguste ovatis acuminatis, petalis transverse bilobis truncatis, labelli laminis ovatis connectivis angustis basalibus, appendice anguste triangulari pubescenti.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 1.5-5 cm long, enclosed by 4-6 close, minutely ciliate-scabrous lepanthiform sheaths. Leaf erect, coriaceous, narrowly elliptical, acute, 12-23 mm long, 3-6 mm wide, the base cuneate into a 1 mm long petiole. Inflorescence an erect, subdense, distichous raceme up to 10 mm long, borne behind the leaf by a filiform peduncle 6-9 mm long; floral bract 1 mm long; pedicel 1.5 mm long; ovary 2.3 mm long; sepals light yellow, glabrous, narrowly ovate, acute, acuminate, the dorsal sepal 6.5 mm long, 2.75 mm wide, connate 1 mm to the lateral sepals, the lateral sepals oblique, connate 1.5 mm, 6 mm long, 4.25 mm wide together; petals bright red, cellular-pubescent, transversely oblong, 1 mm long, 3.5 mm wide, the upper lobe subquadrate, truncate, the lower lobe ovate, obtuse; lip bright red, cellular-pubescent, the blades ovate, the apices obscurely notched, the bases rounded, the connectives narrow, from the bases of the blades, connate to the base of the column, the appendix narrowly triangular, pubescent, protruding from the sinus; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: Named for Puck, a mischievous elf.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2500 m, 4 Feb. 1983, *C. Luer, J. Luer, R. Vásquez & E. Besse 8672* (Holotype: SEL).

This undistinguished little plant with narrowly elliptical leaves and short inflorescences is most notable for the flowers with acuminate sepals with reflexed apices, truncate petals, ovate blades of the lip borne along the column by narrow connectives from the base. As a narrowly pubescent organ, the appendix protrudes from the sinus below the base of the column.

Lepanthes quaternaria Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio oblongo longi-acuminato breviore, racemo congesto, sepalis acuminatis, petalis transverse oblongis, labelli laminis oblongis convexis pubescentibus corpore connectivorum transverse subquadrato bilobato.

Plant large, epiphytic, caespitose; roots coarse. Secondary stems slender, erect, 16-27 cm long, enclosed by 12-15 close lepanthiform sheaths, glabrous to microscopically scabrous. Leaf erect, thinly coriaceous, oblong, 8-10.5 cm long, 2.5-3.5 cm wide, the acute apex long-acuminate, the rounded base abruptly contracted into a petiole 4-5 mm long. Inflorescence racemose, 2-8 congested, successively flowered racemes up to 2 cm long borne by peduncles up to 2 cm long, in a fascicle along the back of the leaf; floral bract and pedicel each 1 mm long; ovary 2 mm long; sepals yellow-white, glabrous, the dorsal sepal ovate, acute, acuminate, 6 mm long, 3 mm wide, connate to the lateral sepals for 1 mm, the lateral sepals connate 3 mm into an ovate, bifurcated lamina 5.5 mm long, 5 mm wide, the apices acuminate, acute, diverging; petals yellow, suffused with purple medially, microscopically pubescent, transversely oblong, bilobed, 1.2 mm long, 6 mm wide, the upper lobe oblong-subfalcate, obtuse, the lower lobe similar but smaller; lip yellow, suffused with brown, the blades oblong, convex, pubescent, 1.2 mm long, the ends obtuse, the connectives broad, erect, the body of the connectives transversely subquadrate, pubescent, bilobed anteriorly beneath the apical lobes of the blades above, the lobes falcate, incurved, obtuse, the body connate posteriorly to the under surface of the column above the base, the appendix a minute nubbin in the sinus; column stout, 1.5 mm long, the anther apical, the stigma subapical.

Etymology: From the Latin *quaternarius,* "consisting of four," in reference to the four anterior lobes of the lip.

Type: *ECUADOR:* NAPO: epiphytic in cloud forest southeast of El Carmelo, alt. 2050 m, 17 May 1981, *C. Luer, J. Luer A. Hirtz et al.* 6307 (Holotype: SEL).

This species can be distinguished from all others known to date by the broad body of the united connectives of the lip which, in addition to the usual pair of blades above the column, is bilobed below the column, providing the lip with four anterior lobes.

Lepanthes repens Luer, sp. nov.

Planta grandis repens, inflorescentia folio elliptico acuminato breviore, racemo congesto, flore magno, sepalis glabris acuminatis setaceis, petalis transverse oblongis, labelli laminis trapeziformibus appositis, appendice minuta.

Plant large, epiphytic to terrestrial, repent, the rhizome 1-3 cm long between secondary stems; roots coarse. Secondary stems stout, ascending to erect, 15-33 cm tall, enclosed by 10-13 microscopically scabrous lepanthiform sheaths. Leaf erect, thinly coriaceous, ovate-elliptical, acute, acuminate, 8-11.5 cm long, 2-3.3 cm wide, the base broadly cuneate into a petiole 5-9 mm long. Inflorescence a congested, distichous raceme up to 40 mm long, borne by a filiform peduncle 15-40 mm long, 1-3 racemes behind the leaf; floral bract 2.5 mm long; pedicel 3 mm long; ovary 3 mm long; sepals light yellow, glabrous, ovate, acute, attenuate, the dorsal sepal 10 mm long, 6 mm wide, connate to the lateral sepals for 2 mm, the lateral sepals oblique, 9.5 mm long, connate for 3 mm, 7.5 mm wide together; petals yellow, edged in purple, transversely oblong, 1.9 mm long, 3.75 mm wide, the upper lobe triangular, obtuse, the outer margin rounded, the lower lobe smaller, acute; lip orange, edged in purple, the blades trapeziform, 2.8 mm long, in apposition over the column, the ends obliquely truncate, the apex weakly ciliate, the connectives short, cuneate, connate to the base of the column, the appendix minute, pedunculate in the sinus; column 2 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *repens*, "creeping," referring to the repent rhizome.

Type: *ECUADOR:* CARCHI: terrestrial on the road cut above El Carmelo, alt. 3200 m, 17 May 1981, *C. Luer, J. Luer, A. Hirtz et al. 6261* (Holotype: SEL); *COLOMBIA:* NARINO: epiphytic in cloud forest around the crater lake of Volcan Galeras, alt. 3200 m, 21 Jan. 1979, *C. Luer & J. Luer 3748* (SEL).

The stout, repent habit of this large species is unusual in the genus. The large flowers are borne successively in congested racemes which may approach the leaf in length. The trapezoid blades of the lip close like doors over the column. The appendix is a minute, pedunculated gland in the sinus.

Lepanthes rhynchion Luer, sp. nov.

Planta mediocris vel grandis, inflorescentia folio ovato acuminato breviore, racemo congesto, sepalis serratis breviter acuminatis, petalis transverse bilobatis, labelli laminis glabris ellipticis acutis, appendice vestigiali, stigmate apicali transversali protrudenti.

Plant medium to large, epiphytic, caespitose; roots coarse. Secondary stems stout, erect, 6-37 cm long, enclosed by 7-15 loose lepanthiform sheaths, glabrous to microscopically ciliate. Leaf erect, coriaceous, elliptical-ovate, acuminate, acute, 4.5-10 cm long, 2-3.5 cm wide, the base cuneate into a petiole 3-5 mm long. Inflorescence racemose, the rachis congested, successively flowered, up to 35 mm long, borne by a filiform peduncle up to 30 mm long, in a fascicle of up to 10 along the back of the leaf; floral bracts 1.5 mm long, more or less spiculate; pedicel 1-2 mm long; ovary 1.5-2 mm long, spiculate; sepals yellow, serrate, carinate-lacerate, ovate, acute, shortly acuminate, the dorsal sepal 4.5-5.75 mm long, 2.25-3.6 mm wide, connate 0.5-1 mm to the lateral sepals, the lateral sepals oblique, 4-4.5 mm long, 2-2.5 mm wide, connate 1 mm; petals yellow, sometimes edged in purple, transversely bilobed, 1.25 mm long, 2.5 mm wide, the upper lobe broadly oblong, the apex rounded, the lower lobe smaller, narrowly oblong with the apex rounded; lip orange to red, the blades narrowly elliptical, 2 mm long, glabrous, the apices acute, the bases obtuse to round, the connectives broadly oblong, connate to the under surface of the column below the middle, the appendix reduced to a small, pubescent nubbin in the sinus; column 2 mm long, the anther dorsal, the stima apical, narrowly transverse.

Etymology: From the Greek *rhynchion*, "a little snout," referring to the protruding stigma.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest between San Jose de Minas and Otavalo, alt. ca. 2800 m, 24 Aug. 1978, *C. Luer, J. Luer & A. Hirtz 3333* (Holotype: SEL); LOJA: south of Yangana, alt. 2250 m, 11 May 1981, *C. Luer, J. Luer, D. D'Alessandro et al. 6141* (SEL); IMBABURA: west of Otavalo toward Selva Alegre, alt. 3000 m, 7 Feb. 1979, *C. Luer, J. Luer, A. Hirtz & R. Escobar 3885* (SEL); *COLOMBIA:* PUTUMAYO: between La Cocha and Sibundoy, alt. 2700 m, 30 July 1978, *C. Luer, J. Luer, R. Escobar et al. 3158* (SEL); NARINO: between Pasto and La Cocha, alt. 3000 m, 21 Jan. 1979, *C. Luer & J. Luer 3766* (SEL).

This species may be identified by the congested racemes shorter than the acuminate leaf; the serrate, shortly acuminate sepals; petals with a large, rounded upper lobe; the glabrous lobes of the lip; a rudimentary, pubescent appendix; and a transverse, protruding, apical stigma.

Lepanthes saltator Luer, sp. nov.

Planta grandis caespitosa, inflorescentia folio ovato acuminato breviore, racemo congestissimo disticho, sepalo dorsali anguste triangulari, sepalis lateralibus ovatis apicibus divergentibus, petalis late transverse bilobatis, labelli laminis anguste oblongis glabris, appendice oblonga cum glande pubescenti apicali.

Plant large, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 6-25 cm tall, enclosed by 9-16 ciliate lepanthiform sheaths. Leaf erect, thinly coriaceous, sparsely ciliate along the veins beneath, elliptic-ovate, acute, long-acuminate, 5-12 cm long, 2-5.5 cm wide, the base rounded to subcordate, abruptly contracted into a petiole 4 mm long. Inflorescence a very congested, distichous, successively flowered raceme up to 25 mm long, borne by a filiform peduncle up to 40 mm long along the back of the leaf; floral bract 1.25 mm long; pedicel 1-1.25 mm long; ovary 2.5 mm long; sepals yellow, glabrous, the dorsal sepal narrowly triangular, acute, 6.5 mm long, 3.25 mm wide, connate basally to the lateral sepals for 1.5 mm, the lateral sepals ovate, oblique, 6 mm long, 3.5 mm wide, connate 1 mm, the subacute apices shortly acuminate, widely spread; petals yellow, edged in purple, broadly transversely elliptical, bilobed, 2.1 mm long, 4.1 mm wide, the upper lobe ovate, obtuse, the lower lobe smaller, triangular, acuminate, obtuse; lip rose, suffused with purple, the blades narrowly oblong, 2.2 mm long, the apices acute, the bases narrowly obtuse, the connectives cuneate, connate to the column at the base, the appendix oblong, channeled, with a ciliate, apical gland; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *saltator*, "a male dancer," referring to the fancied appearance of the flower.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest toward the silver mine above Toachi, alt. 1500 m, 14 March 1982, *C. Luer, A. Hirtz & S. Dalström 7372* (Holotype: SEL); same area, alt. 1300 m, 21 May 1983, *C. H. Dodson & A. Gentry 13696* (SEL); COTOPAXI: west of El Corazon, alt. 1200 m, 18 Feb. 1979, *C. Luer, J. Luer & A. Hirtz 4019* (SEL).

The flowers of this large species with a congested raceme shorter than the leaf, which is ciliate beneath, are of medium size with a narrowly triangular dorsal sepal and broad lateral sepals with diverging apices. The petals are proportionately broad and large; the blades of the lip are narrowly oblong and glabrous; and the appendix is an oblong organ with a pubescent apical gland.

Lepanthes scalaris Luer, sp. nov.

Planta mediocris scandens, racemo successivifloro folio elliptico duplolongiore, sepalis glabris ovatis acutis, petalis transverse oblongis, labelli lobis oblongi-lunatis glabris, appendice cupulata lobis pubescentibus.

Plant medium in size, epiphytic, scandent; roots slender. Secondary stems slender, erect, prolific, 5.5-9.5 cm long, enclosed by 5-7 close lepanthiform sheaths, minutely ciliate at the ostia. Leaf erect, coriaceous, elliptical, acute, 20-36 mm long, 9-12 mm wide, cuneate below into a petiole 3-4 mm long. Inflorescence a loose, successively flowered raceme up to 7 cm long, the filiform peduncle from a node near the apex of the secondary stem; floral bract 2.5 mm long; pedicel curved, 1.2 mm long; ovary 1.5 mm long; sepals glabrous, rosy salmon in color, the veins prominent externally, the dorsal sepal ovate, 7 mm long, 4.75 mm wide, the apex shortly acuminate, acute, the lateral sepals oblong, oblique, 8 mm long, 6 mm wide together, connate to near the middle, the apices shortly acuminate; petals transversely oblong, 1.25 mm long, 5 mm wide, the upper lobe purple, the lower lobe smaller, orange; lip rosy brown, the blades oblong-lunate, the ends rounded, 2.2 mm long, the connectives cuneate, connate to the under surface of the column, the appendix cup-shaped with a ciliate margin; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *scalaris*, "ladderlike," referring to the prolific habit of growth.

Type: *ECUADOR:* CARCHI: epiphytic in scrub cloud forest above San Gabriel, alt. 3340 m, 16 May 1981, *C. Luer, J. Luer, A. Hirtz et al. 6255* (Holotype: SEL). Additiona material examined: *COLOMBIA:* NARINO: epiphytic in cloud forest, east slope of Volcan Galeras, alt. ca. 3200 m, 21 Jan. 1979, *C. Luer & J. Luer 3738* (SEL).

This species is related to *L. superposita* Schltr., but *L. scalaris* may be distinguished by the non-reniform petals, and the glabrous lobes of the lip with narrow connectives attached near the bases instead of near the middle of the lamina. The cuplike appendix is minutely bilobed at the apex.

Lepanthes scansor Luer & Escobar, sp. nov.

Planta mediocris scandens, racemo successivifloro subfractiflexo folio elliptico breviore, sepalis glabris late ovatis acutis, petalis transverse oblongis, labelli lobis subfalcatis, appendice parva pubescenti.

Plant medium in size, epiphytic, scandent; roots slender. Secondary stems erect, slender, prolific, 4-16 cm long, enclosed by 6-8 close lepanthiform sheaths minutely ciliate at the ostia. Leaf erect, coriaceous, elliptical, acute, 2-5 cm long, 1-1.5 cm wide, cuneate below into the petiole 3-4 mm long. Inflorescence a subdense, successively flowered, lightly fractiflex raceme up to 3 cm long, the filiform peduncle from a node near the apex of the secondary stem; floral bract 2 mm long, pedicel 1 mm long; ovary 1.5 mm long, ribbed; sepals glabrous, yellow, suffused with purple centrally, the veins prominent externally, the dorsal sepal broadly ovate, acute, 4.75 mm long, 3.75 mm wide, the lateral sepals ovate, oblique, subfalcate, acute, connate to the middle, 4.75 mm wide together; petals yellow-orange, suffused with red medially, transversely oblong, 1.1 mm long, 3.5 mm wide, the upper lobe oblong, the lower lobe smaller, narrowly oblong, slightly incurved; labellar laminae oblong-falcate, 2 mm long, the apices acute, incurved, minutely pubescent, the bases rounded, the connectives broadly cuneate, connate to the under surface of the column, the appendix small, rounded, densely pubescent; column 1.5 mm long, the anther apical, the stigma apical and protruding.

Etymology: From the Latin *scansor*, "a climber," referring to the scandent habit.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest at the pass north of Loja, alt. 3100 m, 30 Oct. 1982, *C. Luer & R. Escobar 8240* (Holotype: SEL).

This species may be distinguished from *L. prolifera* Foldats, the other scandent *Lepanthes* with the inflorescence shorter than the leaf, by the less densely flowered rachis, smaller flowers, broad, glabrous sepals, a smaller appendix, and an apical stigma.

Lepanthes schizix Luer, sp. nov.

Planta parva caespitosa, racemo laxe plurifloro fractiflexo folio duplo-vel triplolongiore, sepalis atropurpureis minute ciliatis breviter caudatis, sepalo dorsali concavo, synsepalo latissime oblongo, labelli lobis lunatis glabris, appendice parva cylindrica cum glande apicali.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 10-30 mm long, enclosed by 4-6 close lepanthiform sheaths, the markedly dilated ostia ciliate. Leaf erect, coriaceous, elliptical, obtuse, 12-15 mm long, 7-9 mm wide, the base broadly cuneate into a petiole ca. 2 mm long. Inflorescence a loose, successively flowered, zigzag raceme 3-5 cm long, the filamentous peduncle from a node near the apex of the secondary stem; floral bract pubescent, 1 mm long; pedicel 1.75-2 mm long; ovary 1.25 mm long; sepals dark purple, carinate, the margins minutely ciliate, the dorsal sepal ovate, concave, 5.5 mm long, 3 mm wide unexpanded, the apex attenuated into a short, decurved tail, the lateral sepals 10 mm long, 3 mm wide together, connate 5 mm into an oblong lamina, the acute apices tapered into slender, approximate tails ca. 3 mm long; petals dark purple, transversely oblong, 1.1 mm long, 4 mm wide, the upper lobe oblong with the apex rounded, the lower lobe falcate, acute; lip rose, the blades lunate, glabrous, 1.75 mm long, the connectives narrowly cuneate, connate to the under surface of the column, the appendix small, cylindrical, with an apical gland; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: Named for the similarity to the star of Frank King's *Gasoline Alley*.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest near Rio Silante, Canchacato, alt. ca. 2000 m, 28 Oct. 1979, *C. Luer, J. Luer & A. Hirtz 4411* (Holotype: SEL).

Among the members of the "effusae" group, this species is remarkable for the concave dorsal sepal with a short, hooked tail, and the proportionately long, oblong synsepal ending in short, adjacent tails. The lower lobe of the petals is falcate. The lip is glabrous and the small appendix is cylindrical.

Lepanthes schizura Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio anguste ovato breviore, racemo congesto disticho, sepalis ovatis obtusis denticulatis, petalis grandibus transverse oblongis, labelli laminis carnosis lunatis contiguis, appendice late fissa.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2.5-5.5 cm long, enclosed by 5-7 close, minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, narrowly ovate, acute, 3-5.5 cm long, 0.8-1.4 cm wide, the base cuneate into the petiole ca. 1 mm long. Inflorescence a congested, distichous raceme of successive flowers, up to 6 mm long, borne by a filiform peduncle 8-11 mm long behind the leaf; floral bract 1.5 mm long, minutely spiculate; pedicel 1.5 mm long; ovary 2 mm long, sparsely papillose; sepals orange-brown with light green margins, ovate, obtuse, serrulate, carinate-ciliate externally along the veins, the dorsal sepal 3 mm long, 2.66 mm wide, the lateral sepals 3 mm long, connate 1.5 mm, 4 mm wide together; petals orange, suffused with brown, transversely oblong, 1.2 mm long, 3 mm wide, the apices rounded, the upper lobe slightly larger than the lower lobe; lip brown, the blades lunate, thick, convex, 1.3 mm long, in apposition over the column, the connectives stout, erect, elevating the blades, the base of the body connate to the under surface of the column above the base, the appendix more or less rounded, broadly cleft centrally, ciliate; column 1 mm long, stout, the anther subapical, the stigma ventral.

Etymology: From the Greek *schiz-*, "cleft," and *ura*, "tail," in reference to the broadly split appendix of the lip.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in forest north of Gualaquiza near Rio Calagras, alt. 1650 m, 4 Nov. 1982, *C. Luer, R. Escobar & D. D'Alessandro 8278* (Holotype: SEL).

This small species with a congested raceme shorter than the narrowly ovate leaf may be identified by the denticulate, obtuse sepals; large, transversely oblong petals; and a lip with fleshy blades in apposition over the column, the appendix broadly cleft into a pair of obtuse, ciliate halves.

Lepanthes scolops Luer & Vásquez, sp. nov.

Planta parva vel mediocris, racemo laxo fractiflexo folio elliptico subaequilongo, sepalis libris attenuatis spiculatis, petalis transverse oblongis, labelli laminis ovatis, sinu connectivorum protuberanti rotundo, appendice parva pubescenti.

Plant small to medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-10 cm long, enclosed by 6-8 ciliate lepanthiform sheaths with markedly dilated ostia. Leaf erect, coriaceous, suffused with purple beneath, elliptical-ovate, acute, 21-35 mm long including the petiole 2-3 mm long, 9-13 mm wide, the base cuneate into the petiole. Inflorescence a loose, fractiflex, successively flowered raceme up to 35 mm long including the filiform peduncle ca. 10 mm long, approaching the leaf in length; floral bract 1.5 mm long, spiculate; pedicel 1.5-2 mm long; ovary 1.75 mm long, papillose; sepals light green suffused with red, or brown, widely spread, free to near the base, carinate-spiculate externally, the dorsal sepal ovate, concave, acute, acuminate, 7.5 mm long, 3 mm wide, the lateral sepals narrowly triangular, concave with narrowly involute margins, acute, acuminate, 8 mm long, 1.5 mm wide, 1-veined; petals yellow to brown, transversely oblong, 1 mm long, 4 mm wide, the lobes narrowly obtuse, slightly curved; lip yellow, suffused with red, cellular-pubescent, the blades ovate, 1.3 mm long, shortly obtuse at the apex, rounded at the base, the connectives broad, curved forward with a protuberant, rounded sinus, cleft centrally, with the appendix a minute, pubescent lobule at the apex, connate to the column above the base; column 2.75 mm long, the clavate apex protruding beyond the lip, the anther and stigma apical.

Etymology: From the Greek *skolops*, "a thorn, or anything pointed," referring to the long, pointed spiculate sepals.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2650 m, 9 Feb. 1980, *C. Luer, J. Luer & R. Vásquez 5187* (Holotype: SEL); LA PAZ: Prov. of Sud Yungas: epiphytic in cloud forest along the Rio Unduavi, alt. 2450 m, 6 Feb. 1980, *C. Luer, J. Luer, R. Vásquez & M. Manon 5141* (SEL).

The flowers of this species are similar to those of *L. falcata*, but the laminae of the lip of *L. scolops* are well-developed and ovate; the connectives are also well-developed with a prominent, protruding sinus with a minute, pubescent appendix.

Lepanthes serriola Luer & Vásquez, sp. nov.

Planta mediocris, racemo subdense flexuoso folio elliptico plus minusve aequilongo, sepalis ovatis denticulatis breviter caudatis, petalis transverse oblongis, labelli laminis ellipticis, appendice parva ligulata pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 5-9 cm long, enclosed by 7-9 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, suffused with purple beneath, ovate, elliptical, acute, 2.5-3 cm long, 1-1.4 cm wide, the base cuneate into a petiole 2 mm long. Inflorescence a subdense, flexuous, successively several-flowered raceme up to 30 mm long including the filiform peduncle 3-5 mm long; floral bract and pedicel each 1 mm long; ovary 1 mm long, sparsely papillose; sepals light red-purple, edged in yellow, denticulate, carinate-spiculate, ovate, acuminate, shortly caudate, the dorsal sepal concave, 5.2 mm long, 2.6 mm wide, connate 1 mm to the lateral sepals, the lateral sepals oblique, 5 mm long, 1.75 mm wide, connate 1 mm; petals orange, edged in red, minutely pubescent, transversely oblong, 1.25 mm long, 2.75 mm wide, the ends rounded, the lower lobe smaller; lip red, glabrous, at most microscopically cellular-pubescent, the blades elliptical, 2 mm long, the apices narrowly obtuse, the bases rounded, the connectives cuneate, connected to the column above the base, the sinus cleft with a minute, pubescent, ligulate appendix; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *serriolus*, "with little serrations," referring to the denticulate sepals.

Type: *BOLIVIA:* COCHABAMBA: Prov. of Chapare: epiphytic in cloud forest between Cochabamba and Villa Tunari, alt. 2650 m, 9 Feb. 1980, *C. Luer, J. Luer & R. Vásquez 5186* (Holotype: SEL).

This species may be distinguished by the flexuous raceme approaching the elliptical leaf in length; the denticulate, ovate, shortly caudate sepals; and the elliptical blades of the lip with a minute, ligulate appendix.

Lepanthes stupenda Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio elliptico acuminato breviore, racemo congesto, flore maximo, sepalis lateralibus papillosis, petalis nanis transverse ellipticis, labelli laminis oblongis glabris, appendice membranacea obtusa ciliata.

Plant medium (to large?) in size, epiphytic, caespitose; roots thick, coarse. Secondary stems slender, erect, 5-8 cm long, enclosed by 8-9 lepanthiform sheaths with microscopically ciliate stomal margins. Leaf erect, thinly coriaceous, reticulated, elliptical-ovate, acute, acuminate, 5-8 cm long, 2-2.7 cm wide, the broadly cuneate to rounded base contracted into a petiole 4 mm long. Inflorescence a congested, successively flowered raceme up to 10 mm long, borne by a filiform peduncle 15-22 mm long behind the leaf; floral bract 2 mm long; pedicel 1 mm long; ovary 2 mm long, narrowly winged; sepals yellow, the dorsal sepal glabrous, ovate, acute, acuminate, 16 mm long, 8 mm wide, connate basally to the lateral sepals for 2.5 mm, the lateral sepals papillose centrally, ovate, oblique, acute, acuminate, connate 6 mm, 16 mm long, 10 mm wide together; petals yellow, edged in purple, transversely elliptical, 1.66 mm long, 3.2 mm wide, the lobes triangular-ovate, obtuse, the lower lobe shorter; lip purple, the blades oblong, obtuse, glabrous, 2.5 mm long, the connectives broadly cuneate, connate to the base of the column, the appendix membranous, broadly obtuse, ciliate, spanning the broad sinus; column 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *stupendus*, "stupendous," referring to the size of the flower.

Type: *ECUADOR:* IMBABURA: epiphytic in cloud forest, Selva Alegre west of Otavalo, alt. 2730 m, 1 May 1981, *C. Luer, J. Luer, A. Hirtz et al. 6042* (Holotype: SEL).

The plant described is probably a small specimen. The unusually large flower is borne on a short, congested raceme; the petals are proportionately small; the blades of the lip are elliptical and glabrous; and the appendix is an obtuse, ciliate membrane across the broad, deep sinus.

Lepanthes systole Luer, sp. nov.

Planta parva, racemo flexuoso subdensifloro foliis angustissime ovatis breviore, sepalis ovatis, petalis pubescentibus perparvis transversis obtusis, labello pubescenti columna minore laminis ovoideis appendice obtusa.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 3-4 cm long, enclosed by 6-8 minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, very narrowly ovate, acute, 15-31 mm long, 5-6 mm wide, the base cuneate into a petiole 2 mm long. Inflorescence a subdense, flexuous, successively several-flowered raceme up to 10 mm long, borne behind the leaf by a filiform peduncle 3-5 mm long; floral bract 1 mm long, echinate; pedicel 0.75 mm long; ovary 0.75 mm long; flowers small, dark rose; sepals glabrous, ovate, acute, the dorsal sepal concave, 3.25 mm long, 2.2 mm wide expanded, connate to the lateral sepals for 0.75 mm, the lateral sepals oblique, connate 1 mm, 2.75 mm long, 3 mm wide together; petals shortly pubescent, transversely oblong, 0.5 mm long, 1 mm wide, the upper lobe broadly triangular, obtuse, the lower lobe shorter, rounded; lip minutely pubescent, the blades ovoid, 0.5 mm long, the apex subacute, the base rounded, the connectives broadly oblong, carrying the blades parallel to the column, connate to the base of the column, the sinus protruding with an obtuse, ligulate, pubescent appendix; column larger than the lip, 0.66 mm long, the anther apical, the stigma ventral.

Etymology: From the Greek *systole*, "a contraction," in allusion to the minute lip.

Type: *GUATEMALA:* ALTA VERAPAZ: epiphytic in wet forest above Senahu, alt. 1140 m, 28 Feb. 1981, *C. Luer, J. Luer, M. Dix & M. Dix 5933* (Holotype: SEL).

Vegetatively this species resembles *L. stenophylla* Schltr., but the flowers of *L. systole* with the minute petals and an even smaller lip, smaller than the column, easily distinguish it.

Lepanthes teres Luer, sp. nov.

Planta parva caespitosa, foliis anguste teretibus racemo congestissimo multilongioribus, sepalo dorsali elliptico acuto lateralibus ovatis ciliatis, petalis magnis transverse bilobatis dolabriformibus, labelli laminis oblongis apice ciliatis, appendice globuliformi bilobata.

Plant small, epiphytic, caespitose; roots very slender. Secondary stems slender, erect, 2-4 cm long, enclosed by 4-5 close lepanthiform sheaths, microscopically scabrous along the ribs and margins of the ostia. Leaf red-purple, erect, fleshy, narrowly ovoid, terete, 25-35 mm long, 3-5.5 mm wide and deep, gradually narrowed from above the base to the acute apex, the base cuneate into the 1-1.5 mm long petiole. Inflorescence an extremely congested, successively flowered raceme up to 8 mm long, borne by a filiform peduncle up to 5 mm long along the under surface of the leaf; floral bract 0.5 mm long; pedicel 0.5 mm long; ovary 1.3 mm long; sepals yellow-white with bright red margins, the dorsal sepal oblong, acute, glabrous, 2.8 mm long, 1.5 mm wide, connate to the lateral sepals for 0.5 mm, the lateral sepals ovate, obtuse, coarsely ciliate, 2.5 mm long, 1.25 mm wide, connate for 0.5 mm; petals large, light yellow with red margins, transversely bilobed, dolabriform, 1.3 mm long, 3.66 mm wide, the margins acutely angled at the midvein below the middle, the upper lobe oblong with the apex rounded, the lower lobe considerably smaller, narrowly triangular, obtuse; lip yellow with red margins, the blades of the lateral lobes oblong, 2 mm long, the apex rounded, ciliate, the base rounded, the connectives short, cuneate, connate to the under surface of the column, the appendix a subspherical, bilobed body accommodated in a cavity in the sinus; column 1 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *teres*, "cylindrical, round in cross section," referring to the leaf.

Type: *ECUADOR:* LOJA: epiphytic in cloud forest south of Yangana, alt. 2250 m, 11 May 1981, *C. Luer, J. Luer D. D'Alessandro et al. 6144* (Holotype: SEL).

This species with terete leaves grows very near the locality where the only other species of *Lepanthes* with similar leaves is known to occur. In *L. teres* the dorsal sepal is glabrous while the laterals are minutely fringed, the petals are proportionately large, and the globular appendix is set in a cavity in the sinus between the connectives.

Lepanthes transparens Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio ovato acuminato breviore, racemo congesto, sepalis acutis serrulatis, petalis transverse oblongis, labelli laminis lunatis diaphanis, connectivis angustis, corpore rotundata longi-unguiculata, appendice oblonga pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems suberect, slender, 5-12 cm long, enclosed by 9-11 close, ciliate lepanthiform sheaths with markedly dilated ostia. Leaf suberect, thinly coriaceous, ovate, acuminate, acute, 3.5-5 cm long, 1.8-2.5 cm wide, the rounded base abruptly contracted into a petiole 2-3 mm long. Inflorescence a congested, successsively flowered raceme up to 5 mm long, borne by a filiform peduncle up to 12 mm long along the back of the leaf; floral bract 1.5 mm long; pedicel 1 mm long; ovary 2.5 mm long; sepals light greenish tan, carinate, serrulate, the dorsal sepal triangular, 6 mm long, 4.5 mm wide, connate to the lateral sepals for 1.5 mm, the acute apex shortly acuminate, the lateral sepals connate 2 mm into an ovate, acute, bifid lamina, the shortly acuminate apices approximate; petals yellow, suffused with purple, microscopically pubescent, transversely oblong, 1.2 mm long, 4.25 mm wide, the upper lobe oblong, truncate, the lower lobe smaller, narrowly falcate, acute; lip brown, the blades lunate, thin, membranous, transparent, minutely ciliate, 2 mm long, 0.75 mm wide, the connectives narrow, erect, elevating the blades over the column, the body more or less rounded, with a slender, basal claw adnate to the column, the appendix oblong, shortly pubescent, associated with an appendage from the stigma; column slender, clavate, 2 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *transparens*, "transparent," referring to the thin, membranous blades of the lip.

Type: *ECUADOR:* CARCHI: epiphytic in cloud forest above El Carmelo, alt. 3200 m, 17 May 1981, *C. Luer, J. Luer A. Hirtz et al. 6260* (Holotype: SEL); *COLOMBIA:* CAUCA: epiphytic in cloud forest, Paramo de Barbillas, alt. 3150 m, 13 Nov. 1982, *C. Luer & R. Escobar 8381* (SEL).

This species is most remarkable for the transparent, lunate blades of the lip held above the column by narrow connectives. The body of the connectives is adnate to the base of the column by a long, slender claw. The appendix makes contact with an appendage from the stigmatic cavity.

Lepanthes trimerinx Luer, sp. nov.

Planta minuta caespitosa, caulibus secondariis brevissimis, pedunculo filiformi folio elliptico paulo longiore, sepalis ovatis ciliatis longicaudatis, petalis transverse bilobatis, labello plano quadrilobato lobis posticis columnam amplectentibus.

Plant minute, epiphytic, caespitose; roots proportionately fleshy. Secondary stems 1-2 mm long, enclosed by 2 imbricating sheaths with sparsely ciliate ribs and margins. Leaf erect, coriaceous, elliptical, obtuse, 6-8 mm long, 4 mm wide, the base cuneate into a petiole 1 mm long. Inflorescence a congested, few-flowered raceme borne by a filiform peduncle up to 10 mm long; floral bract 0.5 mm long; pedicel 2 mm long; ovary 0.75 mm long, ribbed; sepals yellow, ovate, 2 mm long, 1.5 mm wide, connate basally, the margins serrulate-ciliate, the acute apices contracted into slender tails 1.5-5 mm long; petals yellow, suffused with red, minutely pubescent, transversely bilobed, 0.5 mm long, 1.75 mm wide, the upper lobe narrowly triangular, obtuse, the lower lobes smaller, triangular, acute; lip red with yellow margins, minutely pubescent, 4-lobed, ("H-shaped"), 1.5 mm long, 1.5 mm wide, the halves transversely oblong or bilobed, with rounded anterior and posterior lobes, the posterior lobes embracing the column, the base between them connate to the under surface of the column near the middle, with a minute apiculum in the sinus between the anterior lobes; column 0.75 mm long, the anther and stigma apical.

Etymology: From the Greek *tri*, "three-" and *merinx*, "a bristle," referring to the three slender tails of the flower.

Type: *ECUADOR:* PASTAZA: epiphytic in trees along the Rio Napo between Banos and Puyo, alt. ca. 1500 m, collected March 1976, flowered in cultivation at SEL 12 July 1976, *C. Luer 1019* (Holotype: SEL); PICHINCHA: near Tandapi, alt. 1500 m, 13 March 1976, *C. Luer, J. Luer & P. Taylor 850* (SEL).

This minute species is remarkable for its small size and the long tails of the sepals. The two posterior lobes of the flat, four-lobed lip embrace the column. A specimen in flower resembles a *Platystele*.

Lepanthes usitata Luer & Vásquez, sp. nov.

Planta parva, racemo densifloro foliis ovatis breviore, sepalis ovatis acutis lateralibus pubescentibus, petalis inaequaliter bilobis, lobo superiore majore, labelli laminis ovatis, appendice minima ligulata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 25-35 mm long, enclosed by 4-5 shortly ciliate-scabrous lepanthiform sheaths. Leaf erect, coriaceous, ovate, subacute, 15-17 mm long, 8 mm wide, the rounded base contracted into a petiole 1.5 mm long. Inflorescence a dense, distichous, successively flowered raceme up to 5 mm long, borne behind the leaf by a filiform peduncle 3-4 mm long; floral bract 1 mm long; pedicel 0.75 mm long; ovary 1 mm long; flowers small, dull purple; dorsal sepal glabrous, broadly ovate-triangular, concave, acute, acuminate, 4.25 mm long, 2.75 mm wide, connate to the lateral sepals for 1 mm; lateral sepals minutely pubescent within, ovate, acute, acuminate, connate 1 mm, 4.25 mm long, 3 mm wide together, each 1-veined; petals minutely pubescent, transversely bilobed, 0.75 mm long, 2 mm wide, the upper lobe broadly oblong, rounded, the lower lobe narrowly oblong, obtuse; lip purple, the blades minutely pubescent, ovate, 1.25 mm long, the apices narrowly obtuse, the bases rounded, the connectives oblong, connate to the column above the middle, the sinus cleft with a small, ligulate, decurved, glabrous appendix; column 1.25 mm long, the anther dorsal, the stigma ventral.

Etymology: From the Latin *usitatus*, "usual, familiar," referring to the lack of any unusual floral or vegetative character.

Type: *BOLIVIA:* SANTA CRUZ: epiphytic in cloud forest near Siberia, alt. 2500 m, 1 Dec. 1978, *C. Luer, F. Fuchs et al. 3595* (Holotype: SEL).

This little species possesses no single, distinctive feature, but it is the combination of all the seemingly usual, non-outstanding, morphological characters that distinguish *L. usitata*: small habit, ovate leaves, short inflorescence, ovate sepals, the dorsal concave, the laterals minutely pubescent, inequally bilobed petals, and the "standard" lip with a minute, glabrous appendix.

Lepanthes vasquezii Luer, sp. nov.

Planta mediocris, racemo laxe paucifloro foliis ellipticis multilongiore, sepalo dorsali ovato concavo longiacuminato, synsepalo triangulari angustiore, lobis petalorum inaequalibus lobo superiore late ovato majore, labelli laminis ellipticis obtusis pubescentibus, appendice anguste sigmoidea.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 5-9 cm long, enclosed by 5-7 close, glabrous to microscopically scabrous lepanthiform sheaths. Leaf erect, coriaceous, elliptical, subacute, 3.5-4 cm long including the 3-4 mm long petiole, 1.8-2.2 cm wide, lightly suffused with purple beneath, the base cuneate into the petiole. Inflorescence a weak, loose, secund, few-flowered raceme 13-18 cm long including the slender peduncle, 2-3 flowers open simultaneously; floral bract 2.5 mm long; pedicel 5-6 mm long; ovary 1.5 mm long, costate; sepals light green, suffused with brown centrally, glabrous, the dorsal sepal ovate, concave, acute, long-acuminate, 16 mm long, 6 mm wide, connate to the lateral sepals for 1.5 mm, the lateral sepals connate to about the middle into a narrowly triangular, acute lamina 19 mm long, 4 mm wide, the attenuate apices approximate; petals dark green, minutely pubescent, unequally bilobed, 1.75 mm long, 5 mm wide, the upper lobe broadly ovate, rounded, the lower lobe much smaller, narrowly oblong, obtuse; lip blue-green, minutely pubescent, the blades elliptical with rounded ends, 1.6 mm long, the inner margins ciliate, the connectives short, from the bases of the blades, connate to the column above the middle, the appendix pubescent, narrowly oblong-sigmoid; column 1.5 mm long, the anther dorsal, the stigma ventral.

Etymology: Names in honor of Roberto Vásquez Ch., investigator and artist of orchids of Bolivia.

Type: *BOLIVIA:* LA PAZ: Prov. of Inquisivi: epiphytic in cloud forest between Inquisivi and Circuata, alt. 2550 m, 27 Jan. 1981, *C. Luer, J. Luer, R. Vásquez & E. Besse 5801* (Holotype: SEL).

The long, few-flowered raceme of widely gaping, narrow flowers of this species is reminiscent of the Colombian *L. ionoptera* Rchb. f. The dark green petals have a large, hairy, earlike upper lobe, and the blue-green blades of the lip obscure the sigmoid-shaped appendix.

Lepanthes vatrax Luer, sp. nov.

Planta parva caespitosa, inflorescentia subdensa flexuosa folio anguste ovato breviore, sepalis glabris acutis, petalis grandibus transverse bilobatis, labelli laminis ovatis, connectivis latissimis brevibus, appendice extus pedunculata bilobata.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2-4.5 cm long, enclosed by 4-5 close, microscopically scabrous lepanthiform sheaths. Leaf erect, coriaceous, narrowly ovate, acute, 27-43 mm long, 6-7 mm wide, the base narrowly cuneate into a petiole ca. 3 mm long. Inflorescence a subdense, subflexuous, successively flowered raceme up to 10 mm long, borne by a filiform peduncle 12-15 mm long up the back of the leaf; floral bract 1.25 mm long, ciliate; pedicel and ovary each 1 mm long; sepals glabrous, the dorsal sepal purple with the apex yellow, ovate, acute, 3 mm long, 2.5 mm wide, connate basally to the lateral sepals for 1 mm, the lateral sepals yellow, ovate, oblique, acute, connate 1.3 mm, 2.5 mm long, 2.5 mm wide together, each 1-veined; petals yellow, suffused with purple, transversely oblong-bilobed, 1 mm long, 2.66 mm wide, the upper lobe oblong with the apex rounded, the lower lobe narrower; lip orange, the blades ovate, 1.3 mm long with obtuse ends microscopically ciliate, the connectives short, very broadly cuneate, connate to the base of the column, the appendix a pendent, pedunculated, bilobed gland near the middle of the under surface of the body of the connectives; column 1 mm long, the anther and stigma apical.

Etymology: From the Latin *vatrax*, "a clubbed foot," in reference to the appearance of the appendix of the lip.

Type: *ECUADOR:* ZAMORA-CHINCHIPE: epiphytic in cloud forest, Quebrada Honda, alt. 1100 m, 18 Jan. 1982, *D. D'Alessandro 120* (Holotype: SEL), C. Luer illustr. 9077.

This species may be identified by the narrow leaf with a shorter, slightly flexuous raceme, the proportionately large petals, and the tiny pendent pedunculated appendix on the under surface of the lip.

Lepanthes vermicularis Luer, sp. nov.

Planta parvula caespitosa, racemo laxe fractiflexo folio obovato petiolato multilongiore, caudis sepalorum breviter setaceis, petalis transverse bilobatis auriculatis, labelli laminis oblongis, appendice glabra vermiculari.

Plant very small, epiphytic, caespitose; roots slender. Secondary stems slender, 10-15 mm long. enclosed by 3-4 close, minutely ciliate lepanthiform sheaths. Leaf suberect, thinly coriaceous, obovate, petiolate, obtuse, 10-13 mm long including the petiole 2-3 mm long, 5-6 mm wide, cuneate below into the petiole. Inflorescence a progressively lengthening, loose, fractiflex raceme up to 5 cm long including the filiform peduncle; floral bract 2 mm long; pedicel 1.5 mm long; ovary 1 mm long; sepals pale orange, carinate-serrulate, the dorsal sepal ovate, concave, 6 mm long, 2.5 mm wide, the subacute apex produced into a setaceous tail ca. 2 mm long, the lateral sepals ovate, oblique, connate 2 mm, 6.5 mm long, 3.75 mm wide together, the margins serrulate, the acute apices attenuated into tails ca. 2 mm long; petals red-orange, transversely oblong, bilobed, 0.8 mm long, 2.25 mm wide, the upper lobe elliptic with the apex rounded or earlike, the lower lobe shorter, narrowly oblong, obtuse; lip red-orange, the blades oblong, 1.25 mm long with rounded ends, minutely ciliate, the connectives short, narrowly cuneate, connate to the under surface of the column at the base, the appendix glabrous, cylindrical, incurved, acute; column 0.75 mm long, the anther apical, the stigma ventral.

Etymology: From the Latin *vermicularis*, "wormlike," in reference to the appendix of the lip.

Type: *ECUADOR:* ZAMORA-CHINCHIPE: epiphytic in cloud forest south of the pass south of Yangana, alt. 2600 m, 3 March 1982, *C. Luer, D. D'Alessandro & S. Dalström 7122* (Holotype: SEL).

This small species is characterized by the loose, flexible, flexuous raceme of short-tailed flowers. The upper lobes of the petals are earlike and the wormlike appendix of the lip is naked and incurved.

Lepanthes vespa Luer & Vásquez, sp. nov.

Planta parva, racemo laxe paucifloro folio late elliptico multilongiore, sepalis acuminatis lateralibus ciliatis, petalis transverse acuminatis, labelli laminis oblongis, appendice ligulata pubescenti, columna gracillima.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2-3.5 cm long, enclosed by 4-7 close, minutely ciliate lepanthiform sheaths. Leaf erect, coriaceous, broadly elliptical, obtuse, 12-14 mm long including the 1.5 mm long petiole, 6-8 mm wide, the base broadly cuneate into the petiole. Inflorescence a weak, loose, lightly flexuous, successively several-flowered raceme up to 5 cm long; floral bract 1 mm long; pedicel 0.75 mm long; ovary 1 mm long; sepals translucent pale rose, the dorsal sepal ovate, acute, acuminate, 6.5 mm long, 3.25 mm wide, the margins slightly irregular, connate to the lateral sepals for 1 mm, the lateral sepals ovate, acute, acuminate, connate 3 mm, 6 mm long, 4.25 mm wide together, the margins ciliate; petals rose, suffused with tan, microscopically pubescent, transversely oblong, 1 mm long, 5.25 mm wide, the upper lobe triangular-subfalcate, acute, the lower lobe triangular-acute, acuminate; lip rose, suffused with tan, microscopically pubescent, the blades oblong with obtuse ends, 1.3 mm long, the connectives short, cuneate, connate to the column below the stigma, the appendix narrowly ligulate, pubescent; column 2 mm long, the apical half dilated with a large dorsal anther and ventral stigma, the lower half extremely slender.

Etymology: From the Latin *vespa,* "a wasp," referring to the wasplike shaft of the column.

Type: *BOLIVIA:* SANTA CRUZ: epiphytic in cloud forest near Siberia, alt. 2500 m, 1 Dec. 1978, *C. Luer, F. Fuchs et al. 3591* (Holotype: SEL).

This species is most remarkable for the extremely slender shaft of the column which supports not only the seemingly oversized anther and stigma, but also the lip surrounding the anther and stigma. It is reminiscent of the waist of a wasp.

Lepanthes ximenae Luer, sp. nov.

Planta mediocris caespitosa, inflorescentia folio elliptico acuto breviore, racemo congesto disticho, floribus parvis aurantiacis, sepalis glabris acutis, petalis transverse bilobatis, labelli laminis ovatis glabris appendice minuta pubescenti.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 5-9 cm long, enclosed by 8-12 ciliate lepanthiform sheaths. Leaf erect, coriaceous, elliptical, acute, lightly acuminate, 4-6 cm long, 1-1.8 cm wide, cuneate below into a petiole ca. 3 mm long. Inflorescence a congested, distichous, successively flowered raceme up to 20 mm long, borne by a filiform peduncle 10-20 mm long up the back of the leaf; floral bract 1.3 mm long, ciliate; pedicel 2 mm long; ovary 1.5 mm long, with lightly irregular, narrow wings; sepals orange, glabrous, the dorsal sepal triangular, acute, 3.5 mm long, 3.1 mm wide, connate basally for 1 mm to the lateral sepals, the lateral sepals ovate, oblique, acute, 3.5 mm long, 1.75 mm wide, connate 1 mm; petals orange with red margins, transversely oblong-bilobed, 1.3 mm long, 3 mm wide, the upper lobe elliptical with the apex rounded, the lower lobe smaller, subfalcate, obtuse; lip red, the blades glabrous, ovate, 1.5 mm long, the apices acute, the bases rounded, the connectives broadly cuneate, connate to the column above the base, the appendix minute, triangular, pubescent; column 1.25 mm long, the anther and stigma apical.

Etymology: Named in honor of Ximena Leon de Hirtz of Quito, Ecuador, who participated in collecting numerous specimens in this remote region of Ecuador.

Type: *ECUADOR:* NAPO: epiphytic in wet forest near Rio Jatunyacu west of Tena, alt. 600 m, 21 Feb. 1982, *C. Luer & A. Hirtz 6915* (Holotype: SEL).

This species is distinguished not by a single, unique character, but by the combination of the characters described above. The appendix is reduced to a tiny, triangular, pubescent body at the sinus. The apical stigma is one of those that resembles the snout of a pig.

Lepanthes zongoensis Luer & Vásquez, sp. nov.

Species haec *L. longipedicellatae* C. Schweinf. similis, sed racemis folio brevioribus et pedicelis brevibus differt.

Plant small to medium in size, epiphytic, caespitose; roots relatively coarse. Secondary stems stout, erect, 5-7.5 cm long, enclosed by 5-7 ciliate lepanthiform sheaths with markedly dilated ostia. Leaf erect, coriaceous, suffused with purple beneath, elliptical, obtuse, 25-27 mm long including the petiole 2-3 mm long, 14-17 mm wide, cuneate below into the petiole. Inflorescence a subdense, distichous, successively flowered raceme up to 10 mm long, borne behind the leaf by a filiform peduncle up to 5 mm long; floral bract 1.5 mm long, spiculate; pedicel 1.5 mm long; ovary 1.25 mm long; sepals brown, spiculate externally along the thickened veins, shortly pubescent within, the dorsal sepal ovate, concave, the acute apex attenuate, 5.25 mm long, 2.25 mm wide unexpanded, connate 0.5 mm to the lateral sepals, the lateral sepal narrowly ovate, attenuate, 6 mm long, 1.5 mm wide, concave with involute margins, connate 0.5 mm; petals purple-brown, transversely oblong with obtuse apices, 0.5 mm long, 3 mm wide, microscopically pubescent; lip purple-brown, microscopically pubescent, the blades narrowly oblong, 1.5 mm long, the apices acute, incurved beneath the apex of the column, the connectives broadly cuneate, the lip 2 mm wide expanded, connate to the base of the column, the appendix a minute lobule in the acute sinus, with a microscopic tuft of hairs immediately above and below the lobule; column 1.5 mm long, the anther and stigma apical.

Etymology: Named for the vicinity of Rio Zongo where this species was discovered.

Type: *BOLIVIA:* LA PAZ: Prov. of La Paz: epiphytic in cloud forest along the Rio Zongo, alt. 2600 m, 27 Jan. 1980, *C. Luer, J. Luer, R. Vásquez & R. Lara 4972* (Holotype: SEL).

Although the specific epithet of the related Peruvian species implies long pedicels, Schweinfurth failed to include the measurement in his description, but states that the pedicels are "much surpassing the subtending bract." The pedicels of *L. zongoensis* are only 1.5 mm long, as long as the subtending bract. Other minor differences will be noted in the above description.

Lepanthes zygion Luer, sp. nov.

Planta parva caespitosa, inflorescentia folio ovato acuminato sub- vel aequilongo, racemo congesto disticho, sepalis breviter acuminatis lateralibus serrulatis, petalis transverse oblongis, labelli laminis subfalcatis columnam amplectentibus, appendice cylindrica pubescenti.

Plant small, epiphytic, caespitose; roots slender. Secondary stems slender, suberect, 3.5-6.5 cm long, enclosed by 7-10 close, microscopically ciliate lepanthiform sheaths. Leaf suberect, thinly coriaceous, ovate, acuminate, acute, 18-28 mm long, 9-11 mm wide, the obtuse base contracted into a 2 mm long petiole. Inflorescence a congested, distichous, successively flowered raceme up to 15 mm long, borne by a filiform peduncle up to 20 mm long; floral bract 0.75 mm long; pedicel 2-3 mm long; ovary 1.25 mm long, winged; sepals yellow, suffused with red-brown centrally, carinate, the dorsal sepal triangular, acute, shortly acuminate, 3.5 mm long, 2.25 mm wide, connate 0.6 mm to the lateral sepals, the lateral sepals ovate, oblique, 3.6 mm long, 1.5 mm wide, connate for 0.6 mm, the acute apices acuminate, the margins minutely ciliate; petals orange, transversely oblong, 0.5 mm long, 3 mm wide, the upper lobe oblong, obtusely angled on the inner margin near the apex, the lower lobe shorter, narrowly oblong, obtuse; lip orange, the blades oblong-subfalcate, 1 mm long, glabrous, obliquely clasping the column near the middle, the connectives short, broad, connate to the under surface of the column near the base, the appendix small, oblong, pubescent, continuous from the under surface of the sinus; column 1 mm long, the anther and stigma apical.

Etymology: From the Greek *zygion*, "a little yoke," referring to the blades of the lip surrounding the column.

Type: *ECUADOR:* PICHINCHA: epiphytic in cloud forest above Mindo, alt. 2000 m, 11 Nov. 1979, *C. Luer & A. Hirtz 4731* (Holotype: SEL); same area, 15 Oct. 1979, *A. Hirtz s.n.* (SEL).

The inflorescence of this little species may equal the leaf in length as the congested, distichous, long-pedicelled raceme elongates. The subfalcate lobes of the lip clasp the column near the middle like a yoke around the neck of a pig.

MISCELLANEOUS NEW SPECIES IN THE PLEUROTHALLIDINAE (ORCHIDACEAE)

*C. A. Luer**

Acostaea bicornis Luer, sp. nov.

Species haec *A. costaricensis* Schltr. similis sed callo labelli bicorni differt.

Plant very small, epiphytic, densely caespitose, roots comparatively thick, flexuous. Secondary stem abbreviated, 1-3 mm long, enclosed by 2-3 loose, ribbed, tubular sheaths. Leaf erect, coriaceous, elliptical-obovate, margined, 5-10 mm long, 3-4 mm wide, the obtuse apex notched, apiculate, the base cuneate into a short petiole. Inflorescence a weak, successively flowered raceme up to 3 cm long including the filiform peduncle, from a node on the secondary stem; floral bract 0.5-1 mm long; pedicel 1-1.5 mm long; ovary 1 mm long; sepals translucent red, glabrous, the dorsal sepal transversely ovate, obtuse, deeply concave, 3 mm long, 5 mm wide expanded, the lateral sepals connate into an elliptical lamina 5 mm long, 3 mm wide; petals translucent yellow, elliptical to lightly falcate, acute, 2 mm long, 0.75 mm wide; lip yellow, more or less oblong, 2 mm long, 0.5 mm wide, the apex bifid with a deflexed apiculum in the sinus, the base membranous, concave, attached with tension to the column-foot, the disc with a broad, elongated callus, rounded below, the apical portion free, subquadrate, the lateral apical angles produced into short, antrorse horns; column yellow-white, membranous with broadly rounded wings, bidentate at the apex, 2 mm long, 3 mm wide expanded, with a broad, concave foot 1.5 mm long.

Etymology: From the Latin *bicornis*, "two-horned," referring to the apex of the callus of the lip.

TYPE: *PANAMA:* PANAMA: Epiphytic in cloud forest, Cerro Jefe, alt. 1000 m, 2 March 1976, *C. Luer, J. Luer, P. Taylor & R. Dressler 744* (Holotype: SEL).

Distribution: Eastern Panama.

This species is similar to *A. costaricensis* but differs in the two-horned callus of the lip. See next species for discussion.

Acostaea unicornis Luer, sp. nov.

Species haec *A. costaricensis* Schltr. similis sed callo labelli unicorni differt.

Plant very small, epiphytic, densely caespitose; roots comparatively thick, flexuous. Secondary stem abbreviated, 2-4 mm long, enclosed by 2-3 loose, ribbed, tubular sheaths. Leaf erect, coriaceous, elliptical-obovate, margined, 7-15 mm long, 3-5 mm wide, the obtuse apex notched, apiculate, the base cuneate into a short petiole. Inflorescence a weak, successively flowered raceme up to 4 cm long including the filiform peduncle, from a node on the secondary stem; floral bract 0.5-1 mm long; pedicel 1-1.5 mm long; ovary 1 mm long; sepals translucent red-purple, glabrous, the dorsal sepal transversely ovate, obtuse, deeply concave, 3 mm long, 5 mm wide spread out, the lateral sepals connate into an elliptical lamina 5 mm long, 3 mm wide; petals translucent yellow, elliptical to lightly falcate, acute, 1.5 mm long, 0.4 mm wide;

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lip yellow, suffused with red, more or less oblong, 2 mm long, 0.5 mm wide, the apex bifid with a short, decurved apiculum in the sinus, the base membranous and concave, broadly attached under tension to the column-foot, the disc with a broad, elongated callus, rounded below, the apical portion free, ligulate and produced at the apex into an upcurved horn, pubescent beneath; column yellow-white, membranous with broadly rounded wings, bidentate at the apex, 2 mm long, 3 mm wide expanded, with a broad, concave foot 1.5 mm long.

Etymology: From the Latin *unicornis*, "one-horned," in reference to the apex of the callus of the lip.

TYPE: *PANAMA:* COCLE: Epiphytic in cloud forest above El Valle, alt. 1000 m, 6 March 1976, *C. Luer, J. Luer, R. L. Dressler & P. Taylor 760* (Holotype: SEL); VERAGUAS: Epiphytic in cloud forest above Santa Fe, alt. ca. 700 m, 5 Sept. 1976, *C. Luer & R. L. Dressler 1143* (SEL).

Distribution: Central Panama.

The above two species apparently differ from *A. costaricensis* only in the morphology of the callus of the lip. The anterior margin of the protruding callus is rounded in *A. costaricensis*, and the large cells are visible microscopically. These cells are produced into cilia or fimbria in *A. pleurothalloides* Schltr. A hornlike process extends forward from the anterior margin of the callus in *A. unicornis*. Some cilia or cellular processes are present on the under surface. Two hornlike processes protrude forward from the sides of the apex of the callus in *A. bicornis*.

Numerous populations of four species of *Acostaea* from seven Panamanian localities (Cerro Colorado and Cerro Hornito in Chiriqui, the continental divide above Santa Fe in Veraguas, the mesa above El Valle in Coclé, and in the province of Panama, Cerro Jefe, the Altos de Pacora, and the Llano-Carti area) have been examined. The size of the plants varies somewhat, but the flowers vary in size and color within each population. Red or purple to yellow or orange, or combinations of any two colors seem to occur at random. The shapes of the sepals and petals, however, are rather constant, but the lips are variable. The Costa Rican *A. costaricensis* and *A. pleurothalloides* are found to be widespread, but *A. bicornis* is found only in the region of Cerro Jefe (eastern Panama) and *A. unicornis* is found only in Veraguas and Coclé (central Panama).

Masdevallia datura Luer & Vásquez, sp. nov.

Planta mediocris caespitosa, foliis angustissime ellipticis pedunculo unifloro ter longioribus, flore grandi spectabili niveo, sepalis glabris in tubum longissimum connatis, petalis anguste oblongis apice apiculatis erosis base unguiculatis cum dente crasso, labello ovato acuto.

Plant medium in size, epiphytic, caespitose; roots slender. Secondary stems slender, erect, 2-4.5 cm long, enclosed by 2 loose, ribbed, tubular sheaths. Leaf erect, coriaceous, very narrowly elliptical to linear-elliptical, narrowly long-petiolate, 11-16 cm long including the 3-5 cm long petiole, 1-1.5 cm wide, the apex acute, gradually narrowed below into the petiole. Inflorescence a large, solitary, showy, snow-white flower borne by a peduncle 6-9 cm long, with a bract near the base, from a node low on the secondaty stem; floral bract 13 mm long; pedicel 13-15 mm long; ovary 8-9 mm long; sepals white, slightly suffused with yellow and veined in light yellow toward the base with a small brown spot on either side, glabrous, the blade of the dorsal sepal narrowly obovate, 37 mm long, 13 mm wide, connate 34 mm to the lateral sepals to form a long, horizontal, trumpet-shaped, sepaline tube, the free portion transversely triangular, the obtuse apex contracted into a slender, erect, yellow tail 55-65 mm long, the lateral sepals narrowly obovate, oblique, 47 mm long, connate 43 mm, 35 mm wide together, the obtuse apices contracted into slender tails 43-55 mm long; petals white, narrowly oblong, 7.75 mm long, 1.5 mm wide, the

apex acute, apiculate, erose and with a low, rounded callus externally, the lower margin with a longitudinal callus ending in a thick, retrorse tooth, the base slender-clawed; lip white, ovate, 5.5 mm long, 2.75 mm wide, the apex acute, undulate, the base rounded, the disc with a low pair of longitudinal calli above the middle; column white, semiterete, 5 mm long, the foot 4 mm long including the slender extension.

Etymology: Named for the similarity of the flower to a flower of the genus *Datura* of the nightshade family. *Datura* from the Hindu *dhatura*, "a plant."

Type: *BOLIVIA:* LA PAZ: Prov. of Inquisivi: epiphytic in cloud forest between Inquisivi and Circuata, alt. 2500 m, 29 Jan. 1981, C. Luer, J. Luer, E. Besse & R. Vásquez, cultivated in Munich, West Germany by W. Koeniger, flowered in cult. April 1982, *C. Luer 8136* (Holotype: SEL).

This species was discovered without flowers in a remote cloud forest in central Bolivia in January 1981. The plants were sent to Germany where they were cultivated in the greenhouses of W. Koeniger and B. Wuerstle. About a year later the plants produced a profusion of the huge, spectacular, snow-white flowers. The trumpet-shaped sepaline tube spontaneously reminds all who see the plant of a species of *Datura*.

Masdevallia leptoura Luer, sp. nov.

Species haec *M. pachyurae* Rchb. f. similis sed statura floribusque paulo majoribus et caudis sepalorum gracilibus differt.

Plant medium in size, epiphytic, densely caespitose; roots coarse. Secondary stems erect, 3-4 cm long, enclosed by 2-3 loose, tubular sheaths. Leaf erect, coriaceous, elliptical, long-petiolate, 8-15 cm long including the 3-6 cm long petiole, 2-3 cm wide, the apex subacute to obtuse, the base cuneate into the petiole. Inflorescence a loosely several-flowered erect raceme of simultaneous colorful flowers, 15-25 cm long including the peduncle, with 1-2 bracts below the rachis, from a node low on the secondary stem; floral bract inflated, 5-6 mm long; pedicel 5-7 mm long; ovary 2-4 mm long with 3 undulating crests; sepals glabrous, pale yellow-green or whitish, with purple dots usually arranged transversely, the dorsal sepal ovate, concave, 12-15 mm long, 12-15 mm wide expanded, connate to the lateral sepals for 5-6 mm to form a shallow, gaping cup, the rounded apex contracted into a slender, yellow tail 8-12 mm long, the lateral sepals oblong, 12-14 mm long, 4-6 mm wide, connate 1.5-3 mm, the oblique apices contracted into tails similar to that of the dorsal sepal; petals white, often dotted with purple, more or less oblong, 6 mm long, 2.5 mm wide, apiculate at the apex, both margins denticulate above the middle, the lower margin with a longitudinal callus, the base unguiculate; lip brown to green marked with purple, oblong, 6 mm long, 2.5 mm wide, the margins erect, overlapping the blade above the middle as obtuse lateral lobes, the anterior portion rounded, the base truncate, cleft; column yellow-white with purple margins, semiterete, 6 mm long, the thick foot 3 mm long with a short, incurved extension.

Etymology: From the Greek *leptos*, "slender" and *-urus*, "tailed," in reference to the tails compared to those of *M. pachyura*.

Type: *ECUADOR:* BOLIVAR: terrestrial on the road embankment west of Guaranda, alt. 2800 m, 10 March 1982, *C. Luer & S. Dalstrom 7264* (Holotype: SEL); CANAR: new road between Cuenca and Guayaquil, E. Sanchez, 16 Nov. 1979, cultivated at SEL, flowered in cult. 25 Dec. 1979, *C. Luer 4840* (SEL); CHIMBORAZO: epiphytic in cloud forest remnant east of Pallatonga, alt. 2200 m, 13 Nov. 1979, *C. Luer, J. Luer & A. Hirtz 4808* (SEL).

Two distinct but very similar species grow intermixed in the cloud forests of the western slopes of the Andes of central Ecuador. The smaller of the two, with thick, clavate tails, was described by Reichenbach as *M. pachyura*. The other, a little larger with more flowers with narrow, non-clavate tails, is more frequently encountered. Reichenbach's type of *M. pachyura* consists of two flowers, unmistakably those of the smaller one with clavate tails. *Masdevallia aureodactyla* is probably only an unusually colorful form of the latter. The species with the larger flowers and slender tails, described here as *M. leptoura*, was picured and identified in *Curtis' Botanical Magazine* 8361 by Rolfe as *M. pachyura*.

Masdevallia margaretae Luer, sp. nov.

Planta mediocris caespitosa, pedunculo triquetro gracili foliis ellipticis longiore, racemo congesto successivifloro, sepalis caudatis in cupulam brevem connatis, lamina synsepali purpurea rotundata, petalis oblongis acutis carinatis, labello ad medium constricto apice verrucoso acuto.

Plant medium in size, presumably epiphytic, caespitose; roots slender. Secondary stems erect, to 2.5 cm long, enclosed by 2-3 tubular sheaths. Leaf erect, coriaceous, up to 8 cm or longer including a petiole ca. 1.5 cm long,up to 2.7 cm wide, cuneate below into the petiole. Inflorescence a congested, successively flowered raceme borne by an erect or suberect, slender, triquetrous peduncle to 12.5 cm long or longer, with a bract near the base, from a node low on the secondary stem; floral bracts imbricating, 8 mm long; pedicel 6 mm long; ovary 2.5 mm long; dorsal sepal orange, ovate, 24 mm long, 5 mm wide, connate to the lateral sepals for 1.5 mm into a shallow, sepaline cup, the acute, free portion contracted into a slender, yellow tail; lateral sepals purple, orange toward the base, ovate, oblique, connate 7 mm into a broad, rounded lamina 12 mm long, 15 mm wide expanded, the obtuse apices contracted into yellow tails 10 mm long; petals white, oblong, 6 mm long, 1.25 mm wide, the apex yellow, acute, the lower margin with a longitudinal callus ending in a rounded protuberance above the base; lip purple, subpanduriform, 6 mm long, 2.75 mm wide expanded, sharply constricted at the middle with marginal folds, the anterior half of the lip ovate, verrucose, acute, the posterior half cuneate, smooth, the base truncate, hinged beneath; column white, semiterete, 5 mm long, the foot 2 mm long with a short, incurved extension.

Etymology: Named in honor of Mrs. Margaret Herring of Seattle, Washington, who submitted this species to the Orchid Identification Center of the American Orchid Society for identification.

Type: *COLOMBIA:* without locality, cultivated in Seattle, WA, by Margaret Herring, s.n. 8 July 1982, *C. Luer 8075* (Holotype: SEL).

This species was imported from Colombia, unfortunately without locality. It was purchased and cultivated by Margaret Herring who submitted the plant to the OIC. In addition to other characters, this species differs from each of its Colombian relatives by its distinctive lip.

Masdevallia mendozae Luer, sp. nov.

Planta parva caespitosa, pedunculo unifloro foliis ellipticis breviore, flore aureo sepalis in tubum longum cylindricum connatis caudis brevissimis, petalis oblongis carina in dentem magnum supra basim effecta, labello oblongo basi concavo.

Plant small, epiphytic, caespitose; roots slender. Secondary stems blackish, 1-1.7 cm long, enclosed by 2 close, tubular sheaths. Leaf erect, coriaceous, the blade narrowly elliptical, 3-5.5 cm long including the 1-1.5 cm long petiole, 1.2-1.6 cm wide, the apex obtuse, cuneate below into the more or less blackish petiole. Inflorescence a solitary, bright orange, tubular flower borne by a slender peduncle 3 cm long, with a bract near the base, from a node low on the secondary stem; floral bract close, tubular, 5 mm long; pedicel 5 mm long; ovary 3-4 mm long; sepals orange, glabrous externally, shortly pubescent within above the middle, carinate along the midveins, the dorsal sepal linear-oblong, curved, 27 mm long, 8 mm wide expanded, connate to the lateral sepals for 22 mm to form a curved, cylindrical tube, the free portion rounded, abruptly contracted into a 2 mm long, recurved tail, the lateral sepals connate 19 mm into a more or less oblong, curved lamina 24 mm long, 14 mm wide expanded, the free portions rounded, convex, abruptly contracted into tails 1.5 mm long; petals orange, oblong, 6.5 mm long, 1.75 mm wide, the truncate apex lightly trilobed, with a carina along the lower margin becoming a large, thick, incurved tooth extending beyond the unguiculate base; lip orange, oblong, 7.5 mm long, 2.9 mm wide, the apex truncate, lightly decurved, with a low callus, the base truncate, thickened, concave on the end and hinged below, the disc with a pair of low, parallel, indistinct calli; column semiterete, 5.5 mm long, the foot 3 mm long, with a slender, incurved extension.

Etymology: Named in honor of Hartman Eudaldo Mendoza of Vilcabamba, Ecuador, who discovered this species.

Type: *ECUADOR:* ZAMORA-CHINCHIPE: Loma del Aguila, road to Valle de Numbala, east of the pass, alt. 2200 m, Sept. 1979, collected by H. Mendoza, cultivated by A. Andreetta in Cuenca, flowered in cult. 27 Oct. 1982, *C. Luer 8201* (Holotype: SEL).

To date only a single plant of this species has been discovered. In a remote virgin cloud forest, H. Mendoza found the plant with a single flower lying near the trail on the forest floor as if it had fallen from a perch higher in the trees. He could find no more. In April 1982 another intensive search for plants was conducted in this area by three persons, but again in vain. The original plant was gradually deteriorating in the warm climate of Vilcabamba, but it quickly began to thrive in the cool climate of Cuenca after it was given to Padre Andreetta. The plant has now quadrupled in size, and it has already produced two flowers. The long, curved, bright orange, cylindrical sepaline tube suggests a hummingbird as the pollinator.

Masdevallia panguiensis Luer & Andreetta, sp. nov.

Species haec *M. ayabacanae* Luer affinis sed flore minore, sepalis intus valde verrucosis caudis multibrevioribus et labello plano verrucoso differt.

Plant medium in size, epiphytic, caespitose; roots coarse. Secondary stems stout, erect, 2-2.5 cm long, enclosed by 2-3 tubular sheaths. Leaf erect, thickly coriaceous, narrowly obovate, 11-14 cm long, 2-2.3 cm wide, the apex obtuse, gradually narrowed below to the subpetiolate base. Inflorescence a succession of solitary flowers borne in a congested raceme 1-1.5 cm long, by an ascending peduncle 11 cm long or longer, with 3-4 bracts, from a node low on the secondary stem; floral bract and pedicel each 5-6 mm long; ovary 10 mm long; sepals dark purple, coarsely verrucose within, the dorsal sepal ovate, 47 mm long, 8 mm wide, connate to the lateral sepals for 6 mm to form a short, cylindrical tube, the acute free portion acuminate into an erect, rigid tail becoming yellow toward the apex, the lateral sepals ovate, oblique, 47 mm long including the tails, connate 16 mm into a lamina 19 mm wide, the acute apices acuminate into rigid tails 1.5-2 cm long; petals dark purple, fleshy, cuneate, unguiculate, 6 mm long, 4 mm wide, the apex broadly bilobed with an obscure, obtuse apiculum externally between the lobes; lip dark purple, oblong, flat, 6 mm long, 2.5 mm wide, the obtuse apex minutely serrulate, verrucose above the middle, smooth below the middle with thin, erect margins above the subcordate base; column dark purple, semiterete, 4.5 mm long, the thick foot with a very short, incurved extension.

Etymology: Named for the community of Pangui, near the locality where this species was found.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest above Pangui, alt. 1500 m, M. Portilla, cultivated by A. Andreetta in Cuenca, flowered in cult. 1 Nov. 1982, *C. Luer 8289* (Holotype: SEL).

This species is closely related to *M. ayabacana* from adjacent northern Peru to the southwest and from above Bomboiza to the north. *Masdevallia panguiensis* may be identified by the smaller habit, smaller flowers with much shorter tails, sepals coarsely verrucose within, and a flat lip without the recurved apical callus which extends beneath as a prominent tuberosity in *M. ayabacana.*

Masdevallia receptrix Luer & Vásquez, sp. nov.

Planta mediocris caespitosa, pedunculo triquetro foliis subaequilongo, racemo successivi-bifloro congesto, sepalis brunneis in cupulam latam connatis, cauda sepali dorsalis erecta crassa caudis sepalorum lateralium duplolongiore, petalis bidentatis supra basim callosis, labello subpandurato arcuato apice rotundato.

Plant medium in size, presumably epiphytic, caespitose; roots coarse. Secondary stems erect, stout, 1.5-4.5 cm long, enclosed by 2-3 loose, tubular sheaths. Leaf erect, coriaceous, oblong-elliptical, 9-15 cm long including an indistinct petiole 2-3 cm long, 2-2.6 cm wide, the apex rounded, minutely notched, cuneate below into the petiole. Inflorescence a successively 2-flowered (? always) congested raceme borne by an erect, stout, triquetrous peduncle up to 11 cm long or longer, from a node at the base of the secondary stem; floral bracts imbricating, 15 mm long; pedicels 10-13 mm long, 5 mm apart; ovary 6 mm long; sepals rigidly fleshy, brown, yellow toward the bases, the margins more or less reflexed, microscopically pubescent within, the blade of the dorsal sepal ovate, carinate, 13 mm long, 10 mm wide, connate to the lateral sepals for 5 mm to create a gaping cup, the subacute apex contracted into an erect, yellow tail 35 mm long, 2 mm thick in the distal half, the lateral sepals ovate, oblique, 20 mm long, 15 mm wide, connate 13 mm and forming a cavity below the mentum with the column-foot to accommodate the apex of the lip, the subacute apices contracted into yellow tails 16 mm long; petals yellow, oblong, 7 mm long, 2 mm wide; the apex brown, unequally bidentate, the lower margin with a longitudinal callus ending in a rounded swelling above the base; lip tan, marked with dark brown, oblong-pandurate, arcuate, 7 mm long, 3 mm wide, with marginal folds near the middle, ovate and lightly verrucose above with undulate margins, the apex rounded, rectangular below the middle, the truncate base hinged beneath; column yellow, semiterete, 5 mm long, the foot equally long.

Etymology: From the Latin *receptor, receptrix,* "a receptor," in allusion to the concavity of the synsepal to accommodate the apex of the lip. The development of a similar cavity may be seen in several other species (e.g. *M. odontopetala* Luer).

Type: *BOLIVIA:* LA PAZ: collected by Dino Menato of Chulumani, probably in the Prov. of Sud Yungas, without locality, cultivated in Spielberg, West Germany, by B. Wuerstle, flowered in cult. April 1982, *C. Luer 8144* (Holotype: SEL).

This species was collected by Dino Menato and cultivated by him at his home in Chulumani. A division of his plant was given to us at the time of our visit in January 1980. The division was taken to Germany in May, and it flowered two years later in the greenhouse of Berthold Wuerstle.

Masdevallia ustulata Luer, sp. nov.

Planta mediocris caespitosa, pedunculo gracili unifloro foliis plus minusve aequilongo, sepalis flavis brunneo striatis glabris in tubum gibbosum connatis caudis gracilibus aequilongis, petalis truncatis basi uncinatis, labello oblongo subtruncato.

Plant medium in size, epiphytic to terrestrial, caespitose; roots slender. Secondary stems erect, slender, 2-4.5 cm long, enclosed by 2-3 loose, tubular sheaths. Leaf erect, coriaceous, long-petiolate, 8-14 cm long including the slender 3-5 cm long petiole, 2-3.2 cm wide, the apex subacute to obtuse, cuneate below into the petiole. Inflorescence a solitary flower borne by a slender peduncle 7.5-15 cm long, with a bract near the base, from a node low on the secondary stem; floral bract 8-12 mm long; pedicel 8-9 mm long; ovary 6-9 mm long; sepals yellow, veined in purple-brown, glabrous, the blade of the dorsal sepal 20-23 mm long, 7-8 mm wide, connate to the lateral sepals for 14-16 mm to form a cylindrical tube, the free portion triangular, the acute apex contracted into an erect, slender tail 3-4.5 cm long, the lateral sepals oblong-falcate, connate 13-17 mm to form a shallow concavity above the short mentum with the column-foot, the free portions gradually narrowed into slender tails, the entire length 5-6 cm, the width 1-1.5 cm together; petals light yellow, intensely marked with purple on the lower half, oblong, 6-7 mm long, 2-2.75 mm wide, the truncate apex bilobed, with a carina along the lower margin ending in an acute, retrorse, uncinate tooth above the base; lip cream to rose, marked with purple, oblong, 6.5-7 mm long, 3.25 mm wide, the apex truncate or broadly obtuse, lightly recurved, the truncate base shallowly retuse, hinged below; column white with purple margins, semiterete, 6 mm long, the stout foot 3 mm long with a short, incurved extension.

Etymology: From the Latin *ustulatus*, "singed, scorched," in allusion to the yellow color of the sepals with brownish veins.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest east of Paute, alt. 1700 m, 10 July 1977, *C. Luer, J. Luer, G. Luer & A. Andreetta 1660* (Holotype: SEL); NAPO: cloud forest north of Baeza, alt. ca. 1500 m, 10 Aug. 1978, *C. Luer, J. Luer, A. Hirtz & A. Andreetta 3214* (SEL); *COLOMBIA:* PUTUMAYO: without locality, collected by Hermano Octavio Ospina of Sibundoy, flowered in cult. 5 Aug. 1978, *C. Luer 3093* (SEL); *PERU:* AMAZONAS: cloud forest between Leimebamba and Chachapoyas, alt. 2500 m, Aug. 1978, W. Koeniger 7b, cultivated in Munich, West Germany, flowered in cult. 28 May 1980, *C. Luer 5280* (SEL).

This species, known from the cloud forests of the eastern slopes of the Andes from southern Colombia to northern Peru, is similar to *M. ensata* Rchb. f. from the Eastern Cordillera of Colombia and Venezuela, but *M. ustulata* may be distinguished by the larger flower with a shorter mentum of the column-foot. The petals are heavily marked with purple on the lower half which ends in a sharp, hooked tooth slightly longer than the base of the petal.

Masdevallia venatoria Luer & Malo, sp. nov.

Planta parva caespitosa pedunculo unifloro foliis ellipticis brevipetiolatis breviore, flore specioso aurantiorubescenti, sepalis brevicaudatis in cupulam brevem connatis, petalis oblongis supra basim cum dente obtuso, labello elliptico apice parvicalloso.

Plant small, epiphytic, caespitose; roots slender. Secondary stems blackish, slender, 0.5-1 cm long, enclosed by 2 loose, tubular sheaths. Leaf erect, coriaceous, elliptical, short-petiolate, 3-5 cm long including the 0.8-1.5 cm long petiole, 1-1.7 cm wide, the apex obtuse, cuneate below into the more or less blackish petiole. Inflorescence a solitary flower borne by a suberect peduncle 2-2.5 cm long, with a bract near the base, from a node low on the secondary stem; floral bract thin, tubular, 6 mm long; pedicel 5 mm long; ovary 5 mm long; sepals colorful, glabrous, the free margins minutely erose, the dorsal sepal light red-orange below the middle fading into yellow above the middle, obovate, shallowly concave, 15 mm long, 9.5 mm wide, connate to the lateral sepals for 6 mm to form a shallow, gaping cup, the apex rounded, abruptly contracted into a slender, orange tail 16 mm long, the lateral sepals red on the lower third turning to red-orange on the middle third and light red-orange on the distal third, oblong, 18 mm long, 10 mm wide,

more or less reflexed, connate for 6 mm to form a shallow mentum, the apices obtuse, oblique, contracted into slender orange tails 10 mm long; petals white with a few purple dots, oblong, 6 mm long, 2 mm wide, the truncate apex shallowly bilobed, with a carina along the lower margin ending in a short, obtuse tooth above the base; lip yellow, dotted with purple, elliptical, 6 mm long, 2.75 mm wide, the apex rounded with a small, marginal, purple callus, the base truncate, hinged beneath; column white, marked with purple on the margins, semiterete, 5 mm long, the foot with a slender, incurved extension 2 mm long.

Etymology: From the Latin *venatorius*, "of or belonging to the hunter," in dedication to all those who look for orchids.

Type: *ECUADOR*: ZAMORA-CHINCHIPE: epiphytic in cloud forest of the eastern slope of the mountain range east of the old trail from Loja to Zamora, alt. 2300 m, 9 Sept. 1981, B. Malo, cultivated at Tarqui, flowered in cult. 26 Oct. 1982, *C. Luer 8195* (Holotype: SEL).

Only one plant of this showy little species has been discovered to date. Benigno Malo describes finding a single flowering plant growing on a small transverse branch in a remote cloud forest. A search for more plants yielded a small but venomous snake in the Crotalid family lurking among the lush growth of epiphytes growing on the same branch. The snake met with disaster and was brought home in a glass jar, but no other plant of the new *Masdevallia* could be found. A second search has not yet been conducted.

Myoxanthus affinoides Luer, sp. nov.

Species haec *M. affinis* (Lindl.) Luer similis sed habitu minore, foliis angustissimis, inflorescentia pauciflora, sepalis extus spiculatis et labello subpandurato supra medium bilamellato differt.

Plant medium in size, epiphytic, shortly repent, caespitose; roots coarse, flexuous. Secondary stems slender, erect, unifoliate, 10-34 cm long, enclosed by a series of 6-8 close, imbricating, tubular sheaths, the lowermost hispidulous. Leaf erect, coriaceous, narrowly ovate, 7-15 cm long, 1-1.5 cm wide, the apex acute, tridenticulate, the base narrowly cuneate, subsessile. Inflorescence a succession of solitary flowers produced singly or 2-3 simultaneously from a cluster of exserted nodes near the apex of the secondary stem; peduncles spiculate, 2-3 mm long; floral bract spiculate, 3 mm long; pedicel glabrous, 2 mm long; ovary densely short-spiculate, 1.5-2 mm long; sepals yellow-green, dotted with purple along the veins, covered by short red spicules externally, glabrous within, the dorsal sepal ovate, acute, 9 mm long, 3.25 mm wide, the lateral sepals ovate, oblique, acute, 8 mm long, 3 mm wide, connate basally, pubescent within near the base; petals yellow, thick, 8.5 mm long, 2.5 mm wide, ovate below the middle, minutely serrate and contracted near the middle into a semiterete, narrowly obtuse apex; lip yellow below the middle, dark purple above the middle, oblong-subpandurate, 3 mm long, 1.5 mm wide, the margins below the middle broadly rounded and erect, the apical half rounded, with a pair of converging lamellae; column rosy white, semiterete, 3 mm long, the foot thick, concave, 2 mm long.

Etymology: Named for the similarity of the flowers of this species to those of *M. affinis*.

TYPE: *ECUADOR*: ZAMORA-CHINCHIPE: epiphytic in cloud forest south of the pass south of Yangana, alt. 2600 m, 3 March 1982, *C. Luer, A. Andreetta, D. D'Alessandro & S. Dalström 7114* (Holotype: SEL); Quebrada Honda, south of Yangana, alt. 1800 m, June 1982, *D. D'Alessandro 238* (SEL).

Distribution. Southern Ecuador.

This species is most similar to *M. affinis*, but *M. affinoides* may be recognized by the smaller habit, the much narrower leaves, the fewer flowers covered by red spicules, and the subpandurate, bilamellate lip. The clinandrium of both species is bidentate.

Myoxanthus gorgon Luer, sp. nov.

Inter species generis *Myoxanthi* Poepp. & Endl. planta grandis floribus flavis brevipedunculatis, bracteis floralibus dilatatis longipubescentibus, ovario et basibus sepalorum bractea obtectis, petalis longis crassis semiteretibus infra medium denticulatis, labello parvo simplici.

Plant large, epiphytic, caespitose; roots coarse. Secondary stem stout, erect, 30-40 cm tall, enclosed by a series of 6-7 close, imbricating, tubular sheaths, the lowermost densely short-hispidulous. Leaf erect, rigidly coriaceous, narrowly elliptical-ovate, acute, 20-30 cm long, 3.5-5 cm wide, longitudinally veined, the base cuneate, sessile. Inflorescence a fascicle of simultaneous, solitary, yellow flowers borne from a cluster of nodes near the apex of the secondary stem; peduncles 1-2 mm long, shortly pubescent; floral bract with a white pubescence, broadly expanded enclosing the pedicel, ovary and bases of the sepals, 5 mm long, ca. 9 mm wide at the orifice expanded; pedicel 0.5 mm long; ovary 1 mm long, minutely pubescent; dorsal sepal elliptical-ovate, obtuse, 15 mm long, 4.5 mm wide; lateral sepals lightly adherent nearly to the apex, oblong-ovate, 12 mm long, 7 mm wide together, the apex obtuse or more or less rounded together; petals 15 mm long, ovate in the lower third, 3.5 mm wide with denticulate margins, the distal two thirds thickened, semiterete, curved, 1.5 mm wide, narrowly obtuse; lip white, marked with purple, ovate with the apex rounded, 2.5 mm long, 1.25 mm wide, with a low, yellow callus at the base, the disc with a pair of low, longitudinal carinae; column light green, thick, broadly winged, 2 mm long, the apex bidentate, the thick foot 1.5 mm long.

Etymology: Named for a gorgon of Greek mythology in reference to the similarity of the inflorescence to a head of snaky locks.

Type: *ECUADOR:* MORONA-SANTIAGO: epiphytic in cloud forest north of Gualaquiza, alt. 1500 m, March 1982, C. Luer & A. Andreetta, cultivated at SEL, flowered 14 March 1983, *C. Luer 8693* (Holotype: SEL).

This species is similar to *M. monophyllus* Poepp. & Endl. in size, and the pubescent floral bracts also engulf the bases of the sepals. The flowers are smaller, yellow, and with thick, elongated, curved petals. The lateral sepals are lightly adherent. The petals are thick and semiterete in the distal two thirds. The simple lip is much smaller than the stout, bidentate column.

Myoxanthus priapus Luer, sp. nov.

Inter species *Myoxanthi* Poepp. & Endl. species haec habitu gracili, floribus purpureis breviter pubescentibus et labello oblongo callo supra basin crasso erecto dignoscenda.

Plant medium in size, epiphytic, shortly repent, caespitose; roots coarse, flexuous. Secondary stems slender, erect, unifoliate, 10-21 cm long, enclosed by a series of 6-7 close, imbricating, tubular sheaths, the lowermost hispidulous. Leaf erect, coriaceous, narrowly elliptical, 6-12 cm long, 1-1.5 cm wide, the apex acute, tridenticulate, the base narrowly cuneate, subsessile. Inflorescence a succession of solitary flowers produced singly or 2-3 simultaneously from a cluster of exserted nodes near the apex of the secondary stem; peduncles pubescent, 3-4 mm long; floral bract pubescent, 2-3 mm long, pedicel 2 mm long; ovary densely short-pubescent, 1.5 mm long; sepals purple, shortly pubescent externally, glabrous within, the dorsal sepal oblong, acute, 6 mm long, 2.5 mm wide, the lateral sepals ovate, oblique, concave, obtuse, apiculate, 5 mm long, 3 mm wide, connate basally; petals yellow with a purple midvein, 4.5 mm long, 1.75 mm wide, oblong below the middle, subacutely angled at the middle into a semiterete, 2 mm long, narrowly obtuse apex; lip purple-black, oblong, 2.25 mm long, 1 mm wide, with a pair of small, uncinate marginal lobes near the middle, the apex rounded, the base truncate, with a short pair of acute marginal angles, the disc with a thick, erect, 0.5 mm tall, shallowly grooved callus above the base, with a pair of low, parallel carinae above the middle; column purple, semiterete, 2 mm long, the thick foot concave, with a pair of marginal calli.

Etymology: Named for Priapus, the Greek mythological god of reproduction, in allusion to the callus of the lip.

TYPE: *ECUADOR:* LOJA: epiphytic in cloud forest east of Yangana, Altos de Numbala, alt. 2800-2900 m, June 1982, *D. D'Alessandro 195* (Holotype: SEL). C. Luer illustr. 8118.

Distribution: Southern Ecuador.

This species differs from all the other known species of the genus by the large, thick, erect callus above the base of the lip. Except for the lip, *M. priapus*, a species of high altitude, appears most similar to *M. georgei* (Luer) Luer, a species of low altitude.

Platystele viridis Luer, sp. nov.

Planta pro genere grandis, racemo multifloro foliis longipetiolatis multilongiore, floribus viridibus, sepalis oblongis obtusis, petalis oblongis acutis et labello minuto oblongo semitereti.

Plant large for the genus, presumably epiphytic, caespitose; roots slender. Secondary stems erect, slender, 2.5-3.5 cm long, enclosed by 3-4 loose, thin, ribbed, tubular sheaths. Leaf erect, thinly coriaceous, narrowly obovate, long-petiolate, 5-7 cm long including the 2-3 cm long petiole, 1.2-1.5 cm wide, the apex obtuse, cuneate below into the slender petiole. Inflorescence an erect raceme, up to 20 cm long including the peduncle, with up to 23 simultaneous, light green, glabrous flowers; floral bract 1.5 mm long; pedicel 2 mm long; ovary 1 mm long; sepals oblong-ovate, obtuse, the dorsal sepal 4 mm long, 1.25 mm wide, the lateral sepals connate 1 mm, 4 mm long, 2.25 mm wide together; petals oblong, lightly oblique, acute, 3 mm long, 1.75 mm wide; lip oblong, semiterete, obtuse, 1.6 mm long, 0.5 mm wide, the surface and margins microscopically cellular; column 0.5 mm long, hooded with a bilobed stigma, footless.

Etymology: From the Latin *viridis*, "green," referring to the flowers.

Type: *ECUADOR:* without locality, cultivated by the Jesups in Bristol, Connecticut, flowered in cultivation 28 March 1982, *C. Luer 7425* (Holotype: SEL).

Unfortunately, the locality of this giant of the genus is unknown. It is easily recognized by the tall raceme of numerous, simultaneous, green flowers. The sepals are narrowly ovate but obtuse, and the minute lip is semiterete.

Pleurothallis megaloöphora Luer, sp. nov.

Planta perparva caespitosa, racemo foliis ellipticis breviore, floribus successivis atropurpureis, ovario trialato grandi, sepalis anguste triangularibus carnosis clausis, petalis anguste ovatis pubescentibus, labello parvissimo quinquilobato.

Plant very small, epiphytic, shortly climbing to caespitose; roots very fine. Secondary stems fascicled, 3-5 mm long, enclosed by 2-3 thin, ribbed, tubular sheaths. Leaf erect to suberect, coriaceous, elliptical, subacute, 15-22 mm long, 5-8 mm wide, cuneate below into the subpetiolate base. Inflorescence a raceme 5-15 mm long including the peduncle, of several, successive flowers, borne from a node on the secondary stem; floral bract and pedicel each 1.5-2 mm long; ovary proportionately large, 2 mm long, 2.5 mm wide, trialate; sepals purple, non-spreading, glabrous, thick, narrowly triangular, acute, subconduplicate, 8 mm long, 1.5-2 mm wide expanded; petals narrowly ovate, acute, 5 mm long, 1 mm wide, the midvein subcarinate and glandular-pubescent externally; lip more or less oblong, 5-lobed, 1.5 mm long, 0.3 mm wide, ovate and narrowly obtuse above the middle, with a pair of uncinate, marginal lobes below the middle and a pair of pedunculated, membranous lobes at the base, with a minute, cleft callus immediately above the base; column semiterete, 1.25 mm long, the clinandrium erose, with a thick, curved foot.

Etymology: From the Greek *megalo*, "large," *oön*, "egg," and *phoros* "bearing," hence, bearing a large ovary.

Type: *ECUADOR:* NAPO: epiphytic in wet forest near Rio Jatuncayu west of Tena, alt. 600 m, 21 Feb. 1982, *C. Luer, A. Hirtz & X. Leon 6933* (Holotype: SEL).

The oversized ovary accompanied by essentially unopened flowers suggests cleistogamy, but the flowers fade, usually falling without persisting fruit as seen in most other cleistogamous species. This species had been found in previous trips to this area, and attempts have been made in vain to cultivate it in the hope of obtaining an open flower.

Pleurothallis tipuloides Luer, sp. nov.

Planta parva caespitosa, caulibus secundariis gracilibus foliis ovatis acuminatis longioribus, floribus tenuibus successivis longipedunculatis, sepalo dorsali synsepalo petalisque longiacuminatis, petalis ciliatis, labello trilobato, lobis basalibus rotundatis erectis serrulatis, lobo antico longiattenuato basi calloso.

Plant small, epiphytic, densely caespitose, roots slender, flexuous. Secondary stems suberect to erect, slender, unifoliate, 4-9 cm long, with a close, tubular sheath below the middle and another 1-2 sheaths at the base. Leaf coriaceous, suberect to spreading, ovate, 3.5-6 cm long, 1.5-2 cm wide, the apex acuminate, acute, tridenticulate, the middle tooth long-apiculate, the base rounded, sessile. Inflorescence a succession of solitary, delicate flowers borne by an ascending peduncle 1.5-2 cm long, from a 2 mm long spathe at the base of the leaf; floral bract 3 mm long; pedicel 4 mm long; ovary 2 mm long; sepals translucent light green suffused with purple toward the base, glabrous, the dorsal sepal concave, ovate basally, 28 mm long, 3 mm wide unspread, the apex acuminate into a filiform tail, the lateral sepals connate into a synsepal similar to the dorsal sepal, 28 mm long, 3.5 mm wide unspread; petals widespread, translucent green mottled with brown, narrowly ovate, oblique, 20 mm long, 1.5 mm wide, the lower portion ciliate, gradually contracted above into a filiform tail; lip 3-lobed, 5 mm long, 2 mm wide unspread, the basal lobes light green, rounded, erect, embracing the column, minutely denticulate anteriorly, the anterior lobe orange, smooth, narrowly ovate, attenuate, acute, thickened at the base with a glenion between the lateral lobes; column stout, 1.5 mm long, footless.

Etymology: Named for the fancied resemblance of the flower to a crane fly *(Tipula).*

TYPE: *ECUADOR:* PICHINCHA: epiphytic in cloud forest west of Mindo toward Puerto Quito, alt. 1600 m, 13 March 1982, *C. Luer, A. Hirtz & S. Dalström 7324* (HOLOTYPE: SEL).

Distribution: Western Ecuador.

This fragile little species is related to *P. amphigya* Luer & Escobar, *P. arachnion* Luer, and what is assumed to be *P. quadricaudata* Schltr. (the latter was described from a flower without a lip!), but *P. tipuloides* may be distinguished from them by the serrulate basal lobes and the long-attenuate middle lobe of the lip.

Pleurothallis valladolidensis Luer, sp. nov.

Planta mediocris caespitosa, caulibus secundariis gracilibus folio deflexo anguste cordato longioribus, spatha magna erecta, flore magno successivo roseobrunneo, sepalo dorsali synsepaloque late ellipticis obtusis, petalis hastatis acutis unguiculatis marginibus minute erosis, labello suborbiculari concavo intus verruculoso basi unguiculato calloso.

Plant medium in size, epiphytic, caespitose, roots slender, flexuous. Secondary stems slender, unifoliate, 10-30 cm long, with a close tubular sheath below the middle and another at the base. Leaf horizontal to deflexed, very narrowly ovate, 10-15 cm long, 1.8-2 cm wide, the apex acute, tridenticulate, the sessile base deeply cordate, the basal lobes ca. 1 cm deep. Inflorescence a succession of large, solitary flowers borne from an erect, foliaceous spathe 15-18 mm long, 6 mm wide, at the base of the leaf, the flower rosy brown, facing downward; peduncle 5 mm long, the floral bract 10 mm long, the pedicel 8 mm long, all concealed within the spathe; ovary 7 mm long, minutely verrucose; sepals glandular-cellular, the dorsal elliptical, obtuse, 15 mm long,

11 mm wide, 7(9)-veined, the laterals completely connate into a lamina similar to the dorsal sepal; petals glandular-cellular, ovate-hastate, 11 mm long, 6 mm wide, 3-veined, the apex acute, the margins minutely erose-denticulate, the base unguiculate; lip yellow, suborbicular, 7 mm long, 6.25 mm wide, concave with thickened, slightly irregular margins, verrucose within toward the base, the apex rounded, the base unguiculate with a flattened callus beneath the column; column stout, pedestal-like without a foot, 3 mm long, 3.5 mm wide, the stigma bilobed.

Etymology: Named for the community of Valladolid near the locality where the species was discovered.

TYPE: *ECUADOR:* ZAMORA-CHINCHIPE: epiphytic in cloud forest near the river above Valladolid, alt. ca. 2000 m, 21 Feb. 1982, *D. D'Alessandro 167* (HOLOTYPE: SEL), C. Luer illustr. 8080.

Distribution: Southern Ecuador.

This species is another of many distinguished by a deflexed, narrowly cordate leaf with a conspicuous, erect spathe. The flower of *P. valladolidensis*, however, is large, rosy brown, with a unique, yellow, round, concave lip verrucose within toward the unguiculate base.

Restrepiopsis carnosa Luer & Vásquez, sp. nov.

Inter species generis *Restrepiopsidis* Luer species haec habitu grandi, floribus aurantiacis carnosis, sepalis lateralibus connatis, labelli lobis basalibus parvis et disco canaliculato distinguitur.

Plant large for the genus, epiphytic, caespitose; roots coarse. Secondary stems stout, erect, 7-8.5 cm long, enclosed by a series of 6-7 laterally compressed, loose sheaths; leaf erect, thinly coriaceous, elliptical, acute to subacute, 6-7.5 cm long, 2.5-3 cm wide, the base cuneate into a petiole ca. 1 mm long. Inflorescence a succession of solitary flowers borne in a fascicle from near the apex of the secondary stem, the pedicels 5 mm long; floral bract 5 mm long; pedicel 2.5 mm long, with a slender filament; ovary 4 mm long; sepals yellow-orange, fleshy, studded within above the middle by papillary cells, the dorsal sepal elliptical-ovate, concave, acute, 10 mm long, 4.5 mm wide, the lateral sepals connate to the apex into an obtuse, elliptical-ovate lamina 9 mm long, 5 mm wide; petals oblong-elliptical, 6 mm long, 2 mm wide, the apex rounded, the margins cellular; lip light green, oblong, 3-lobed, 4.5 mm long, 2 mm wide, the margins cellular denticulate, the apex rounded, shallowly retuse, the lobes basal, small, erect, obtuse, oblique, the disc longitudinally channeled, broadly at the base between the basal lobes, narrowly in the middle, disappearing at the apex; column light green, semiterete, 3 mm long, the foot 1 mm long.

Etymology: From the Latin *carnosus*, "fleshy," in reference to the substance of the flowers.

Type: *BOLIVIA:* LA PAZ: Dept. of Nor Yungas: epiphytic in cloud forest west of Coroico, alt. 1820 m, Feb. 1983, C. Luer, J. Luer, E. Besse & R. Vasquez, cultivated at SEL, flowered in cultivation 15 June 1983, *C. Luer 9083* (Holotype: SEL).

This is the first report of the genus from Bolivia. The flowers are orange, large and fleshy. The lateral sepals are connate to the apex, and the lip is three-lobed, the lobes small and basal.

Restrepiopsis pulchella Luer, sp. nov.

Inter species generis *Restrepiopsidis* Luer species haec habitu parvo, foliis late ovatis, sepalis latis et labello supra medium transverse oblongo bilobato cum callo inter lobos distinguitur.

Plant small, epiphytic, caespitose; roots slender. Secondary stems erect, slender, 2-4 cm long, enclosed by a series of 3-4 close, tubular sheaths. Leaf erect, coriaceous, suffused with purple beneath, ovate, subacute, 2-3.3 cm long, 1.2-2.4 cm wide, the rounded base contracted into a 3 mm long petiole. Inflorescence a solitary flower borne in succession in a fascicle from near the apex of the secondary stem by a filamentous peduncle 5-7 mm long; floral bract 3-4 mm long; pedicel 4-5 mm long with a small filament; ovary 3 mm long; sepals free, spreading, translucent yellow-green, minutely dotted with purple, the

dorsal sepal ovate, obtuse, concave, 7.5 mm long, 5 mm wide unexpanded, 3-veined, the lateral sepals narrowly obovate, subacute, 7 mm long, 2.5 mm wide, 3-veined; petals elliptical, 5 mm long, 2.5 mm wide, 1-veined, the apex rounded, the surface and margins prominently cellular; lip pandurate-trilobed, 4 mm long, 3.25 mm wide below the apex, transversely oblong above the middle, the apex broadly rounded or bilobed, lightly retuse, with erect, low, broad, obtuse marginal lobes above the base, the disc with calli at the bases of the lobes, concave between, and with a midline callus between the apical lobes, the base concave, hinged to the column-foot; column green, semiterete, 3.5 mm long, with a short, thick foot.

Etymology: From the Latin *pulchellus*, "pretty," in reference to qualities of the plant.

Type: *VENEZUELA:* without locality, obtained by B. Wuerstle from Hubben, cultivated at Spielberg, West Germany, flowered in cultivation, 13 Sept. 1982, *C. Luer 8143* (Holotype: SEL).

This species may be distinguished from the others of the genus by the small habit and ovate leaves. The sepals are comparatively wide and the lip is widened across the transversely oblong, bilobed apex with a midline callus. The basal lobes are short, broad, and obtuse.

Scaphosepalum dodsonii Luer, sp. nov.

Inter species *Scaphosepali* Pfitz. habitu parvo, foliis spathulatis, pedunculo filiformi descendenti, flore atrorubro maculato, synsepalo mentoso, pulvinis triangularibus, petalis obliquis apiculatis basi callosis et labello alte bilamellato distinguitur.

Plant small, epiphytic, caespitose; roots slender, flexuous. Secondary stems blackish, unifoliate, 10-15 mm long, enclosed by 2-3 loose, ribbed sheaths. Leaf erect, coriaceous, elliptical-spathulate, long-petiolate, 20-35 mm long including the 5-15 mm long petiole, 12-16 mm wide, cuneate below into the slender, blackish petiole. Inflorescence a successively flowered raceme borne by a smooth, filiform, descending peduncle 5-7 cm long including the rachis, from a node high on the secondary stem near the abscission layer; floral bract 2 mm long; pedicel 4-7 mm long; ovary 2 mm long; sepals translucent green, spotted with dark red; middle sepal ovate and concave below the middle, tricarinate, 7.5 mm long, 3 mm wide expanded above the base, the apex contracted into a slender, terete tail; lateral sepals connate 4.5 mm into an oblong, carinate lamina with minutely ciliate margins and forming a deep, longitudinal mentum, 6 mm long, 5 mm wide expanded, the "cushions" distinct, triangular, 2.5 mm long, 1.5 mm wide, the rounded apices prolonged by the carinae into slender tails 5.5 mm long; petals oblong, oblique, 2.75 mm long, 1.5 mm wide, the rounded apex asymetrically apiculate, the base with a low, rounded callus on the antilabellar half; lip suboblong, multangular, arcuate, 2.5 mm long, 1.25 mm wide, the margins broad below the middle from a minutely lobulated base, ending abruptly near the middle, the disc with a pair of tall, erect lamellae filling the middle third, the anterior third spathulate, rounded, denticulate; column slender, arcuate, 3 mm long, broadly winged above the middle, the thick foot 2 mm long.

Etymology: Named in honor of Calaway H. Dodson, investigator of the flora of Ecuador, who discovered this species.

TYPE: *ECUADOR:* COTOPAXI: epiphytic in cloud forest, Tenefuerste, Rio Pilalo, alt. 1200 m, Feb. 1982, *C. H. Dodson & A. H. Gentry 12265* (Holotype: SEL), C. Luer illustr. 8117.

Distribution: Western Ecuador.

This small species resembles a dwarf *S. swertiaefolium* (Rchb. f.) Rolfe, but *S. dodsonii* is immediately distinguished by the minute flowers and habit with spathulate leaves, and the lip lacks the lateral lobes seen in *S. swertiaefolium*.

A NEW TAXON AND NAME CHANGES IN *SOLANUM* (SECT. *PETOTA*)

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SOLANUM BAEZENSE Ochoa sp. nov.

Herbaceum, tuberiferum. Plantae erectae, caules generatim simplici, graciles, 3-4 mm crassi, glabri; allae nullae vel peranguste alati, alae rectae sed difficiliter adspectabiles; internodia 4-6 cm longa. Folia imparipinnata immo brevia, lataque, 9-12 x 7-9 cm, 2-3-juga, foliola interjecta 0-4. Folia superne obscurios viridia quam subtus, petioli 1.0-2.5 cm longi; foliola elliptico-lanceolata vel auguste elliptico-lanceolata, sessilia vel breviter petiolulata, supra pilis brevibus, sparsioribus obtecta, subtus glabra. Foliolum terminale lateralibus paulo mayus 4.5-6.0 x 1.8-2.0 cm, apice acuminatum, basi attenuatum vel cuneatum. Foliola lateralis breviter acuminata, subacuminata vel acuta, basi attenuata vel rotundata. Foliola primi jugis supremi 3.7-4.5 x 1.5-1.8 cm, sessilia vel alicuando ad rhachin decurrentia; foliola interjecta sessilia, membranacea, suborbicularia, 2-3 mm diam. Inflorescentia cymosa, 5-6-flora, pedunculi 3-6 cm longi, glabri tamquam pedicelli et calyx, in medium vel paulo supra articulati, valde pigmentati. Calyx parvus 4-5 mm longus, pigmentatus, lobi elliptico-lanceolati, breviter acuminati, acumina acuta, 1.0-1.5 mm longa. Corolla rotata, parva, 1.6-2.0 cm diam., obscure violacea, stella fere nigra, splendens. Antherae 5.0-5.5 mm longae, anguste lanceolatae, basi cordatae; filamenta 0.3-0.5 mm longa, glabra. Stylus brevis 7.0-7.5 mm longus, 1.0-1.5 mm exsertus, basi usque ad 1/3 dense

papillosus; stigma capitatum, parvum, styli apice vix crassius. Ovarium longum, conicum, pigmentatum vel subpigmentatum. Species ad seriem Coniciba-ccata pertinet.

Holotypus: Field Museum of Natural History No. 1855458, Chicago, Illinois, U.S.A. *In silvis humi-dis, prope Baeza, Prov. Napo, Ecuador, alt. circa 1200 m, Januarius 1979, ab L. Besse, Kiat Tan et J. Halton, No. 050, inventum. Inum isotypus in Jardin Bot. Maria Selby, Florida, U.S.A. asservatum est.*

Solanum albicans (Ochoa) Ochoa *sp. et stat. nov.*
= *Solanum acaule* Bitt. var. *albicans* Ochoa. *In* Agronomía, Lima, 27:363-364, 1960.

= *Solanum acaule* subsp. *albicans* (Ochoa) Hawkes *comb. nov.* *In* Scot. Pl. Breed. St. Record: 117, 1963.

Solanum ancophilum (Corr.) Ochoa *sp. et stat. nov.*
= *Solanum rhomboideilanceolatum* Ochoa var. *ancophilum* Corr. *In* Wrigtia 2:195, 1961.

Solanum circaefolium Bitt. var. *capsicibaccatum* (Card.) Ochoa *comb. nov.*
= *Solanum capsicibaccatum* Card. *In* Rev. Agr. Cochabamba, 2:35, 1944.

Solanum circaefolium Bitt. var. *latifoliolatum* (Ochoa) Ochoa *comb. nov.*
= *Solanum capsicibaccatum* Card. var. *latifoliolatum* Ochoa. *In* Phytologia, 50:181-182, 1982.

Solanum donachui (Ochoa) Ochoa *sp. et stat. nov.*
= *Solanum garcia-barrigae* Ochoa var. *donachui* Ochoa. *In* Phytologia, 51:399-400, 1982.

TRICHOSALPINX, A NEW GENUS IN THE PLEUROTHALLIDINAE

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In the Pleurothallidinae three vegetatively similar genera are characterized by lepanthiform stems, i.e., secondary stems enclosed by a series of imbricating, ribbed, tubular sheaths dilated above to oblique ostia, and with the ribs and thickened margins of the ostia usually ciliate or scabrous. The three taxa may be differentiated from each other by the morphology of the column.

The column of *Lepanthes* Sw. is wingless and footless, with a dorsal, apical or subapical anther, and an apical or ventral stigma. The short, hooded column of *Lepanthopsis* (Cogn.) Ames is Platystele-like, with the anther apical and the stigma transversely bilobed. The column of *Pleurothallis* R. Br. Sect. *Lepanthiformes* (Lindl.) Cogn., proposed here as *Trichosalpinx*, is usually elongated, more or less winged, with an apical, subapical or ventral anther and stigma, and with a foot usually well-developed. The column could be called Pleurothallis-like sensu lato. The relationship of *Trichosalpinx* to *Pleurothallis* is analogous to the relationship of *Lepanthopsis* to *Platystele* Schltr. If *Lepanthopsis* is to be maintained, this taxon should be elevated to the rank of genus.

Trichosalpinx Luer, gen. nov.

Pleurothallis sect. *Brachystachyae* Lindl. Subsect. *Lepanthiformes* Lindl., Folia Orchid. Pleuroth. 25, 1859, in part.

Pleurothallis sect. *Elongatae* Lindl. Subsect. *Lepanthiformes* Lindl., Folia Orchid. Pleuroth. 26, 1859, in part.

Pleurothallis sect. *Acuminatae* Lindl. Subsect. *Lepanthiformes* Lindl., Folia Orchid. Pleuroth. 32, 1859, in part.

Pleurothallis sect. *Caulescentes* Lindl., Folia Orchid. Pleuroth. 44, 1859, in part.

Lepanthes sect. *Longicaulae* Barb. Rodr., Gen. Spec. Orch. 2: 40, 1882, in part.

Lepanthes sect. *Phyllocaulae* Barb. Rodr., Gen. Spec. Orch. 2:41, 1882, in part.

Lepanthes sensu Barb. Rodr., Vellosia 1, ed. 2: 120, 1891, in part.

Pleurothallis sect. *Lepanthiformes* (Lindl.) Cogn., Fl. Bras. 3(4): 591, 1896, in part.

Pleurothallis sect. *Bipaleolatae* Pabst, Orchid. Brasiliensis 162, 1975.

Herbae epiphyticae parvae vel grandes caulibus secundariis unifoliatis interdum superpositis. Vaginae caulinae imbricatae costatae tubulosae superne dilatatae cum ostio obliquo marginato, margine costisque plerumque breviter ciliatis scabrosisve. Inflorescentia uniflora racemosave. Petala integra fimbriatave. Labellum integrum vel trilobatum interdum fimbriatum. Columna elongata saepe alata, margine clinandrii brevi vel cucullato, pede columnae brevi elongatove, anthera stigmataque apicalibus subapicalibus vel ventralibus polliniis duobus.

Plants small to large, caespitose to scandent with prolific secondary stems. Sheaths of the secondary stems lepanthiform. Inflorescence usually racemose, rarely 1-flowered. Lateral sepals free or connate. Petals entire to fimbriate. Lip entire to 3-lobed, often fimbriate. Column usually elongated and winged, the foot usually well-developed, the anther apical to ventral, the stigma subapical to ventral. Pollinia 2.

Etymology: From the Greek *tricha* (τριχα), "a hair," and *salpinx* (σαλπιγξ), "a trumpet," in reference to the ciliated ribs and margins of the trumpet-like sheaths of the secondary stems.

TYPE: *Specklinia ciliaris* Lindl.

This somewhat diverse group of about 90 species is widely distributed from sea level to altitudes over 3000 meters, from southern Mexico to southern Brazil. Some species seem allied to *Pleurothallis*, others, to *Lepanthopsis*. The lips of some species are amazingly similar to the lips of some species of *Pleurothallis* sect. *Specklinia*, e.g. *P. barbulata* Lindl. and *T. ciliaris*, but vegetatively these two species are totally different. It would be interesting to discover if a common pollinator could account for this apparent example of convergent evolution.

The following new combinations become necessary.

Trichosalpinx acremona (Luer) Luer, comb. nov.
Pleurothallis acremona Luer, Selbyana 5: 157, 1979.

Trichosalpinx acunae Luer, nom. nov.
Pleurothallis obliquipetala Acuna & Schweinf., Bot. Mus. Leafl. 6: 3, 1938.

Trichosalpinx aequatorialis (Luer) Luer, comb. nov.
Pleurothallis aequatorialis Luer, Selbyana 5: 158, 1979.

Trichosalpinx alabastra (Luer & Escobar) Luer, comb. nov.
Pleurothallis alabastra Luer & Escobar, Orquideologia 16: 17, 1983.

Trichosalpinx apoda (Garay & Dunster.) Luer, comb. nov.
Pleurothallis apoda Garay & Dunsterv., Venez. Orchids Ill. 3: 246, 1965
Lepanthopsis apoda (Garay & Dunsterv.) Luer, Selbyana 7: 100, 1982.

Trichosalpinx arbuscula (Lindl.) Luer, comb. nov.
Pleurothallis arbuscula Lindl., Edward's Bot. Reg. 28: misc. 72, 1842.
Humboldtia arbuscula (Lindl.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.

Trichosalpinx arbusculoides (Hashimoto) Luer, comb. nov.
Pleurothallis arbusculoides Hashimoto, Bull. Natl. Sci. Mus. 4: 9, 1978.

Trichosalpinx bacillaris (Pabst) Luer, comb. nov.
Pleurothallis bacillaris Pabst, Arch. Jard. Bot. Rio de Janeiro 14: 7, 1956.

Trichosalpinx berlineri (Luer) Luer, comb. nov.
Pleurothallis berlineri Luer, Selbyana 3: 60, 1976.

Trichosalpinx bicolor (Barb. Rodr.) Luer, comb. nov.
Lepanthes bicolor Barb. Rodr., Rev. de Engenh. 3: 110, 1881 and Gen. Spec. Orch. Nov. 2: 49, 1882.

Trichosalpinx blaisdellii (S. Wats.) Luer, comb. nov.
Pleurothallis blaisdellii S. Wats., Proc. Amer. Acad. Arts 23: 284, 1888.
Pleurothallis peraltensis Ames, Sched. Orchid. 6: 65, 1923.
Pleurothallis standleyi Ames, Sched. Orchid. 9: 37, 1925.

Trichosalpinx bradei (Schltr.) Luer, comb. nov.
Pleurothallis bradei Schltr., Anexos Mem. Inst. Butantan, Secc. Bot. 1(4): 41, 1922.

Trichosalpinx brevispicata (C. Schweinf.) Luer, comb. nov.
Pleurothallis brevispicata C. Scweinf., Bot. Mus. Leafl. 10: 173, 1942.

Trichosalpinx carinifera (Barb. Rodr.) Luer, comb. nov.
Lepanthes carinifera Barb. Rodr., Rev. de Engenh. 3: 110, 1881 and Gen. Spec. Orch. Nov. 2: 69, 1882.
Pleurothallis carinifera (Barb. Rodr.) Cogn. Fl. Bras. 3(4): 584, 1896.

Trichosalpinx carinilabia (Luer) Luer, comb. nov.
Pleurothallis broadwayi var. *tricarinata* C. Schweinf., Bot. Mus. Leafl. 8: 42, 1940.
Pleurothallis carinilabia Luer, Selbyana 3: 256, 1977.

Trichosalpinx castellensis (Brade) Luer, comb. nov.
Pleurothallis castellensis Brade, Arch. Jard. Bot. Rio de Janeiro 9:9, 1949.

Trichosalpinx cedralensis (Ames) Luer, comb. nov.
Pleurothallis cedralensis Ames, Sched. Orchid. 4: 18, May 1923.
Pleurothallis myrtillus Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 108, Nov. 1923.

Trichosalpinx chaetoglossa (Luer) Luer, comb. nov.
Pleurothallis chaetoglossa Luer, Selbyana 3: 262, 1977.

Trichosalpinx chamaelepanthes (Rchb. f.) Luer, comb. nov.
Pleurothallis chamaelepanthes Rchb. f., Bonplandia 3: 240, 1855.
Humboldtia chamaelepanthes (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.

Trichosalpinx ciliaris (Lindl.) Luer, comb. nov.
Specklinia ciliaris Lindl., Edward's Bot. Reg. 24: misc. 31, April 1838.
Pleurothallis villosa Knowl. & Westc., Floral Cab. 2: 78, July 1838.
Pleurothallis lepanthiformis Rchb. f., Linnaea 18: 398, 1844.
Humboldtia lepanthiformis (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.
Humboldtia villosa (Knowl. & Westc.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.
Pleurothallis purpusii Schltr., Orchis 9: 49, 1915.
Pleurothallis brevis Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 183, 1923.
Pleurothallis gnomonifera Ames, Sched. Orchid. 6: 61, 1923.
Pleurothallis ciliaris (Lindl.) L. O. Wms., Caldasia 5: 14, 1942.

Trichosalpinx costata (Luer and Vásquez) Luer, comb. nov.
Pleurothallis costata Luer & Vásquez, Phytologia 46: 364, 1980.

Trichosalpinx crucilabia (Ames & Correll) Luer, comb. nov.
Pleurothallis crucilabia Ames & Correll, Bot. Mus. Leafl. 10: 76, 1942.

Trichosalpinx cryptantha (Barb. Rodr.) Luer, comb. nov.
Lepanthes cryptantha Barb. Rodr., Vellosia 1(ed. 2): 120, 1891.
Pleurothallis cryptantha (Barb. Rodr.) Cogn., Fl. Bras. 3(4): 587, 1896, not Barb. Rodr. 1877, nor Cogn. 1912.

Trichosalpinx curti-bradei (Pabst) Luer, comb. nov.
Pleurothallis microcharis Schltr. ex Hoehne, Bol. Mus. Nac. Rio de Janeiro 12(2): 22, 1936, not Schltr. 1921.
Pleurothallis curti-bradei Pabst, Arch. Jard. Bot. Rio de Janeiro 14: 10, 1956.

Trichosalpinx dependens (Luer) Luer, comb. nov.
Pleurothallis dependens Luer, Selbyana 3: 94, 1976.

Trichosalpinx dinotheri (Rchb. f.) Luer, comb. nov.
Pleurothallis dinotheri Rchb. f. & Warsc., Bonplandia 2: 114, 1854.
Pleurothallis diptera Lindl., Folia Orchid. Pleuroth. 14, 1859.
Humboldtia dinotheri (Rchb. f. & Warsc.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.
Humboldtia diptera (Lindl.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.
Pleurothallis tricaudata Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9:77, 1921.

Trichosalpinx dirhamphis (Luer) Luer, comb. nov.
Pleurothallis dirhamphis Luer, Selbyana 3: 292, 1977.

Trichosalpinx dura (Lindl.) Luer, comb. nov.
Pleurothallis dura Lindl., Folia Orch. Pleuroth. 32, 1859.
Humboldtia dura (Lindl.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.
Pleurothallis corazonica Lehm. & Krzl., Bot. Jahrb. Syst. 26: 443, 1899.
Pleurothallis amygadalodora Krzl., Bot. Jahrb. Syst. 37: 521, 1906.
Pleurothallis lepanthopsis Schltr., Repert. Spec. Nov. Regni Veg. 14: 386, 1916.
Pleurothallis lepanthoides Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 106, 1920.
Pleurothallis williamsii Ames, Orchid. 7: 120, 1922.

Trichosalpinx egleri (Pabst) Luer, comb. nov.
Pleurothallis egleri Pabst, Ann. XIV Congr. Soc. Bot. Bras. 14, 1964.

Trichosalpinx falcipetala (Schltr.) Luer, comb. nov.
Pleurothallis falcipetala Schltr., Repert. Spec. Nov. Regni Veg. Beih. 27: 163, 1924.

Trichosalpinx flexibilis (Luer & Vásquez) Luer, comb. nov.
Pleurothallis flexibilis Luer & Vásquez, Phytologia 49: 205, 1981.

Trichosalpinx foliata (Griseb.) Luer, comb. nov.
Pleurothallis foliata Griseb., Fl. Brit. W. Ind. 610, 1864.
Humboldita foliata (Griseb.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.
Pleurothallis broadwayi Ames, Orchid. 2: 267, 1908.
Pleurothallis guadalupensis Cogn., Symb. Antill. 6: 432, 1909.
Pleurothallis anomala Hoehne, Arch. Inst. Biol. (Sao Paulo) 2: 43, 1929.
Pleurothallis broadwayi ssp. *anomala* (Hoehne) Garay, Arch. Bot. Rio de Janeiro 11: 53, 1951.

Trichosalpinx hypocrita (Garay & Dunsterv.) Luer, comb. nov.
Pleurothallis hypocrita Garay & Dunsterv., Venez. Orchid. Ill. 6: 344, 1976.

Trichosalpinx inaequisepala (C. Schweinf.) Luer, comb. nov.
Pleurothallis inaequisepala C. Schweinf., Bot. Mus. Leafl. 10: 180, 1942.

Trichosalpinx inquisiviensis (Luer & Vásquez) Luer, comb. nov.
Pleurothallis inquisiviensis Luer & Vásquez, Phytologia 49: 208, 1981,

Trichosalpinx intricata (Lindl.) Luer, comb. nov.
Pleurothallis intricata Lindl., Orchid. Linden. 1, 1846.
Humboldtia intricata (Lindl.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.

Trichosalpinx lancifera (Schltr.) Luer, comb. nov.
Pleurothallis lancifera Schltr., Repert. Spec. Nov. Regni Veg. Beih. 23: 48, 1924.

Trichosalpinx mastophora (Luer & Vásquez) Luer, comb. nov.
Pleurothallis mastophora Luer & Vásquez, Phytologia 49: 209, 1981.

Trichosalpinx matinhensis (Hoehne) Luer, comb. nov.
Pleurothallis matinhensis Hoehne, Arq. Bot. Estado Sao Paulo, n.s., forma major 1:13, 1938.

Trichosalpinx membraniflora (C. Schweinf.) Luer, comb. nov.
Pleurothallis membraniflora C. Schweinf., Bot. Mus. Leafl. 5: 91, 1938.

Trichosalpinx memor (Rchb. f.) Luer, comb. nov.
Pleurothallis memor Rchb. f., Bonplandia 4: 330, 1856.
Humboldtia memor (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 667, 1891.

Trichosalpinx microcharis (Schltr.) Luer, comb. nov.
Pleurothallis microcharis Schltr., Repert. Spec. Nov. Regni Veg. Beih. 8: 61, 1921, not Schltr. ex Hoehne 1936.

Trichosalpinx minutipetala (Ames & Schweinf.) Luer, comb. nov.
Pleurothallis minutipetala Ames & Schweinf., Sched. Orchid. 10: 32, 1930.

Trichosalpinx montana (Barb. Rodr.) Luer, comb. nov.
Lepanthes montana Barb. Rodr., Gen. Sp. Orchid. Nov. 1: 22, 1877.
Pleurothallis collina Cogn., Fl. Bras. 3(4): 582, 1896.

Trichosalpinx moschata (Rchb. f.) Luer, comb. nov.
Pleurothallis moschata Rchb. f., Xenia Orchid. 3: 42, t. 217, 1881.
Humboldtia moschata (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.

Trichosalpinx mouraeoides (Hoehne) Luer, comb. nov.
Pleurothallis versicolor Hoehne, Bol. Agric. (Sao Paulo) 34: 606, 1934, not Porsch 1905.
Pleurothallis mouraeoides Hoehne, Arq. Bot. Estado Sao Paulo, n.s., forma major, 1: 13, 1938.

Trichosalpinx multicuspidata (Rchb. f.) Luer, comb. nov.
Pleurothallis multicuspidata Rchb. f., Linnaea 41: 117, 1877.

Trichosalpinx nana (Ames & Schweinf.) Luer, comb. nov.
Pleurothallis nana Ames & Schweinf., Sched. Orchid. 8: 29, 1925.

Trichosalpinx notosibirica (Hashimoto) Luer, comb. nov.
Pleurothallis notosibirica Hashimoto, Bull. Natl. Sci. Mus. 4: 11, 1978.

Trichosalpinx nymphalis (Luer) Luer, comb. nov.
Pleurothallis nymphalis Luer, Phytologia 49: 212, 1981.

Trichosalpinx obliquipetala (Ames & Schweinf.) Luer, comb. nov.
Physosiphon obliquipetala Ames & Schweinf., Sched. Orchid. 8: 12, t. 22, 1925, not *Pleurothallis obliquipetala* Acuña & Schweinf. 1938.
Stelis obliquipetala (Ames & Schweinf.) L. O. Wms., Ceiba 5: 54, 1956.
Pleurothallis connata Luer, Selbyana 5: 388, 1981.

Trichosalpinx operculata Luer, comb. nov.
Pleurothallis operculata Luer, Phytologia 49: 213, 1981.

Trichosalpinx orbicularis (Lindl.) Luer, comb. nov.
Specklinia orbicularis Lindl., Edward's Bot. Reg. 24: misc. 31, 1838.
Pleurothallis orbicularis (Lindl.) Lindl., Edward's Bot. Reg. 28: misc. 79, 1842.
Pleurothallis biflora Focke, Tijdschr. Wis-Natuurk. Wetensch. 2: 197, 1949, not Schltr. 1923.
Humboldtia biflora (Focke) Kuntze, Rev. Gen. Pl. 2: 667, 1891.
Humboldtia orbicularis (Lindl.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.
Pleurothallis trachytheca Lehm. & Krzl., Bot. Jahrb. Syst. 26: 444, 1899.
Pleurothallis rotundata C. Schweinf., Bot. Mus. Leafl. 4: 115, 1937.

Trichosalpinx otarion (Luer) Luer, comb. nov.
Pleurothallis otarion Luer, Selbyana 7: 120, 1982.

Trichosalpinx pergrata (Ames) Luer, comb. nov.
Pleurothallis pergrata Ames, Sched. Orchid. 4: 24, 1923.

Trichosalpinx podoglossa (Hoehne) Luer, comb. nov.
Pleurothallis podoglossa Hoehne, Arq. Bot. Estado Sao Paulo, n.s. forma major, 1: 12, 1938.

Trichosalpinx pringlei (Schltr.) Luer, comb. nov.
Pleurothallis pringlei Schltr., Repert. Spec. Nov. Regni Veg. 3: 20, 1906.

Trichosalpinx pterophora (Cogn.) Luer, comb. nov.
Pleurothallis pterophora Cogn., Fl. Bras. 3(4): 583, 1896.
Pleurothallis pterophora var. *minor* Cogn., Fl. Bras. 3(4): 583, 1896.

Trichosalpinx pumila (Luer) Luer, comb. nov.
Pleurothallis pumila Luer, Selbyana 1: 268, 1975.

Trichosalpinx punctatifolia (Barb. Rodr.) Luer, comb. nov.
Pleurothallis punctata Lindl., Edward's Bot. Reg. 21: sub. t. 1797, 1835, not Ker 1823, nor Barb. Rodr. 1877, nor (Karst.) Schltr. 1919.
Lepanthes punctatifolia Barb. Rodr., Gen. Sp. Orchid. Nov. 2: 55, 1882.
Humboldtia punctata (Lindl.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.
Pleurothallis punctatifolia (Barb. Rodr.) Pabst, Orquidea 28: 227, 1966.

Trichosalpinx pusilla (Kunth) Luer, comb. nov.
Dendrobium pusillum Kunth, Gen. Spec. Pl. 1: 357, 1816.
Specklinia pusilla (Kunth) Lindl., Edward's Bot. Reg. 21: sub t. 1797, 1836.
Humboldtia pusilla (Kunth) Kuntze, Rev. Gen. Pl. 2: 668, 1891.
Pleurothallis pusilla (Kunth) Lindl., Edward's Bot. Reg. 28: misc. 82, 1842.
Pleurothallis lenticularis Luer, Selbyana 3: 132, 1976.

Trichosalpinx pyxos (Luer & Escobar) Luer, comb. nov.
Pleurothallis pyxos Luer & Escobar, Orquideologia 14: 168, 1981.

Trichosalpinx quadridentata (Barb. Rodr.) Luer, comb. nov.
Lepanthes quadridentata Barb. Rodr., Gen. Sp. Orchid. Nov. 2: 50, 1882.
Pleurothallis quadridentata (Barb. Rodr.) Cogn., Fl. Bras. 3(4): 454, 1896.
Pleurothallis mouraei Cogn., Fl. Bras. 3(4): 580, 1896.
Pleurothallis mouraei var. *brevifolia* Cogn., Fl. Bras. 3(4): 581, 1896.

Trichosalpinx quartzicola (Barb. Rodr.) Luer, comb. nov.
Lepanthes quartzicola Barb. Rodr., Vellosia 1, ed. 2: 119, 1891.
Pleurothallis quartzicola (Barb. Rodr.) Cogn., Fl. Bras. 3(4): 581, 1896.
Pleurothallis lepanthipoda Hoehne & Schltr., Album Secc. Bot. Mus. Paulista, San Paulo 135, 1925, nomen; Arch. Bot. Sao Paulo 1: 218, 1926.

Trichosalpinx quitensis (Rchb. f.) Luer, comb. nov.
Pleurothallis quitensis Rchb. f., Bonplandia 3: 240, 1855.
Humboldtia quitensis (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.

Trichosalpinx robledorum (Luer & Escobar) Luer, comb. nov.
Pleurothallis robledorum Luer & Escobar, Orquideologia 14: 170, 1981.

Trichosalpinx roraimensis (Rolfe) Luer, comb. nov.
Pleurothallis roraimensis Rolfe, Trans. Linn. Soc. London, Bot. ser. 2, 6: 58, 1901.

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Pleurothallis ruschii Hoehne, Arq. Bot. Estado Sao Paulo, s.n. forma major 1: 44, 1939.

Trichosalpinx scabridula (Rolfe) Luer, comb. nov.
Pleurothallis scabridula Rolfe, Mem. Torrey Bot. Club 4: 260, 1895.

Trichosalpinx semilunata (Luer) Luer, comb. nov.
Pleurothallis semilunata Luer, Selbyana 3: 184, 1976.

Trichosalpinx sordida (Krzl.) Luer, comb. nov.
Pleurothallis sordida Krzl., Ark. Bot. 16: 8, 1920.
Pleurothallis pauloensis Hoehne & Schltr., Arch. Bot. Sao Paulo 1: 219, t. 15, fig. 3, 1927.

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Pleurothallis stictophylla Schltr., Repert. Spec. Nov. Regni Veg. 23: 43, 1926; descr. emend., Bol. Agric. Sao Paulo 34: 608, 1934.

Trichosalpinx systremmata (Luer) Luer, comb. nov.
Pleurothallis systremmata Luer, Phytologia 49: 219, 1981.

Trichosalpinx tenera (Barb. Rodr.) Luer, comb. nov.
Lepanthes tenera Barb. Rodr., Gen. Sp. Orchid. Nov. 2: 51, 1882.
Pleurothallis tenera (Barb. Rodr.) Cogn., Fl. Bras. 3(4): 407, 1896.

Trichosalpinx tenuiflora (Schltr.) Luer, comb. nov.
Pleurothallis tenuiflora Schltr., Repert. Spec. Nov. Regni Veg. 12: 488, 1913.

Trichosalpinx tenuis (C. Schweinf.) Luer, comb. nov.
Pleurothallis tenuis C. Schweinf., Bot. Mus. Leafl. 10: 190, 1942.

Trichosalpinx trachystoma (Schltr.) Luer, comb. nov.
Pleurothallis trachystoma Schltr., Repert.Spec. Nov. Regni Veg. Beih. 19: 196, 1923.

Trichosalpinx triangulipetala (Ames & Correll) Luer, comb. nov.
Pleurothallis triangulipetala Ames & Correll, Bot. Mus. Leafl. 10: 77, 1942.

Trichosalpinx trilobata (Fawc. & Rendle) Luer, comb. nov.
Pleurothallis trilobata Fawc. & Rendle, J. Bot. 47: 4, 1909.

Trichosalpinx tropida (Luer) Luer, comb. nov.
Pleurothallis tropida Luer, Phytologia 49: 219, 1981.

Trichosalpinx vagans (Garay & Dunsterv.) Luer, comb. nov.
Pleurothallis vagans Garay & Dunsterv., Venez. Orch. Ill. 6: 372, 1976.

Trichosalpinx violacea (Lem.) Luer, comb. nov.
Specklinia violacea Lem., Jard. Fleur. 3: misc. 19, 1852.
Pleurothallis catharinensis Cogn., Fl. Bras. 3(4): 579, 1896.

Trichosalpinx xiphochila (Rchb. f.) Luer, comb. nov.
Pleurothallis xiphochila Rchb. f., Linnaea 22: 831, 1849.
Humboldtia xiphochila (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.
Platystele xiphochila (Rchb. f.) Garay, Caldasia 10: 233, 1968.

Trichosalpinx yanganensis (Luer) Luer, comb. nov.
Pleurothallis yanganensis Luer, Phytologia 49: 221, 1981.

Trichosalpinx zephyrina (Rchb. f.) Luer, comb. nov.
Pleurothallis zephyrina Rchb. f., Bonplandia 3: 71, 1855.
Humboldtia zephyrina (Rchb. f.) Kuntze, Rev. Gen. Pl. 2: 668, 1891.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXXI

Harold N. Moldenke

ERIOCAULON PELLUCIDUM f. *CLAUSENII* Mold., f. nov.

Haec forma a forma typica speciei recedit foliis usque ad 15 cm. longis vaginam excedentibus flaccidis et capitulis depressis.

This form differs from the typical form of the species in having its leaves long and flaccid, to 15 cm. long, pellucid, notably surpassing the sheaths, apically long-attenuate to filiform, the small heads depressed.

The type of the form was collected by Robert T. Clausen (*no. 5546*), in whose honor it is named, from 2--3 feet of water with a muddy bottom in Lantern Hill Pond, at an altitude of 120 feet, Ledyard Township, New London County, Connecticut, collected on August 25, 1941, and deposited in the Lundell Herbarium at the University of Texas. It is a deep-water form of the species and seems to occur sporadically throughout the range of the species, but particularly in the more southern portions. The peduncles are often very much elongated. In general aspect the foliage reminds one strongly of that of *E. compressum* Lam.

PAEPALANTHUS MACROTRICHUS var. *PUBERULUS* Mold., var. nov.

Haec varietas a forma typica speciei vaginis dense minuteque puberulis recedit.

This variety differs from the typical form of the species in having its sheaths only very densely and minutely puberulous.

The variety is based on *Hatschbach 46496* from sandy soil in campo rupestre in the vicinity of Rio de Contas, Bahia, Brazil, collected on May 16, 1983, and deposited in the Lundell Herbarium at the University of Texas.

STACHYTARPHETA GESNERIOIDES var. *ALATA* Mold., var. nov.

Haec varietas a forma typica speciei caulibus perspicue alatis recedit.

This form differs from the typical form of the species in having the stem, even to its apex, conspicuously and persistently alate with equal opposite wings over the entire length of internode between the leaf-bearing nodes, the wings rather uniformly 2 mm. wide on each side of the stem.

The variety is based on *Hatschbach 46323* from "paradões rochosos" along highway BR-116 in the municipality of Medina, Minas Gerais, Brazil, collected on May 13, 1983, and deposited in the Lundell Herbarium at the University of Texas. The collector describes the plant as a subshrub, 50 cm. tall, the corollas blue, the tube green within.

STACHYTARPHETA RETICULATA var. *BAHIENSIS* Mold., var. nov.

Haec varietas a forma typica speciei foliis distincte petio-

latis petiolis usque ad 5 mm. longis laminis foliorum coriaceis ellipticis 1.5--2 cm. longis 1--1.2 cm. latis apicaliter rotundis marginaliter antrorse serrulatis basaliter cuneato-acuminatis recedit.

This variety differs from the typical form of the species in its leaves being distinctly petiolate, the petioles to 5 mm. long, the blades coriaceous, elliptic, 1.5--2 cm. long, 1--1.2 cm. wide, apically rounded in outline, marginally antrorsely serrulate from the widest part to the apex, basally cuneate-acuminate into the petiole.

The variety is based on *Hatschbach 46523* from rocky soil on campo rupestre at the airfield in the municipality of Rio de Contes, Bahia, Brazil, collected on May 17, 1983, and deposited in the Lundell Herbarium at the University of Texas. The collector describes the fresh corollas as blue.

STACHYTARPHETA VILLOSA var. *BAHIENSIS* Mold., var. nov.

Haec varietas a forma typica speciei petiolis 3--5 mm. longis laminis foliorum lanceolatis 1.5--4.5 cm. longis 1.2--2 cm. latis inflorescentiis laxioribus floribus sub anthesin divaricatis recedit.

This variety differs from the typical form of the species in its petioles being 3--5 mm. long, the leaf-blades lanceolate, 1.5--4.5 cm. long and 1.2--2 cm. wide, apically acute, marginally antrorsely serrulate, basally cuneate-attenuate, the inflorescence during full anthesis more loosely flowered, and the flowers more separate and divaricate.

The variety is based on *Hatschbach 46386* from chapada in the vicinity of Aracatú, Bahia, Brazil, collected on May 14, 1983, and deposited in the Lundell Herbarium at rhe University of Texas. The collector describes the plant as a branched shrub, 1.5 m. tall, the corolla violet in color when fresh, with the tube white inside.

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ADDITIONAL NOTES ON THE *ERIOCAULACEAE*. XCIII

Harold N. Moldenke

PAEPALANTHUS GLAZIOVII Ruhl.

Additional bibliography: Mold., Phytologia 37: 44 (1977) and 38: 36. 1977; Mold., Phytol. Mem. 2: 154 & 613. 1980; Mold., Phytologia 50: 247 (1982) and 54: 236. 1983.

Recent collectors describe this plant as a subshrub, 70 cm. tall, the flower-heads white, and have encountered it in brejo and on flooded areas "formando moita na orla de mata", in both flower and fruit in August and November.

Additional citations: BRAZIL: Distrito Federal: *Filgueiras 894* (N); *Heringer, Paula, Mendonça, & Salles 48* (Fe, Ld). Goiás:

Kinoshita & Tamashiro 3745 (Ld).

PAEPALANTHUS GLEASONII Mold.
Additional bibliography: Mold., Phytologia 37: 44. 1977; Mold., Phytol. Mem. 2: 117, 122, 154, & 614. 1980.

PAEPALANTHUS GLOBOSUS Ruhl.
Additional bibliography: Mold., Phytologia 29: 483--484. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.

PAEPALANTHUS GNEISSICOLA Alv. Silv.
Additional bibliography: Mold., Phytologia 41: 481--482. 1979; Mold., Phytol. Mem. 2: 154, 425, & 614. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 77. 1928 (Ld).

PAEPALANTHUS GOMESII Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 44 & 51. 1977; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Additional citations: MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 39. 1928 (Ld, W).

PAEPALANTHUS GONÇALENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 35: 26. 1976; Mold., Phytol. Mem. 2: 154, 425, & 614. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 260, pl. 172 prim.[=171]. 1928 (Ld, N, W).

PAEPALANTHUS GOUNELLEANUS Beauverd
Additional bibliography: Mold., Phytologia 29: 485--486. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 292. 1908 (N, W).

PAEPALANTHUS GRANATENSIS Körn.
Additional bibliography: Mold., Phytologia 29: 486. 1974; Mold., Phytol. Mem. 2: 110 & 614. 1980.

PAEPALANTHUS GRAO-MOGOLENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 486--487. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv. Fl. Mont. 1, 133--134, pl. 83. 1928 (Ld, N, W).

PAEPALANTHUS GRISEUS Mold.
Additional bibliography: Mold., Phytologia 29: 487. 1974; Mold., Phytol. Mem. 2: 122 & 614. 1980.

PAEPALANTHUS GUARAIENSIS Mold.
Additional bibliography: Mold., Biol. Abstr. 64: 4787. 1977; Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154 & 614. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Mold., Phytologia 36: 50, fig. 1. 1977 (Ld).

PAEPALANTHUS GUSTAVII Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 487--488. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 227--228, pl. 150. 1928 (Ld, N, W).

PAEPALANTHUS GUYANENSIS Klotzsch
Additional bibliography: Mold., Phytologia 29: 488--489. 1974; Mold., Phytol. Mem. 2: 122 & 614. 1980.
Additional citations: MOUNTED CLIPPINGS: Klotzsch in Schomb., Reise Brit.-Guian. 3: 1064. 1848 (W).

PAEPALANTHUS GYROTRICHUS Ruhl.
Additional bibliography: Mold., Phytologia 41: 482. 1979; Mold., Phytol. Mem. 2: 154 & 614. 1980.

PAEPALANTHUS HABENULIFER Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 489--490. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 263--265, pl. 175. 1928 (Ld, N, W).

PAEPALANTHUS HARLEYI Mold., Phytologia 45: 472, 474, & 475, pl. 3. 1980.
Bibliography: Mold., Phytologia 45: 472, 474, & 475, pl. 3. 1980; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Illustrations: Mold., Phytologia 45: 474, pl. 3. 1980.
Collectors have described this plant as an erect herb, to 20 cm. tall, the leaves dark glaucous-green, the "culms" silvery-gray, and the involucral bracts dark and reflexed. They have found it growing on "metamorphic sandstone and quartzite rock outcrops with associated marsh, damp flushes and grassland and some cutover mixed deciduous woodland by streams and cerrado", at 1500--1600 m. altitude, in flower in March.
Citations: BRAZIL: Bahia: *Harley, May, Storr, Santos, & Pinheiro in Harley 18728* (Ld--isotype, N--isotype), *19650* (Ld, N, W--2936319).

PAEPALANTHUS HARMSII Ruhl.
Additional bibliography: Mold., Phytologia 29: 490. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.

PAEPALANTHUS HEMIGLOBOSUS Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 490--491. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 181--183, pl. 117. 1928 (Ld, N, W).

PAEPALANTHUS HENRIQUEI Alv. Silv. & Ruhl.
Additional bibliography: Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154, 401 , 426, & 614. 1980.
Additional citations: BRAZIL: Santa Catarina: *Rambo 49606* (W--2653318).

PAEPALANTHUS HERZOGII Mold.
Additional bibliography: Mold., Phytologia 29: 492. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Additional citations: MIUNTED CLIPPINGS: Herzog, Feddes Repert. Spec. Nov. 20: 87. 1924 (Ld, N, W).

PAEPALANTHUS HETEROCAULON Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 492--493. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 203--205, pl. 134. 1928 (Ld, N, W).

PAEPALANTHUS HETEROPUS Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 493. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 139--140, pl. 87. 1928 (Ld, N, W).

PAEPALANTHUS HETEROTRICHUS Alv. Silv.
Additional bibliography: Mold., Phytologia 29: 493. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 200--201, pl. 132. 1928 (Ld, N, W).

PAEPALANTHUS HILAIREI Körn.
Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St. Petersb., ser. 6, 1: 620--621 & 637. 1831; Mold., Phytologia 37: 45, 269, & 271--273. 1977; Mold., Phytol. Mem. 2: 154, 369, 398, 400, 404, 426, & 614. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.
The *Damasio s.n.* [Herb. Jard. Bot. Rio Jan. 63741], distributed as typical *P. hilairei*, actually represents its var. *maximiliani* Ruhl.

PAEPALANTHUS HILAIREI var. *MAXIMILIANI* Ruhl.
Additional bibliography: Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154 & 614. 1980.
Berg describes this plant as an herb, 1 m. tall, with white "flowers", and encountered it in restinga alagada, in flower in August.
Additional citations: BRAZIL: Guanabara: *C. C. Berg 235* (Ut--370659B). Minas Gerais: *Damasio s.n.* [Herb. Jard. Bot. Rio Jan. 63741] (Mi, W--2928662). Rio de Janeiro: *Souza 99* [Herb. FEEMA 17316] (Ld).

PAEPALANTHUS HILAIREI var. *PIAUHYENSIS* Ruhl.

Additional bibliography: Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154 & 614. 1983.

PAEPALANTHUS HILAIREI var. *POHLIANUS* Mold.

Additional bibliography: Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154, 426, & 614. 1980.

PAEPALANTHUS HISPIDISSIMUS Herzog

Additional bibliography: Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154 & 614. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Recent collectors describe this plant as a neat rosette herb, to 6 cm. tall, the leaves closely appressed, firm, gray-green or rather dark-green, the involucral bractlets dark-brown, and the florets white. They have found it growing in "open scrub on white sand with damp areas and extensive sedge meadows (brejo) partly burned over", in sandy soil of campo rupestre, and among "sandstone rocks and open scrub on hillsides", at 500--1950 m. altitude, in both flower and fruit in February, July, and November. Photographs were made of the *Mori & al.* collection in situ.

Additional citations: BRAZIL: Bahia: *Carvalho, Lewis, & Hage 1050* (Ld); *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 18763* (Ld, N, W--2936336), *18847* (N); *Harley, Renvoize, Erskine, Brighton, & Pinheiro in Harley 16100* (W--2791569); *Mori 12952* (Ld, N); *Mori, King, Santos, & Hage 12599* (Ld, W--2854253).

PAEPALANTHUS HOMOMALLUS (Bong.) Mart.

Additional bibliography: Kunth, Enum. Pl. 3: 574. 1841; Mold., Phytologia 29: 485 & 501--502. 1974; Mold., Phytol. Mem. 2: 154 & 614. 1980.

Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 574. 1841 (N, W).

PAEPALANTHUS HYDRA Ruhl.

Additional bibliography: Mold., Phytologia 37: 45. 1977; Mold., Phytol. Mem. 2: 154, 426, & 614. 1980.

Additional citations: BRAZIL: Minas Gerais: *Maguire, Mendes Magalhães, & Maguire 49305* (W--2435328).

PAEPALANTHUS HYMENOLEPIS Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 26. 1976; Mold., Phytol. Mem. 2: 154 & 614. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 183--184, pl. 118. 1928 (Ld, N, W).

PAEPALANTHUS IBITIPOCENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 43. 1976; Mold., Phytol. Mem. 2: 155, 426, & 614. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 54--55, pl. 30. 1928 (Ld, N, W).

PAEPALANTHUS IMPLICATUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 16--17. 1975; Mold., Phytol. Mem. 2: 155 & 614. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 158--160, pl. 100. 1928 (Ld, N, W).

PAEPALANTHUS INCANUS (Bong.) Körn.
Additional bibliography: Mold., Phytologia 41: 482. 1979; Mold., Phytol. Mem. 2: 155, 426, & 614. 1980.
Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 572. 1841 (N, W).

PAEPALANTHUS INOPINATUS Mold., Phytologia 45: 475 & 476, pl. 4. 1980.
Bibliography: Mold., Phytologia 45: 475 & 476, pl. 4. 1980; Mold., Phytol. Mem. 2: 155 & 614. 1980.
Illustrations: Mold., Phytologia 45: 476, pl. 4. 1980.
Citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 20130* (Ld--isotype, N--isotype).

PAEPALANTHUS INSIGNIS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 19. 1975; Mold., Phytol. Mem. 2: 155 & 614. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 193--194, pl. 127. 1928 (Ld, N, W).

PAEPALANTHUS INTERMEDIUS Körn.
Additional bibliography: Mold., Phytologia 37: 46. 1977; Mold., Phytol. Mem. 2: 155 & 614. 1980.

PAEPALANTHUS ITACAMBIRENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 20. 1975; Mold., Phytol. Mem. 2: 155 & 614. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 123--124, pl. 75. 1928 (Ld, N, W).

PAEPALANTHUS ITAMBEENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 37: 46. 1977; Mold., Phytol. Mem. 2: 155 & 614. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 46--47, pl. 24. 1928 (Ld, N, W).

PAEPALANTHUS ITATIAIENSIS Ruhl.
Emended synonymy: *Paepalanthus itatiayensis* Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-Nat. 79: 87. 1908.
Additional bibliography: Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-Nat. 79: 87. 1908; Mold., Phytologia 37: 46. 1977; Mold., Phytol. Mem. 2: 155, 426, & 614. 1980.
Recent collectors describe this plant as an herb, to 25 cm. tall, with whitish inflorescences, and have found it growing in rocky soil among low vegetation on rocky hills, at 2000--2500 m.

altitude, in flower in September and October.

Additional citations: BRAZIL: Minas Gerais: *Bogner 1157* (Ld--photo); *Hatschbach & Kummrow 45554* (Ld). Rio de Janeiro: *Maas & Martinelli 3181* (Ld).

PAEPALANTHUS ITATIAIENSIS var. *GLABER*

Additional bibliography: Mold., Phytologia 30: 22. 1975; Mold., Phytol. Mem. 2: 155, 426, & 614. 1980.

PAEPALANTHUS ITHYPHYLLUS (Mart.) Mart.

Additional bibliography: Mold., Phytologia 37: 46. 1977; Mold., Phytol. Mem. 2: 155, 398, 401, 404, 426, 428, & 614. 1980.

PAEPALANTHUS JAUENSIS Mold.

Synonymy: *Paepalanthus jausensis* Mold., Phytol. Mem. 2: 426, in syn. 1980.

Additional bibliography: Mold., Phytologia 41: 482 (1979) and 44: 215. 1979; Mold., Phytol. Mem. 2: 117, 426, & 614. 1980; Mold., Phytologia 54: 264. 1983.

Recent collectors describe this plant as having pale-green "subcoriaceous" [but the herbarium material exhibits only thin apparently quite pliable!] leaves and white inflorescences. They have encountered it in dense clumps, at 2300--2580 m. altitude, in flower in October and both in flower and fruit in January and February.

Additional citations: VENEZUELA: Amazonas: *Steyermark 103840* (Ld, N, N); *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 125932* (Ld), *126295* (Ld).

PAEPALANTHUS JAUENSIS var. *CAULESCENS* Mold., Phytologia 44: 215. 1979.

Bibliography: Mold., Phytologia 44: 215. 1979; Mold., Phytol. Mem. 2: 117 & 614. 1980.

Maguire and his associates refer to this as a "sterile plant with elongate caudex" and found it growing at the edge of a canyon escarpment, at 2685 m. altitude, identifying it as *P. duidae* Gleason.

Citations: VENEZUELA: Amazonas: *Maguire, Steyermark, Brewer-Carías, Maguire, & Espinosa 65639*(E--2901868). Bolívar: *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115893* (Ld--type).

PAEPALANTHUS JORDANENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 24. 1975; Mold., Phytol. Mem. 2: 155, 426, & 614. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 92--93, pl. 56 & 57. 1928 (Ld, N, W).

PAEPALANTHUS KANAII Satake

Additional bibliography: Mold., Phytologia 41: 482. 1979; Mold., Phytol. Mem. 2: 301 & 614. 1980.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"POCKET FLORA OF THE REDWOOD FOREST" by Rudolf W. Becking, xi & 237 pp, 8 unnumbered color pl. with 29 photo. 1 b/w photo., 1 map, 4 pl. plant part draw. & 212 plant draw. Island Press, Covelo, California 95428. 1982. $15.00 plasticized paperbound.

"It is with profound awe for the sublime trees that this pocket flora has been created. I hope it will inspire users with an understanding of and admiration for the numerous forms of plant life that can be discovered within the redwood forest....in the narrow coastal belt of northern and central California." For over a score of years the author has studied this area as a professional forester and as a natural resources professor. His attractive and accurate drawings of the plants, his simple clear-cut keys to families and then to the genera and the 212 most frequently seen species can readily be handled by the amateur, the forestry folks, the university students and the scientists. The color photographs are very beautifully reproduced. There is also provided an excellent illustrated glossary.

"GOD AND THE ASTRONOMERS" by Robert Jastrow, 136 pp., 7 color photo. pl., 32 b/w photo. pl., 12 b/w photo. & 2 fig. W. W. Norton & Company, Inc., New York, N. Y. 10003. 1978. $9.95 clothbound and 1980. $4.95 paperbound.

Among other posts that he has held, the author has been the founder and director of NASA's Goddard Institute for Space Studies and the presenter of excellent TV programs on astronomy and space exploration. He explains directly and simply how the studies of Slipher, deSitter, Einstein, Hubble, Humason and others caused astronomers today to abandon the Steady State concept of the universe in favor of the Big Bang origin and the Law of the Expanding Universe and its concomitant of recycling. It can explain the origin of our solar system a la recycling some possible 20 billion years ago but not if it or some other was the first formed. "No scientist can answer that question; we can never tell whether the Prime Mover willed the world into being, or the creative agent was one of the familiar forces of physics; for the astronomical evidence proves that the universe was created twenty billion years ago in a fiery explosion, and in the searing heat of that first moment, all the evidence needed for a scientific study of the cause of the great explosion was melted down and destroyed." This book is effectively illustrated and has particularly legible print.

"A NATURALIST IN SOUTHERN FLORIDA" by Charlotte Orr Gantz, xiii & 256 pp., 13 b/w photo, & 1 map. University of Miami Press, Coral Gables, Florida. 1971. $9.95.

It is fortunate that this popular, but scientifically accurate, book is still available as a "take-home" souvenir for visitors and as a "silent companion" for folks who now live there. This "is a guide in the form of walks.....on a few beaches, on trails through some swamps, and on inland roads" for their hermit crabs, palms, fossil corals, and flowering trees (but without any mention of Dr. Edwin Menninger, "The Flowering Tree Man"). At the end of each chapter both the common and scientific names of each plant and animal mentioned are listed and a useful bibliography is added. There is an important final chapter on the great need to preserve this natural treasure from the drainage of swamps, real estate development, air fields, pollution, etc.

"SPANISH SCIENTISTS IN THE NEW WORLD -- The Eighteenth Century Expeditions" by Iris H. W. Engstrand, xv & 220 pp., 4 unnumbered color pl. with 5 fig., 32 unnumbered b/w pl. with 39 fig. and 6 maps. University of Washington Press, Seattle, Washington 98105. 1981. $25.00.

This interestingly written and carefully documented account taken from the author's doctoral dissertation describes (1) the early and later parts of Carlos III's Royal Scientific Expedition to New Spain under Sessé for materials taken, botanical, zoological and anthropological findings, frustrations, (2) Moziño's (Mociño) botanical surveys in central and northern Mexico, (3) Malaspina's collecting and harbor checking from Alaska through California and Longinos' exploration in California, (4) Pineda's expedition within central Mexico proper, (5) the establishment of the Royal Botanical Garden and botanical university training, and (6) expeditions to the West Indies and the denouement of the return to Spain then troubled by France with war threats so that these gallant workers were financially ignored and their scientific treasures sometimes sold for sustenance. The author stresses the importance of the artists on the trips, such as Echeverra, and relates how A. P. deCandolle had volunteers sketch 860 plants from which he and his colleagues identified and published 17 new genera and 271 species.

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FIFTIETH JUBILEE YEAR

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Seedling Variation in Apios

J. A. Duke

Because of renewed interest in Apios americana Medicus and its rarer relative, Apios priceana Robinson, I am pleased to report that their seedlings differ. With several scattered small tubers (with more than 10% protein) along the roots, the ability to fix nitrogen in an acid waterlogged environment, Apios americana may deserve more attention than it has received since it helped the American pilgrims survive their first winters. But its numerous small tubers may lead it to become a weed, especially in cranberry bogs. Perhaps it could be tried as a N-fixing intercrop for rice or wildrice in societies where aquatic crops are cultivated manually. The rare Apios priceana is reported to yield just one (usually larger) tuber. In pots, my seedlings did yield one small tuber during their first year. Both species can tolerate pH <5, a trait we would like to transfer to the soybean.

Thanks to the generosity of Dr. Janet E. A. Seabrook, I have been able to peruse her master's thesis (1) which included seedling data. Thanks to Dr. Edward M. Croom, Jr., I have seedlings of Apios priceana Robinson (Fig. 1) from Mississippi growing alongside seedlings of Apios americana Medicus (Fig. 2) from Maryland. These seedlings will be planted in permanent plots on my farmette in Howard County, Maryland.

Not only do these seedlings differ from each other, they differ from those described by Seabrook, enough so that I repeat her descriptions, using the terminology I have developed elsewhere (2). The first two eophylls of the cryptocotylar seedlings of A. americana studied by Seabrook were unifoliolate, while eophylls 3-5 were bifoliolate. Weak seedlings produced only unifoliolate eophylls. (Mine are unifoliolate.) With A. priceana studied by Seabrook, the first few eophylls were unifoliolate. The first two (rarely three) eophylls are unifoliolate, the third or forth becoming trifoliolate in all that I have observed. If my seedlings are typical, seedlings of the species may be keyed as follows:

First eophylls opposite, the third or fourth bi- or trifoliolate
Apios priceana (Fig. 1).

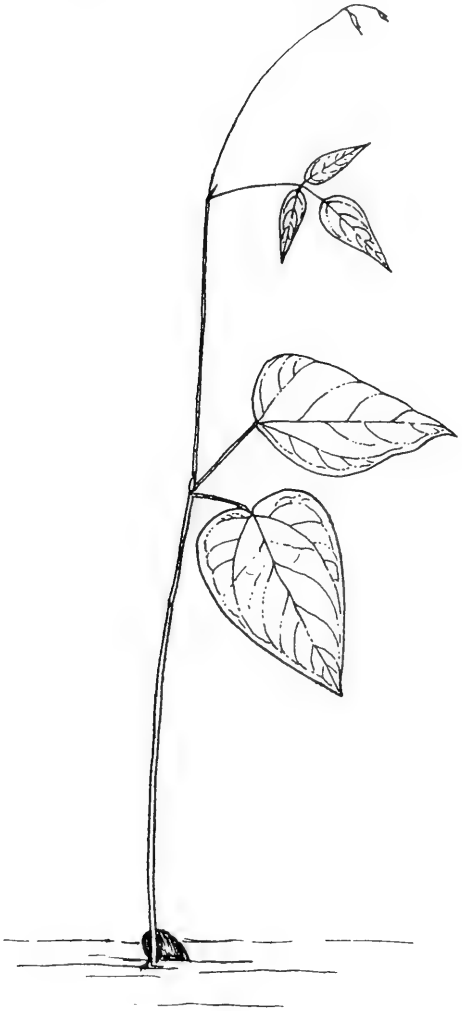
First eophylls alternate, none of first 5 eophylls trifoliolate
Apios americana (Fig. 2).

This preliminary note is published in hopes of soliciting vouchered seeds of any species of Apios for further study. A small lot of vouchered seed collection number will suffice. I am prepared to pay the postage.

1. Seabrook, J.E.A. 1973. A Biosystematic Study of the Genus Apios Fabricius (Leguminosae) with Special Reference to Apios americana Medikus. MS Thesis. Dept. Biology, University of New Brunswick. Sept.

2. Duke, J.A. 1969. On Tropical Tree Seedlings. I. Seeds, seedlings, systems, and systematics. Ann. Mo. Bot. Gard. 56(2): 125-161.

Germplasm Resources Laboratory, USDA
Beltsville, Maryland 20705



x 1

Fig. 1

x 1

Fig. 2

DIEZ (10) HELICONIAS NUEVAS DE COLOMBIA

José E. Abalo, Apartado 266, Maracay 2101, Venezuela

&

Gustavo Morales L., Apartado Aéreo 1283, Popayán, Colombia

En la presente contribución presentamos diez nuevas especies, una de las cuales presenta además de su forma tipo, una variedad. Esto eleva nuestro número de nuevas *Heliconias* colombianas a treinta y cinco (35) especies. Aún nos quedan algunas especies que iremos publicando Dios mediante a medida que podamos verificarlas. Podemos decir que la región de Panamá y Colombia, anexando Costa Rica y Ecuador conforma el polo de mayor diversidad de especies de *Heliconia*. Esta región, al igual que el resto del trópico americano está siendo objeto de una violenta desforestación con el consiguiente cambio ecológico y la desaparición de numerosas especies tanto vegetales como animales. Existe una supuesta preocupación por parte de algunas autoridades por la colecta de muestras por botánicos u horticultores, pero no hay la menor acción por parte de estas mismas autoridades para evitar la desforestación de areas montañosas que están condenadas a la desertización en un corto plazo. De continuar esta tendencia habrá desaparecido una gran mayoría de especies de reducido nicho ecológico para final del presente siglo.

Ha sido experiencia vivida por estos autores en repetidas oca-

In this paper we present ten new species and one new variety of *Heliconia*. This raises our number of new Colombian *Heliconias* to thirty five (35) species. There are still a few new species that, God willing, will be published as we are able to verify them. The region consisting of Panamá, Colombia, Costa Rica and Ecuador is the main area of concentration of the *Heliconia* species. This region as well as all of the Neotropics is being subjected to a violent deforestation resulting in ecological changes and the extinction of numerous plant and animal species. The authorities presumably are concerned with the collection of samples by botanists or horticulturists, however there is absolutely no action by these authorities to halt the deforestation of these mountainous areas which are condemned to become barren in a very short period of time. If this trend continues, a great majority of species will disappear by the end of this century.

It has been our personal experience on numerous ocasions, that in returning to areas in which one or two years before we had collected several species of *Heliconia*, we found only pasture and cattle and were unable to find a single plant of the originally collected species. The area had been sys-

siones que, al regresar uno o dos años mas tarde, en diferente época del año al otrora habitat de una determinada especie de *Heliconia*, hemos encontrado solo pasto y ganado y la especie desaparecida para siempre, ya que previamente a la introducción de gramineas y ganado se incendia toda el area concienzudamente. Nuestro proyecto de estudio del género *Heliconia* se ha basado primero en la colecta, siembra y cultivo de material vivo y luego a la clasificación del mismo utilizando tanto el material original colectado como el nuevo crecido por nosotros. Esto, estamos seguros, nos permitirá salvar un sinnúmero de especies - en ejemplos como el anterior - de la extinción. Esta es la labor que nos hemos impuesto: el salvar el mayor número de especies de este típico representante del trópico para repartirlas entre los jardines botánicos y coleccionistas privados que las deseen, con el fin de que puedan ser admiradas por las generaciones venideras en el futuro incierto que nos aguarda.

Hemos mantenido el mismo patrón de nuestras publicaciones anteriores en lo que a las ilustraciones se refiere, a saber:

A) Inflorescencia

B) Espata abierta

C) Bráctea

D) Flor

tematically burned to make way for pastures and consequently all species had been destroyed in the process. Our study of the genus *Heliconia* is based on first collecting and raising live material and then classifying the species using both the originally collected samples as well as our cultivated material. This will help us save from extinction quite a few species of *Heliconia*. Our main interest lies in saving as many species as possible of this genus, which is a typical representation of the tropics, and distributing them among the botanical gardens and private collectors who may want them in order that they may be enjoyed by the coming generations of this uncertain world.

We have maintained the same pattern of our previous publications with regard to our illustrations, namely:

A) Inflorescence

B) Spathe cut open

C) Bract

D) Flower

E) Staminode

F) Aristiform rudiment

The species hereis described as *Heliconia intermedia* corresponds to the "Hábitos O" figure (Abalo & Morales 1982, pp 7). All of our illustrations have been taken from live material and the distribution of types has been done according to the criteria previously established (Abalo & Morales 1983).

E) Estaminodio

F) Rudimento aristiforme

La especie aquí descrita como *Heliconia intermedia* corresponde a la figura "Hábitos O" (Abalo & Morales 1982, pp 7). Asimismo todas nuestras ilustraciones han sido tomadas de material vivo y nuestra distribución de tipos ha sido hecha de acuerdo a nuestro criterio expuesto anteriormente (Abalo & Morales 1983).

Queremos en esta oportunidad agradecer a todas las personas que de una u otra forma han cooperado con nosotros y muy especialmente la oportuna ayuda del señor George Redmond y la señora Mary Lou Artime.

We wish to express our gratitude to all those persons who have helped us in our project, and especially we want to thank Mr. George Redmond and Mrs. Mary Lou Artime for their timely help.

LITERATURA CITADA

ABALO, J. E. & MORALES L., G. 1982. Veinticinco (25) *Heliconias* Nuevas de Colombia. Phytologia 51: 1 - 61.

ABALO, J. E. & MORALES L., G. 1983. Doce (12) *Heliconias* Nuevas del Ecuador. Phytologia 52: 387 - 413.

Heliconia aristeguietae Abalo & Morales, sp. nov.

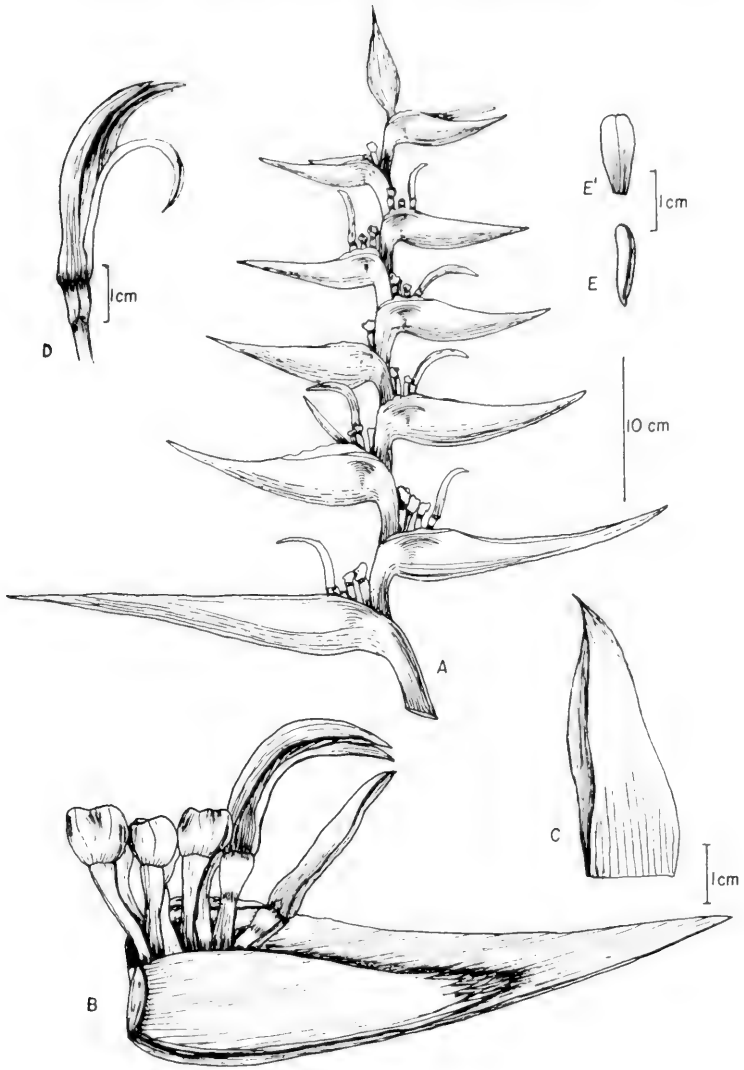
Planta musoides. Pseudocaulis 1.2 - 2.0 m altus. Petiolus viridis, brunneo maculatus, glaber, 60 - 110 cm longus. Lamina 80 - 120 cm longa, 28 - 35 cm lata. Inflorescentia erecta. Pedunculus 0 - 10 cm longus, ruber, pubescens. Rachis rubra, pubescens. Spathae rubrae, glabrae, distichae. Perianthium album et viride. Ovarium luteum. Pedicellus flavovirens, tomentosus.

Planta musoide. Pseudotallo 1.2 - 2.0 m. Hojas 5 - 6, pecíolo verde con manchas marrón, glabro, 60 - 110 cm de largo; lámina 80 - 120 cm de largo por 28 - 35 cm de ancho, base cortada y ápice obtuso con acumen; nervadura central con tomento aracnoideo por el envés. Inflorescencia erecta, 38 - 50 cm de largo; pedúnculo ausente o hasta 10 cm de largo, rojo, finamente pubescente, raquis rojo a rojo - naranja, finamente pubescente, 22 - 50 cm de largo; distancia entre las espatas basales 4.5 - 2.5 cm, medias 2.5 - 2.0 cm y terminales 2.0 cm. Espatas externamente rojas, glabras, internamente rojo - naranja, glabras; 8 - 15 por inflorescencia, dísticas, cuando adultas formando ángulo hasta 90 grados respecto al raquis, lanceolado - conduplicadas, con el borde involuto en la base y el resto recto, ápice agudo; primera espata basal roja con el dorso y el ápice verdes, 34 - 20 cm de largo por 3.0 - 2.5 cm de ancho en la base; espatas basales 23 - 11 cm de largo por 3.0 - 2.5 cm de ancho, medias 13 - 8 cm de largo por 2.5 - 2.0 cm de ancho y terminales 9 - 5 cm de largo por 2.0 - 1.5 cm de ancho. Brácteas blancas, coriaceas, carinadas, glabras, de ápice unguiculado, 5.0 - 4.5 cm de largo por 1.7 - 1.4 cm de ancho en la base. Flores 14 - 24 por espata; perianto blanco con tres bandas verdes en los vértices y desde el tercio inferior hacia el ápice, curvado, glabro, 3.5 cm de largo; estaminodio blanco, obovado angosto de ápice truncado y ligeramente emarginado, 1.7 - 1.5 cm de largo por 0.8 - 0.6 cm de ancho en la parte media y extendido; ovario amarillo, glabro, 0.5 cm de lado, pedicelo amarillo verdoso, con tomento aracnoideo, 1.8 - 1.6 cm de largo. Frutos amarillos, azules al madurar, 1.1 - 1.0 cm de largo por 0.8 - 0.6 cm de lado; pedicelos de los frutos verdes, 2.0 cm de largo.

Tipo: Gustavo Morales & José Abalo 348, 6 Febrero 1983, Colombia, Depto. Meta, Villavicencio, 5 Km hacia el nacimiento del caño Buque, 950 msm. (COL, holotipo; MY, US, isotipos)

Esta especie está dedicada a nuestro amigo el Dr. Leandro Aristeguieta con sincera admiración.

Habitat: Zonas de alta precipitación. Suelos rocosos con acumulaciones de materia orgánica. Sitios semi - abiertos a protegidos, orillas de caños, laderas.



HELICONIA ARISTEGUIETAE

Heliconia badilloi Abalo & Morales, sp. nov.

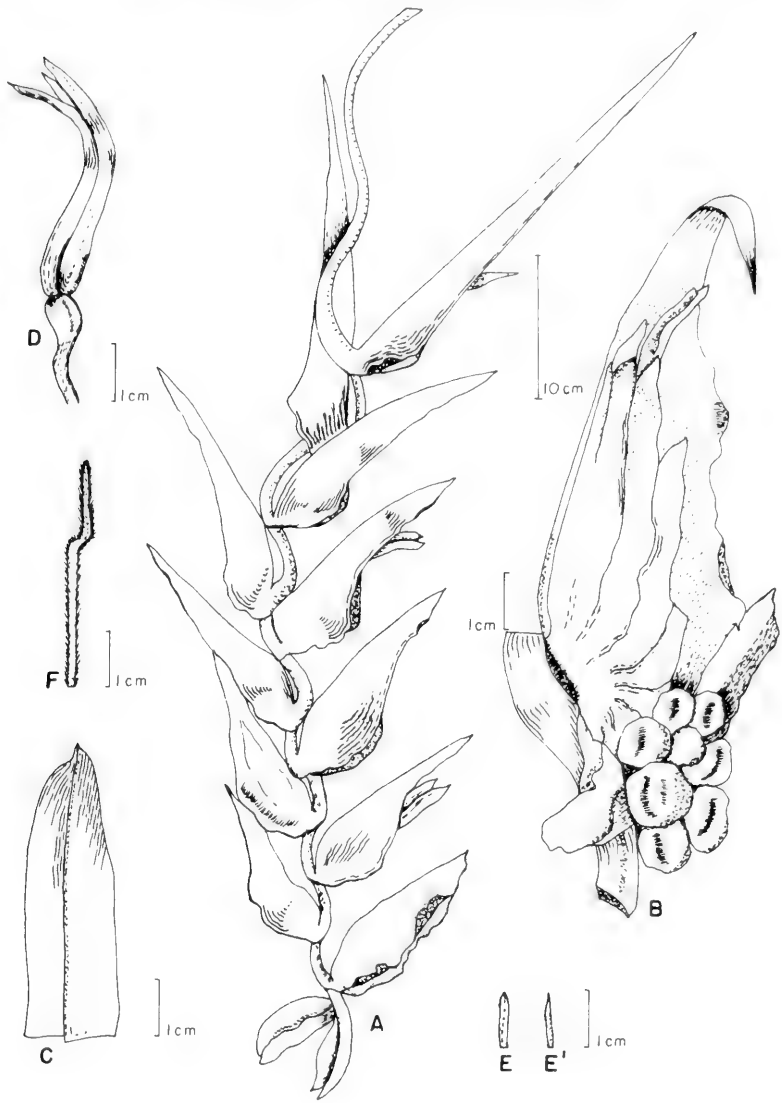
Planta musoides. Pseudocaulis lentiginosus, 1.2 - 1.6 m altus. Petiolus viridis, lentiginosus, 30 - 45 cm longus. Lamina 130 - 220 cm longa, 18 - 24 cm lata. Inflorescentia pendula. Pedunculus ruber glaber 15 - 33 cm longus. Rachis rubra, glabra, flexuosa. Spathae rubrae, pubescentes. Perianthium luteum, pubescens. Ovarium eburneum, pubescens. Rudimentum aristoides adest.

Planta musoide. Pseudotallo 1.2 - 1.6 m, lentiginoso. Hojas con pecíolo verde claro, lentiginoso, 30 - 45 cm de largo; lámina angosto - oblonga, 130 - 220 cm de largo por 18 - 24 cm de ancho, base largamente cuneada, ápice obtuso con acumen. Inflorescencia péndula 59 - 86 cm de largo; pedúnculo rojo, glabro, 15 - 33 cm de largo; raquis rojo, glabro, flexuoso, 40 - 53 cm de largo; distancia entre las espatas basales 8 - 5 cm, medias 3.0 - 2.5 cm, terminales 2.0 - 1.5 cm. Espatas externamente rojas, pubescentes; internamente blancas con el borde rosado, glabras; 12 - 18 por inflorescencia, reflexas, dísticas pero formando una suave helicoide, borde involuto suavemente rizado; primera espata basal roja en la base, el resto verde lentiginoso, 34 - 45 cm de largo por 3.0 cm de ancho; espatas basales 23 - 14 cm de largo por 3.5 cm de ancho, medias 12 - 8 cm de largo por 3.0 cm de ancho y terminales 6 - 5 cm de largo por 3.0 - 2.5 cm de ancho. Brácteas crema, membranáceas, carinadas, externamente pubescentes, 5.0 cm de largo por 2.0 cm de ancho. Rudimento aristiforme crema, pubescente, 4 - 6 cm de largo. Flores gibosas, 25 - 15 por espata. Perianto amarillo, 4.0 cm de largo, sépalos pubescentes, pétalos glabros; estaminodio crema, ensiforme, 1.2 cm de largo por 0.2 cm de ancho en la base; ovario crema, pubescente, 0.6 cm de largo; pedicelo crema a rosado con pubescencia marrón 1.4 cm de largo. Frutos crema, azules al madurar, 1.0 cm de largo por 1.5 cm de lado.

Tipo: Gustavo Morales 329, 24 Septiembre 1982, Colombia, Departamento del Valle, Queremal, 20 Km vía Buenaventura, 1170 msm. (COL, holotipo; MY, US, isotipos)

Esta especie la dedicamos al Dr. Víctor Badillo, quien nos dió oportunas sugerencias y nos brindó apoyo intelectual durante nuestros primeros pasos.

Habitat: Zonas de precipitación media. Suelos arcillosos o rocosos con alto contenido de materia orgánica. Sitios semi-abiertos. Barrancos, laderas.



HELICONIA BADILLOI

Heliconia combinata Abalo & Morales, sp. nov.

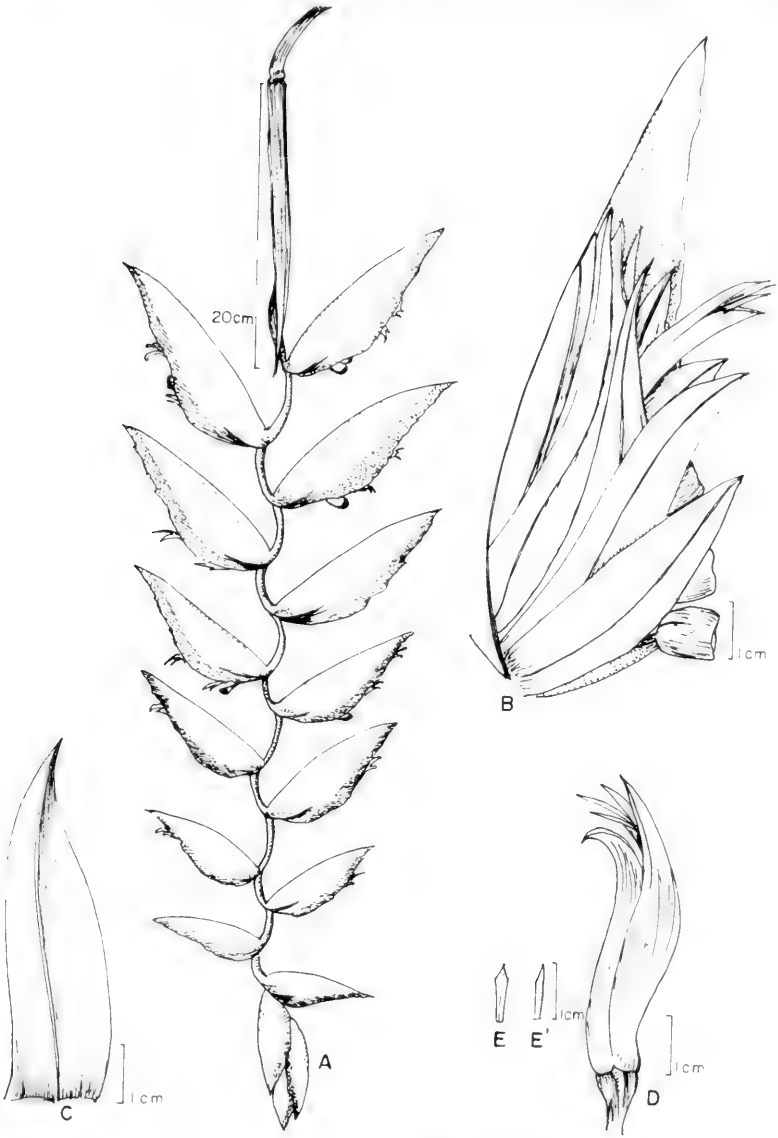
Planta musoides. Pseudocaulis 3.5 m. altus. Petiolus 80 - 100 cm longus. Lamina 130 - 320 cm longa, 38 - 50 cm lata, costa subtus rubra. Inflorescentia pendula. Rachis rubra, pubescens. Spathae rubrae, distichae. Perianthium luteum. Ovarium luteum, pubescens, apex coccineum. Fructus irmaturus luteus, apex coccineus.

Planta musoide. Pseudotallo 3.5 m. Hojas 6 - 7; pecíolo verde, glabro, 80 - 100 cm de largo; lámina 130 - 320 cm de largo por 38 - 50 cm de ancho, base cordada y ápice mucronado; nervadura central verde claro con una banda roja por el envés. Inflorescencia péndula, 86 - 160 cm de largo; pedúnculo verde claro en la base y rojo hacia el raquis, glabro en la base y pubescente hacia el raquis, 26 - 85 cm de largo; raquis rojo, pubescente, flexuoso, 45 - 120 cm de largo; distancia entre las espatas basales 5.0 - 2.0 cm, medias 2.0 - 1.5 cm y terminales 1.5 cm. Espatas externamente rojas con el borde tempranamente necrosado, pubérulas principalmente hacia la base; internamente blancas hacia la parte central y rosadas por los lados, finamente pubescentes en los bordes; borde ondulado, ápice agudo, 15 - 45 por inflorescencia, dísticas, reflexas; espatas basales 14 - 10 cm de largo por 4.0 - 3.0 cm de ancho cerca a la base, medias 10 - 8.5 cm de largo por 4.0 - 3.0 cm de ancho y terminales 8.5 - 6.0 cm de largo por 3.0 - 2.5 cm de ancho. Brácteas amarillo claro, finamente pubescentes por el exterior, coriáceas, carinadas, 6.5 - 7.5 cm de largo por 1.2 - 2.0 cm de ancho y extendidas. Flores 28 - 18 por espata; perianto amarillo, 5.0 cm de largo, sépalos finamente pubescentes, pétalos glabros; estaminodio blanco, lanceolado, 0.8 - 0.7 cm de largo por 0.2 cm de ancho en la base; ovario amarillo con el ápice rojo, pubescencia marrón, 1.0 cm de largo; pedicelo amarillo claro, pubescencia marron, 2.5 cm de largo. Frutos amarillos con el ápice rijo, azules al madurar, 1.5 cm de largo por 1.0 cm de lado.

Tipo: Gustavo Morales 316, 31 Julio 1982, Colombia, Departamento del Chocó, El Carmen del Atrato, El Siete, 7 Km vía Quibdó, 1400 msm. (COL, holotipo; US, MY, isotipos)
Otro material: Gustavo Morales 74, 1 Febrero 1979, Colombia, Departamento del Chocó, La Mansa, 4 Km vía El Carmen del Atrato, 1900 msm. (COL)

El nombre de esta especie hace referencia a la combinación de colores amarillo y rojo presentes en el fruto.

Habitat: Zonas de precipitación media. Suelos arcillosos con acumulaciones de materia orgánica. Sitios semi-abiertos, orillas de arroyos y carreteras. Laderas.



HELICONIA COMBINATA

Heliconia gilbertiana Abalo & Morales, sp. nov.

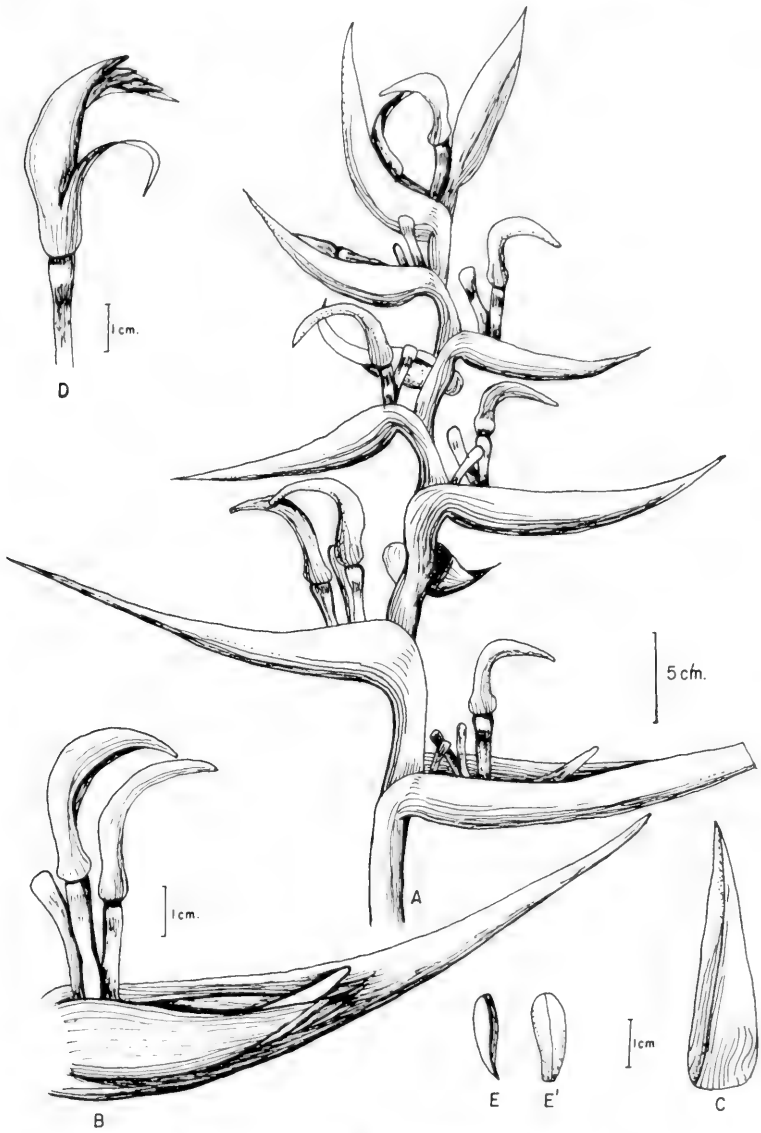
Planta musoides. Pseudocaulis 0.5 - 0.7 m altus. Petiolus viridis, glaber, 30 - 65 cm longus. Lamina 75 - 88 cm longa, 32 - 40 cm lata, atroviridis, aspectus velutinus. Inflorescentia erecta. Pedunculus ruber, glaber; rachis rubra, glabra, flexuosa. Spathae rubrae, glabrae. Bracteae rosaceae. Flores exserti, perianthium album et viride. Ovarium viride, glabrum. Fructus immaturus viridis.

Planta musoide. Pseudotallo 0.5 - 0.7 m. Hojas 4 - 5; pecíolo verde, glabro, 30 - 65 cm de largo; lámina con el haz verde oscuro de aspecto aterciopelado y nervaduras muy pronunciadas, 75 - 88 cm de largo por 32 - 40 cm de ancho, base subcordada y ápice mucronado; nervadura central verde claro por el haz y rojo marrón por el envés. Inflorescencia erecta, 24 - 28 cm de largo; pedúnculo rojo, glabro, 3 - 5 cm de largo; raquis rojo, glabro, flexuoso, 19 - 25 cm de largo; distancia entre las espatas basales 2.5 - 2.0 cm, medias 2.0 - 1.5 cm y terminales 1.5 - 1.0 cm. Espatas externamente rojas, glabras; internamente blancas en la base con rojo desde la parte media hacia el ápice y los bordes; base auriculada, borde involuto, ápice agudo, 9 - 12 por inflorescencia, espiraladas, lanceolado - conduplicadas, forman un ángulo de aproximadamente 90 grados con el raquis; espata basal fértil o estéril, 28 - 18 cm de largo por 2.3 - 2.0 cm de ancho en la base; espatas basales 18 - 12 cm de largo por 2.3 - 1.7 cm de ancho, medias 11 - 8 cm de largo por 1.8 - 1.5 cm de ancho y terminales 6.5 - 4.0 cm de largo por 1.3 - 0.7 cm de ancho. Brácteas rosadas, membranaceas, glabras, 4.5 cm de largo por 1.1 cm de ancho en la base. Flores exsertas, 9 - 26 por espata; perianto blanco en la base y verde claro desde la parte media hacia el ápice con bandas laterales blancas, curvado, glabro, 3.5 cm de largo; estaminodio blanco, obovado de ápice truncado, 1.5 cm de largo por 0.6 cm de ancho en la parte media y extendido; ovario verde, glabro, 0.6 cm de largo; pedicelo verde, glabro, 2.0 cm de largo. Frutos verdes, azules al madurar, 0.9 cm de largo por 0.6 cm de ancho.

Tipo: Gustavo Morales & José Abalo 335, 13 Noviembre 1982, Colombia, Intendencia del Putumayo, Mocoa 19 Km vía Pasto, 1160 msm. (COL, holotipo)
Otro material: Gustavo Morales 264, 3 Enero 1982, Colombia, Departamento del Caquetá, Resinas, 26 Km vía Florencia, 1150 msm. (COL)

Dedicamos esta especie a nuestro buen amigo el Dr. Gilbert S. Daniels, como muestra de nuestro agradecimiento.

Habitat: Zonas de alta precipitación. Suelos rocosos con abundante acumulación de materia orgánica. Sitios protegidos o semi - abiertos. Laderas húmedas.



HELICONIA GILBERTIANA

Heliconia intermedia Abalo & Morales, sp. nov.

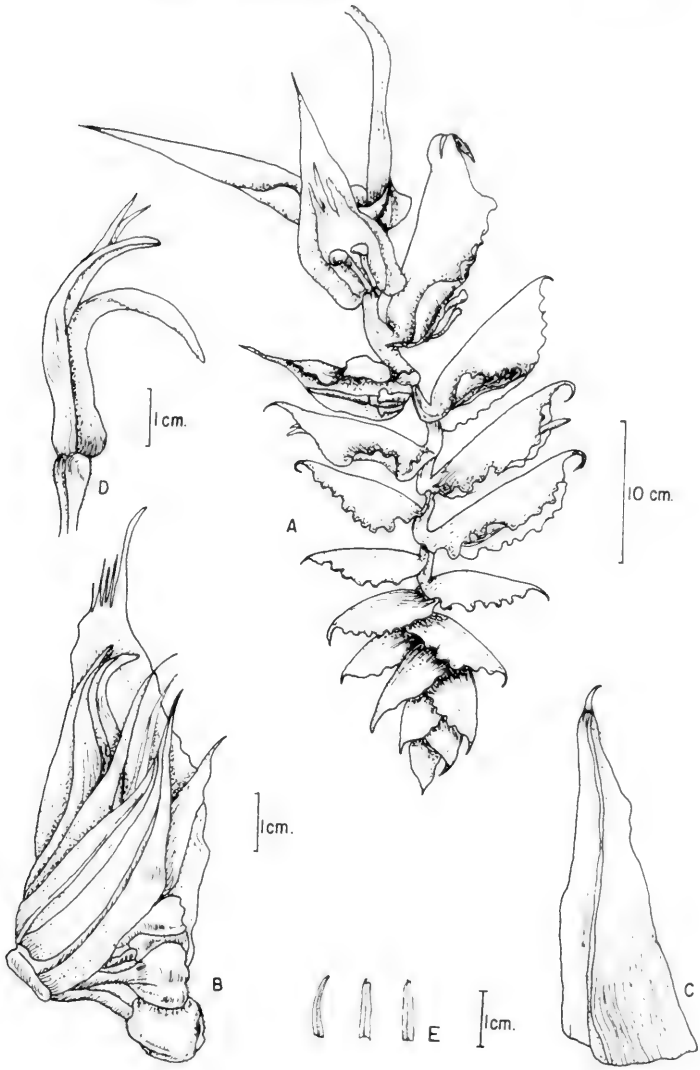
Planta musoides. Pseudocaulis lentiginosus, 1.7 - 2.3 m altus. Petiolus 20 - 100 cm longus. Lamina 146 - 285 cm longa, 16 - 32 cm lata. Inflorescentia pendula emerget circa 75 - 100 cm alta pseudocauli. Pedunculus ruber, pubescens. Rachis rubra, pubescens. Spathae rubrae, pubescentes; margo undulatus. Perianthium luteum. Ovarium lutescens, pubescens. Fructus immaturus albus, pubescens.

Planta musoide. Pseudotallo 1.7 - 2.3 m, lentiginoso. Hojas 4 - 5, claviformes, con la nervadura central rojiza por el envés hasta la parte media; pecíolo 20 - 100 cm de largo; lámina 146 -285 cm de largo por 16 - 32 cm de ancho, bordes ondulados, base inequilátera largamente atenuada, ápice obtuso con acumen. Inflorescencia péndula, 45 - 80 cm de largo que brota del pseudotallo a 75 - 100 cm del suelo; pedúnculo rojo, 15 - 30 cm de largo, finamente pubescente; raquis rojo, flexuoso, pubescente, 30 - 50 cm de largo; distancia entre las espatas basales 6.0 - 2.0 cm, medias 2.0 cm, terminales 1.5 cm. Espatas rojas, 21 - 40 por inflorescencia, dispuestas en un largo espiral, reflexas, pubescentes externa e internamente, auriculadas, de borde rizado y revoluto en la base, ápice tempranamente necrosado; espatas basales 20 - 10 cm de largo por 4.0 - 3.0 cm de ancho cerca a la base, medias 10 - 7 cm de largo por 3.5 - 3.0 cm de ancho y terminales 7 - 5 cm de largo por 3.5 - 2.5 cm de ancho. Brácteas crema, carinadas, membranáceas, con pubescencia exterior principalmente sobre la carina, 6.0 - 5.5 cm de largo por 2.0 - 1.5 cm de ancho. Flores 15 - 37 por espata, teretes; perianto amarillo, 4.0 - 4.5 cm de largo, sépalo semi-libre curvado; estaminodio blanco, ensiforme con el ápice agudo, bifurcado o trifurcado, 1.2 - 0.9 cm de largo por 0.2 cm de ancho en la base; ovario amarillo claro, pubescente, 0.5 cm de largo por 0.5 cm de lado; pedicelo amarillo claro muy pubescente, 1.5 - 1.0 cm de largo. Frutos blancos, pubescentes, azules al madurar, 1.2 cm de largo por 1.3 - 1.5 cm de lado.

Tipo: Gustavo Morales 213, 22 Septiembre 1980, Colombia, Departamento del Chocó, San José del Palmar, 3 Km vía Cartago, 1380 msm. (COL, holotipo; MY, US, isotipos)
Otro material: Gustavo Morales 337, 15 Enero 1983, Colombia Departamento del Chocó, San José del Palmar, 5 Km vía Cartago, 1550 msm. (COL, MY, US)

El nombre de esta especie se refiere a que la inflorescencia brota de la parte media del pseudotallo. Ver ilustración Habitos 0, página 7, Abalo & Morales, 1982.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos con alto contenido de materia orgánica. Sitios protegidos a semi-abiertos. Laderas muy húmedas.



HELICONIA INTERMEDIA

Heliconia mincana Abalo & Morales, sp. nov.

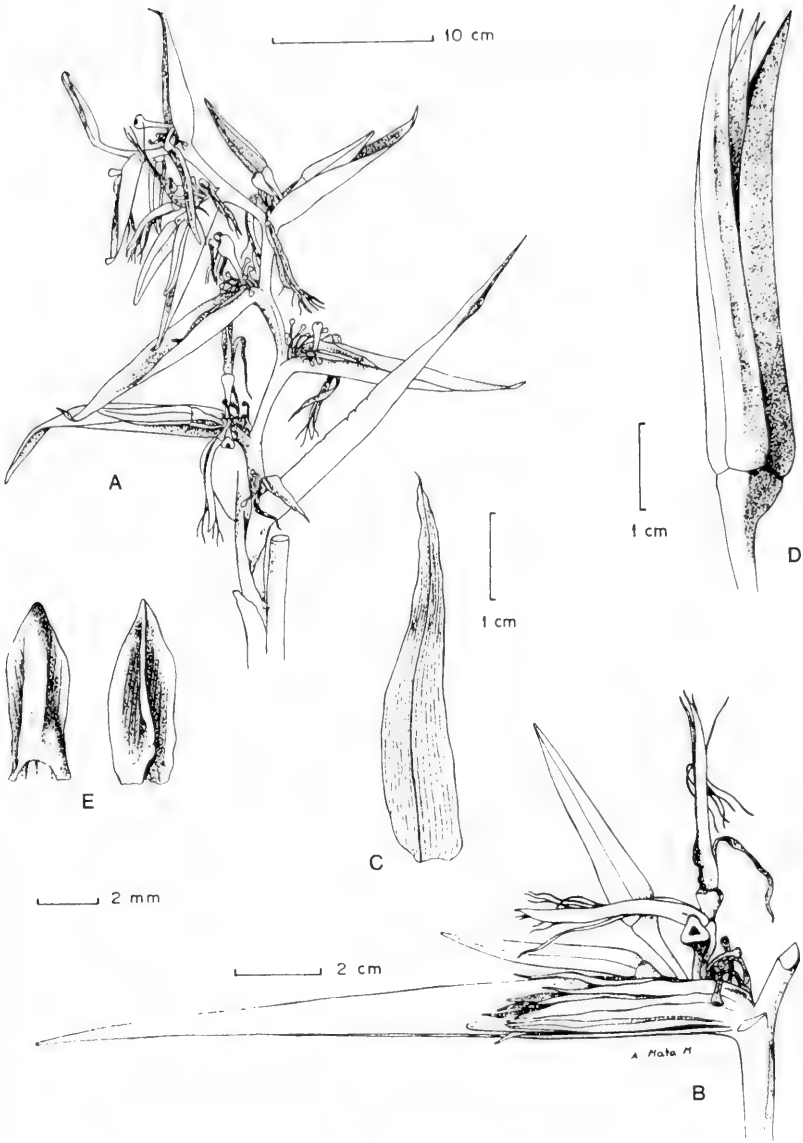
Planta musoides. Pseudocaulis 1.0 - 1.5 m altus. Petiolus viridis, glaber, 12 - 50 cm longus. Lamina 45 - 110 cm longa, 16 - 27 cm lata. Inflorescentia erecta. Pedunculus 0 - 3 cm longus. Rachis rubra, tomentosa, flexuosa. Spathae rubrae, tomentosae. Perianthium luteum, apex subviridis. Ovarium luteum, glabrum. Pedicellus luteus tomentosus.

Planta musoide. Pseudotallo 1.0 - 1.5 m. Hojas 5 - 6, dísticas; pecíolo verde, glabro, 12 - 50 cm de largo; lámina 45 - 110 cm de largo por 16 - 27 cm de ancho, base cuneada a truncada y ápice agudo. Inflorescencia erecta, 18 - 30 cm de largo; pedúnculo ausente o muy corto; raquis rojo, flexuoso, con tomento aracnoideo, 18 - 30 cm de largo; distancia entre las espatas basales 4.5 - 3.5 cm, medias 3.0 - 2.5 cm y terminales 2.3 - 1.5 cm. Espatas externamente rojas con tomento aracnoideo, internamente rojo claro con la base blanca, glabras; 6 - 10 espatas por inflorescencia, lanceolado - conduplicadas, suave espiraladas formando un angulo hasta de 110 grados respecto al raquis; borde revoluto en la base y recto desde la parte media hacia el ápice; ápice agudo; primera espata basal 33 - 17 cm de largo por 2.0 - 1.4 cm de ancho en la base y con un pequeño foliolo en el ápice, o sin él; las demás espatas disminuyendo gradualmente de tamaño desde 22 cm de largo por 2.0 cm de ancho las basales hasta 5.0 cm de largo por 0.8 cm de ancho las terminales. Brácteas crema, membranáceas, ligeramente carinadas, pubescente exteriormente en la base y sobre la carina, 4.5 - 6.5 cm de largo por 1.0 - 1.2 cm de ancho en la base. Flores 12 - 16 en las espatas medias, exsertas; perianto amarillo con el ápice verde claro, 5.0 cm de largo, triangular en corte transverso, glabro, persistentes en la inflorescencia aún después de secos; estaminodio crema, ovolanceolado, 0.6 cm de largo por 0.4 cm de anco en la parte media; ovario amarillo, glabro, 0.5 cm de largo por 0.6 cm de lado; pedicelo amarillo con tomento aracnoideo, 1.5 cm de largo. Frutos amarillos, azules al madurar; pedicelos de los frutos 2.5 cm de largo.

Tipo: Gustavo Morales 108, 27 Marzo 1979, Colombia, Depto. Magdalena, Santa Marta, Minca, 1300 msm. (COL, holotipo).
Otro material examinado: Gustavo Morales & José Abalo 351, 7 Abril 1983, Venezuela, Maracay, cultivada de rizomas colectados en l.c. del tipo. (COL, MY).

El nombre de esta especie hace referencia a la localidad del tipo.

Habitat: Zonas de precipitación media. Suelos rocosos con acumulación de materia orgánica. Sitios protegidos a semi-abiertos. Laderas.



HELICONIA MINCANA

Heliconia montana Abalo & Morales, sp. nov.

Planta cannoides. Pseudocaulis viridis, 1.0 - 2.7 m altus. Petiolus 16 - 40 cm longus. Lamina 42 - 98 cm longa, 10 - 21 cm lata. Inflorescentia erecta. Pedunculus viridis vel ruber, 0 - 5 cm longus, glaber. Rachis rubra, pubescens. Spathae rubrae, pubescentes, distichae. Flores exserti. Perianthium luteum, apex viridis. Ovarium luteum, glabrum. Pedicellum flavovirens, pubescens.

Planta cannoide. Pseudotallo verde, 1.0 - 2.7 m, rizomas cilíndricos, 5 cm de largo. Hojas 6 - 7, dísticas; pecíolo verde, algunas veces con manchas marrón, glabro, 16 - 40 cm de largo; lámina 42 - 98 cm de largo por 10 - 21 cm de ancho, base cordada a breve angosta, ápice acuminado; nervadura central verde claro a roja por el envés. Inflorescencia erecta, 15 - 35 cm de largo; pedúnculo ausente o hasta 5 cm de largo, verde o rojo, glabro; raquis rojo, finamente pubescente, 15 - 33 cm de largo; distancia entre las espatas basales 5.0 - 2.5 cm, medias 3.0 - 2.0 cm y terminales 2.0 - 1.0 cm. Espatas rojas, 7 - 12 por inflorescencia, finamente pubescentes exteriormente en especial hacia los bordes, dísticas, lanceolado - conduplicadas, borde revoluto y ápice agudo; primera espata basal verde con el borde rojo, fértil, 22 - 33 cm de largo por 1.5 - 2.2 cm de ancho en la base, foliolada o nó, con la lámina del foliolo hasta 43 cm de largo por 13 cm de ancho; espatas basales 25 - 10 cm de largo por 2 cm de ancho cerca de la base, medias 11 - 6 cm de largo por 1.5 cm de ancho y terminales 6 - 3 cm de largo por 1.5 - 1.0 cm de ancho. Brácteas crema, membranáceas, glabras, tempranamente necrosadas, 3.4 - 5.0 cm de largo por 0.7 - 0.9 cm de ancho en la base. Flores 12 - 4 por espata, exsertas; perianto amarillo con el ápice verde claro, glabro, suavemente curvado, triangular en corte transverso, 4.7 - 5.4 cm de largo, sépalo semilibre curvado en el ápice; estaminodio amarillo a crema, craso, lanceolado, 0.7 - 0.9 cm de largo por o.2 - 0.3 cm de ancho en la parte media; ovario amarillo, glabro, 0.6 cm de largo por 0.7 cm de lado; pedicelo amarillo verdoso, finamente pubescente, 2.4 - 2.0 cm de largo. Frutos amarillos, azules al madurar, 1.4 - 1.2 cm de largo por 1.2 cm de lado; pedicelos de los frutos verde claro.

Tipo: Gustavo Morales & José Abalo 349, 12 Febrero 1983, Colombia, Departamento Cauca, La Gallera, 80 Km Popayán vía la Gallera, 1900 - 2150 msm. (COL, holotipo; US, MY, isotipos)
Otro material: Gustavo Morales 350, 15 Febrero 1983, Colombia, Depto. Valle, Ponce, orillas río Ponce, 2 Km arriba de la población, 1650 msm. (COL, MY, US)

El nombre de esta especie hace referencia a las zonas montañosas de altas cordilleras rocosas donde se localiza.

Habitat: Zonas de precipitación alta a media. Suelos rocosos o arcillo - arenosos con materia orgánica. Sitios semi - abiertos a protegidos. Laderas.

HELICONIA MONTANA

Heliconia signa - hispanica Abalo & Morales, sp. nov.

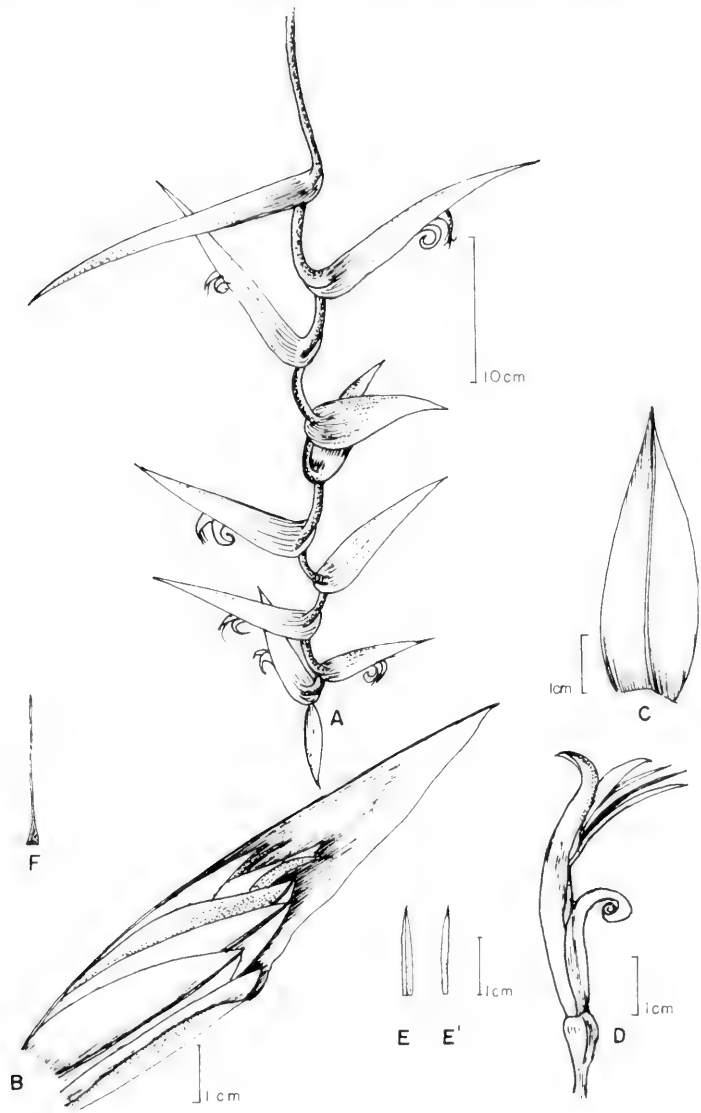
Planta cannoides. Pseudocaulis 1.0 - 1.8 m altus. Petiolus viridis, glaber, 15 - 35 cm longus. Lamina atrovirens, subtus viridis, 40 - 110 cm longa, 16 - 27 cm lata. Inflorescentia pendula; rachis lutea glabra. Spathae rubrae, aureomarginatae, bases aureae, glabrae. Perianthium flavum, glabrum, apex luteus. Fructus eburneus. Rudimentum aristoides adest.

Planta cannoide. Pseudotallo 1.0 - 1.8 m. Hojas 5 - 7; pecíolo verde, glabro, 15 - 35 cm de largo; lámina verde oscuro por el haz y verde claro por el envés, 40 - 110 cm de largo por 16 - 27 cm de ancho, base semicordada a truncada y ápice obtuso con acumen; nervadura central verde claro. Inflorescencia péndula, 75 - 84 cm de largo; pedúnculo amarillo verdoso, glabro, 32 - 36 cm de largo; raquis amarillo, glabro, 42 - 51 cm de largo; distancia entre las espatas basales 7.0 - 3.5 cm, medias 3.0 - 2.5 cm y terminales 2.0 - 1.5 cm. Espatas externamente amarillas en la base, el resto rojo con un borde muy delgado amarillo, glabras; internamente rojo - naranja, glabras; borde doblado hacia un lado en la base y recto desde la parte media hacia el ápice, ápice agudo, 10 - 14 por inflorescencia, espiraladas, reflexas, con abundante mucílago en el interior; espata basal algunas veces no reflexa, con la base roja y el resto amarillo verdoso, estéril, 35 - 28 cm de largo por 2.5 - 2.0 cm de ancho en la base; espatas basales 25 - 14 cm de largo por 2.7 - 2.5 cm de anco en la base, medias 13.5 - 10.5 cm de largo por 2.5 cm de ancho y terminales 10 - 6 cm de largo por 2.0 - 1.7 cm de ancho. Brácteas amarillas, membranaceas, suavemente carinadas, externamente con un tomento aracnoideo, 4.5 cm de largo por 1.2 - 1.0 cm de ancho en la base. Rudimento aristiforme amarillo en la base, el resto crema, presente en la mayoria de las espatas entre la primera y segunda brácteas, 1.2 - 4.2 cm de largo, glabro. Flores 8 - 6 por espata; perianto amarillo claro con el ápice amarillo, glabro, 4.5 cm de largo, sépalo semi-libre circinado, sépalos posteriores auriculares; estaminodio crema, linear de ápice agudo, 1.6 cm de largo por 0.15 cm de ancho; ovario amarillo claro, glabro, 0.8 cm de largo por 0.4 cm de lado; pedicelo amarillo claro glabro, 1.2 - 1.5 cm de largo. Frutos crema, azules al madurar, 1.0 cm de largo por 0.6 cm de lado.

Tipo: Gustavo Morales 315, 31 Julio 1982, Colombia, Departamento del Chocó, El Carmen del Atrato, 13 Km del Siete vía Quibdó, 1150 msm. (COL holotipo; MY, US, isotipos)
Otro material: Gustavo Morales 342, 16 Enero 1983, Colombia Depto. del Chocó, El Carmen del Atrato, 7 Km del Siete vía Quibdó, 1400 msm. (COL, MY, US)

La disposición de los colores de la inflorescencia se asemeja a la bandera de España, de ahí su nombre.

Habitat: Zonas de alta precipitación. Sitios protegidos.



HELICONIA SIGNA-HISPANICA

Heliconia spiralis Abalo & Morales var. spiralis sp. nov.

Planta musoides. Pseudocaulis viridis, 1.0 - 2.5 m altus. Petiolus viridis, glaber, 55 - 80 cm longus. Lamina 70 - 100 cm longa, 15 - 23 cm lata. Inflorescentia pendula. Pedunculus flavovirens, glaber. Rachis lutea, glabra. Spathae luteae. Perianthium luteum, basis eburnea. Ovarium lutescens. Rudimentum aristoides adest.

Planta musoide. Pseudotallo verde, 1.0 - 2.5 m. Hojas 4 - 6, dísticas; pecíolo verde, glabro, 55 - 80 cm de largo; lámina 70 - 100 cm de largo por 15 - 23 cm de ancho, base inequilátera, semitruncada y ápice agudo con acumen. Inflorescencia péndula, 35 - 80 cm de largo; pedúnculo amarillo verdoso, glabro, 12 - 30 cm de largo. Raquis amarillo, semiflexuoso, glabro, 23 - 50 cm de largo; distancia entre las espatas basales 7.0 - 4.0 cm, medias 4.5 - 3.0 cm y terminales 3.5 - 2.5 cm. Espatas amarillas, externamente glabras, internamente de aspecto aterciopelado, 8 - 27 por inflorescencia, espiraladas, reflexas, de borde recto; primera espata basal estéril o fértil, 26 - 12 cm de largo por 3.0 - 2.0 cm de ancho; espatas basales 18 - 12 cm de largo por 3.5 - 2.5 cm de ancho, medias 11 - 8 cm de largo por 3.0 - 2.5 cm de ancho y terminales 8 - 5 cm de largo por 2.5 - 2.0 cm de ancho. Brácteas amarillo claro, carinadas, glabras a pubérulas, 5 - 4 cm de largo por 1.8 - 1.5 cm de ancho en la base. Rudimento aristiforme amarillo claro, glabro a pubérulo, 5.0 - 3.5 cm de largo. Flores 25 - 9 por espata; perianto amarillo con la base crema, 5.0 - 4.5 cm de largo, sépalos finamente pubescentes, pétalos glabros; estaminodio blanco, cuando extendido obovado - angosto con el ápice acuminado, 1.1 cm de largo por 0.3 cm de ancho en la parte media; ovario amarillo claro, glabro, 0.8 cm de largo; pedicelo amarillo claro, glabro, 1'0 cm de largo. Fruto amarillo grisaceo, azul al madurar, 1.0 cm de largo; pedicelos de los frutos 2.0 - 1.5 cm de largo.

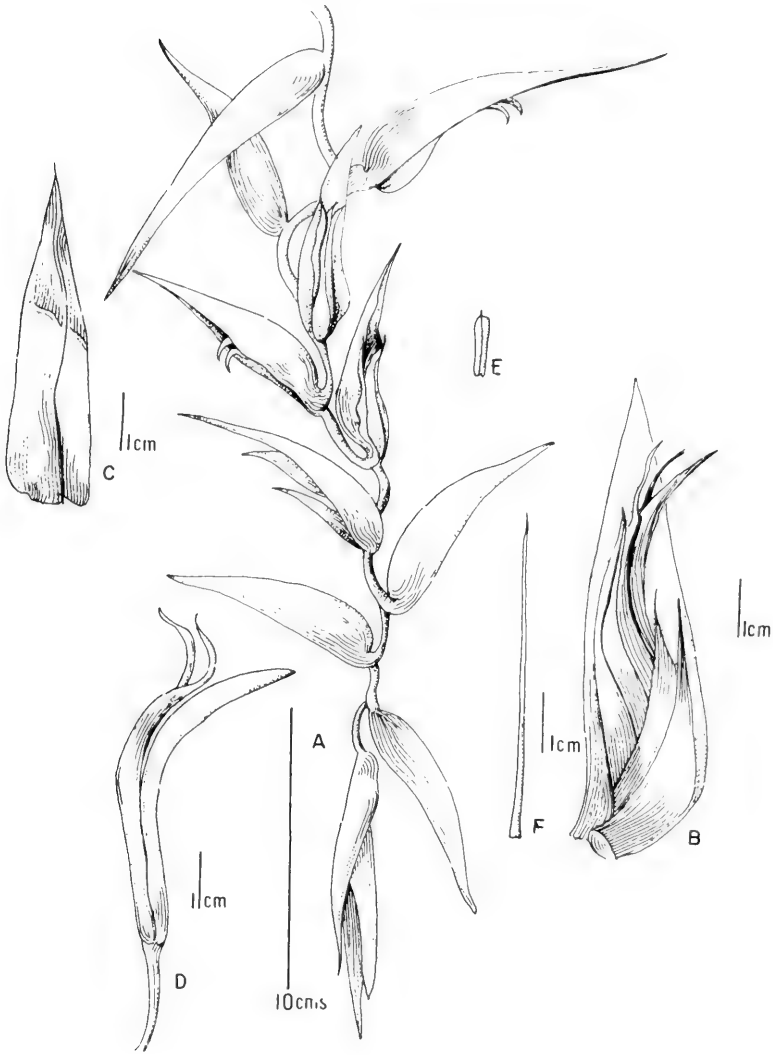
Tipo: Gustavo Morales & José Abalo 281, 16 Abril 1982, Colombia, Departamento del Valle, Sabaletas, 5 Km vía Buenaventura, 40 msm. (COL, holotipo; MY, US, isotipos)

Heliconia spiralis var. anchicayana Abalo & Morales, var. nov.

Differt a var. spiralis colore inflorescentiae.

Esta nueva variedad se diferencia de la forma tipo de la especie por poseer pedúnculo verde en la base y rojo hacia el raquis; raquis amarillo con rojo cuanco joven y rojo cuando adulto; espatas amarillas con la base roja cuanco jóvenes y rojas con el borde y ápice amarillo cuando adultas.

Tipo: Gustavo Morales 287, 24 Abril 1982, Colombia, Departamento del Valle, Queremal, 29 Km vía Buenaventura, orillas del Río Anchicayá, 330 msm. (COL, holotipo; US, MY, isotipos)



HELICONIA SPIRALIS

Heliconia stella - maris Abalo & Morales, sp. nov.

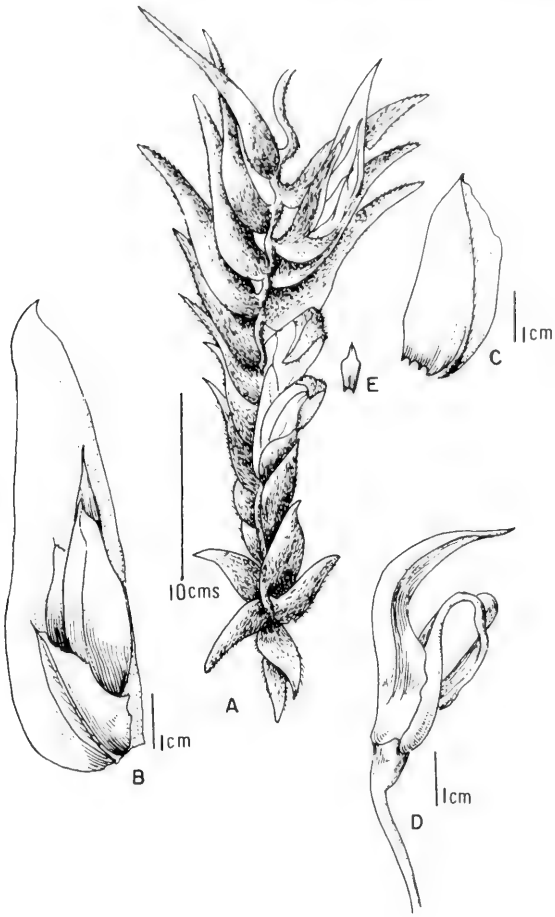
Planta musoides. Pseudocaulis lentiginosus, pubescens, 0.8 - 1.2 m altus. Petiolus 60 - 166 cm longus. Lamina 90 - 130 cm longa, 26 - 40 cm lata, subtus reticulata. Inflorescentia pendula valde pubescens. Rachis rubro - aurantiaca, flexuosa, valde pubescens. Spathae rubrae, pubescens, margo rubro - aurantiacus. Perianthium album. Ovarium album. Fructus immaturus violaceus.

Planta musoide. Pseudotallo 0.8 - 1.2 m, lentiginoso, pubescente principalmente hacia la base de los pecíolos. Hojas 3 - 4, dísticas; pecíolo verde, 60 - 166 cm de largo, glabro a pubérulo; lámina ovada - angosta, 90 - 130 cm de largo por 26 - 40 cm de ancho, base cuneada a truncada, ápice agudo, envés reticulado. Inflorescencia péndula, 27 - 61 cm de largo con abundante pubescencia blanca; pedúnculo rojo - naranja, 5 - 16 cm de largo, muy pubescente; raquis rojo - naranja, flexuoso, 22 - 45 cm de largo, muy pubescente; distancia entre las espatas medias 0.5 cm. Espatas externamente rojas con el borde naranja, muy pubescentes; internamente amarillo - naranja, glabras; 14 - 28 por inflorescencia, reflexas, dispuestas en suave espiral dando un giro do 360 grados entre cada 10 - 12 espatas, borde recto; espatas basales 24 - 10 cm de largo por 3.0 - 2.5 cm de ancho, espatas medias 10 - 8 cm de largo por 2.5 cm de ancho y terminales 7.5 - 5.0 cm de largo por 2.3 - 2.0 cm de ancho. Brácteas externas crema con rosado - claro, internas crema, 4.0 - 3.0 cm de largo por 2.0 - 1.5 cm de ancho, carinadas, membranáceas, pubescentes externamente, ápice unguiculado. Flores gibosas, 6 - 8 por espata; perianto blanco, 4.0 - 4.5 cm de largo, sépalo semi - libre pubescente, los demás glabros, pétalos glabros; estaminodio blanco, lanceolado, 0.6 cm de largo por 0.3 cm de ancho; ovario blanco, 1.0 cm de largo; pedicelo crema, 1.0 cm de largo, pubescente. Frutos violeta - claro, azules al madurar, 1.0 cm de largo, de forma triangular en corte transerval; pedicelos de los frutos 1.5 - 2.5 cm de largo.

Tipo: Gustavo Morales & José Abalo 280, 16 Abril 1982, Colombia, Departamento del Valle, Sabaletas, 5 Km vía Buenaventura, 40 msm. (COL, holotipo, US, MY, isotipos)

El nombre de esta especie se refiere al extremo de su inflorescencia que guarda semejanza con una estrella de mar.

Habitat: Zonas de lata precipitación. Suelos arcillosos con abundante acumulación de materia orgánica. Sitios protegidos. Laderas muy húmedas.



HELICONIA STELLA-MARIS

ADDITIONAL NOTES ON THE *ERIOCAULACEAE*. XCIV

Harold N. Moldenke

PAEPALANTHUS KANAII Satake

Additional bibliography: Mold., Phytologia 54: 406. 1983.

Citations: MOUNTED ILLUSTRATIONS: Satake, Journ. Jap. Bot. 53: 1o7--111, fig. 1 & 2. 1978 (Ba--380878).

PAEPALANTHUS KARSTENII Ruhl.

Additional bibliography: Mold., Phytologia 41: 482--483 (1979), 42: 29 & 30 (1979), and 45: 296. 1980; Hocking, Excerpt. Bot. A. 35: 324. 1980; Mold., Phytol. Mem. 2: 110, 117, 129, 134, 175, 398, 400, 426, 428, & 614. 1980; Cleef, Dissert. Bot. 61: 160/161. 1981; Mold., Phytologia 50: 246. 1982.

Recent collectors describe this plant as a rhizomatous cushion-herb, growing in clumps, the "leaves grass-like with their edges inrolled and a few hairs on the inside face", the "flowering stalks" to 5 cm. tall but mostly shorter, the white heads to 5 mm. wide, the flowers tiny, the perianth white to grayish-white, the filaments white, and the anthers pale but turning darker in age. They have found it forming small patches in wet meadows and abundant of grass paramos, at 3000--3600 m. altitude, in flower in October and both in flower and fruit in May, July, August, and November.

The *Cuatrecasas & Castaneda 25027* collection, cited below, was previously misidentified and cited as *Eriocaulon microcephalum* H.B.K.

Additional & emended citations: COLOMBIA: Boyacá: *Melampy 228* (W--2916212). Cundinamarca: *Dwyer & Idrobo 8189* (E--2773083); *Fosberg 21684* (W--2109217); *Fosberg & Valencia 21462* (W--2109115). Magdalena: *Cuatrecasas & Castañeda 25027* (Fg, W--2339386); *White & Alverson 642* (E--2720632, Ws). Santander: *Killip & Smith 15626* (W--1351477). VENEZUELA: Mérida: *López-Figueiras & Rodriguez 8857* (W--2932335). Táchira: *Luteyn, Lebrón-Luteyn, & Ruiz-Teran 5927* (N). Trujillo: *Aristeguieta 3598* (W--2882087). ECUADOR: Loja: *J. A. Hart 1524* (W--2937031).

PAEPALANTHUS KARSTENII f. *COREI* (Mold.) Mold., Phytologia 45: 296. 1980.

Synonymy: *Paepalanthus karstenii* var. *corei* Mold., Phytologia 29: 386. 1974.

Bibliography: Mold., Phytologia 29: 386 (1974) and 30: 27--29. 1975; Hocking, Excerpt. Bot. A. 25: 380.1975; Mold., Phytologia 33: 44--45 (1976), 35: 27 (1976), 41: 483 (1979), 42: 30 (1979), and 45: 296. 1980; Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytol. Mem. 2: 110, 117, 175, & 614. 1980; Mold., Phytologia 50: 246. 1982.

Recent collectors describe this plant as a mat-forming herb, growing on marshy paramos, at 3375--3845 m. altitude, in flower in

May and September, the floral bracts described as brown. Luteyn and his associates refer to its occurrence as "scattered".

Additional & emended citations: Cundinamarca: *Cuatrecasas 9502* in part (W--2847471); *Dwyer & Idrobo 8186* (E--2773084); *Kirkbride 363* (E--2773076, E--2773094); *Luteyn & Lebron-Luteyn 7755* (W--2930077); *Luteyn, Lebrón-Luteyn, Espina Z., & Palacios 7755* (N); *Pennell 2256* (F--485508, N, W--1082205). Meta: *Kirkbride & Idrobo 363* (E--2773093). VENEZUELA: Mérida: *Steyermark 55727* (N, W--1901714). ECUADOR: Carchi: *Boeke 803* (N). BOLIVIA: La Paz: *G. H. H. Tate 382* (N).

PAEPALANTHUS KARSTENII var. *MINIMUS* Mold.

Synonymy: *Paepalanthus karstenii* f. *minimus* Mold., Phytol. Mem. 2: 614. 1980.

Additional bibliography: Mold., Phytologia 41: 483 (1979) and 42: 29. 1979; Mold., Phytol. Mem. 2: 110 & 614. 1980.

PAEPALANTHUS KARSTENII var. *SUBSESSILIS* (Mold.) Mold.

Additional bibliography: Mold., Phytologia 41: 483. 1979; Mold., Phytol. Mem. 2: 110, 117, 428, & 614. 1980.

López-Figueiras describes this plant as forming mats to 14 cm. in diameter and found it growing at 3300 m. altitude.

Additional citations: VENEZUELA: Lara: *Liesner, González, Wingfield, & Burandt 8065* (Ld); *Steyermark 55495* (W--1901710--isotype). Mérida: *López-Figueiras 8727* (W--2932361).

PAEPALANTHUS KILLIPII Mold.

Additional bibliography: Mold., Phytologia 37: 46. 1977; Mold., Phytol. Mem. 2: 110, 117, & 614. 1980.

Additional citations: COLOMBIA: Meta: *Fosberg 19511* (W--2108249).

PAEPALANTHUS KLOTZSCHIANUS Körn.

Additional bibliography: Mold., Phytologia 33: 46. 1976; Mold., Phytol. Mem. 2: 155, 426, 428, & 614. 1980.

Recent collectors have encountered this plant in the "interior sombrio da matinha do alto do morro", at 100--1220 m. altitude, in both flower and fruit in July. Mattos Silva & Brito encountered it in sandy soil of "mata raleada pelos extratores de fibras de piaçava"

Additional citations: BRAZIL: Bahia: *Hatschbach & Guimaraes 42399* (Ld); *Mattos Silva & Brito 972* (Ld). MOUNTED ILLUSTRATIONS: J. Hutchinson, Fam. Flow. Pl., ed. 3, [711], fig. 264. 1973 (Ld).

PAEPALANTHUS KUNHARDTII Mold.

Additional bibliography: Mold., Phytologia 30: 31. 1975; Mold., Phytol. Mem. 2: 117 & 614. 1980; Mold., Phytologia 54: 234. 1983.

Huber & Steyermark describe this plant as being 20--30 cm. tall, the heads dry, gray or dark-gray. They assert that it forms dense clumps, frequent in the grass of very dry and open fields, at 2200 m. altitude, in both flower and fruit in January and February.

Additional citations: VENEZUELA: Amazonas: *Maguire & Politi 27588* (W--2046438--isotype). Bolívar: *Huber & Steyermark 6971* (Ld), *7035* (Ld).

PAEPALANTHUS KUPPERI Suesseng.

Additional bibliography: Mold., Phytologia 35: 27. 1976; Mold., Phytol. Mem. 2: 81 & 614. 1980.

The *Weston 1537*, distributed as *P. kupperi*, seems, instead, to be *P. costaricensis* Mold.

PAEPALANTHUS LAMARCKII Kunth

Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 180. 1927; Savage, Cat. Linn. Herb. Lond. 21. 1945; Anon., Kew Bull. Gen. Ind. 111 & 209. 1959; Mold., Phytologia 41: 483--484 (1979) and 42: 34. 1979; F. C. Seymour, Phytol. Mem. 1: 85. 1980; Mold., Phytol. Mem. 2: 74, 76, 84, 90, 92, 96, 104, 110, 117, 122, 124, 126, 155, 172, 207--209, 216, 220, 227, 229, 250, 357, 401, 404, 426, & 614. 1980; Mold., Phytologia 50: 242 (1982) and 54: 269. 1983.

Recent collectors have found this plant growing in open sites on sandy savannas, "in sand beside water", on slightly elevated sites with and under *Byrsonima* on wet savannas, in "open pastures and fields on level areas in valleys with natural swampy depressions", at lake margins, in shallow moist depressions, and on laterite in open places in forests, at 50--300 m. altitudes, in both flower and fruit from June to August and in November and December, in flower also in January. They describe it as a diminutive herb, 5--8 cm. tall, the inflorescence heads gray or "greenish-whitish-gray". Delascio and his associates refer to the "cabezuelas blancas", but I have never seen any that appeared to be white.

Seymour (1980) lists the species from Nicaragua, but cites no collections. Knuth (1927) cites *Otto s.n.* from Bermudez and *Chaffanjon 114* and *Passarge & Selwyn 309* & *576* from Bolívar, Venezuela.

Material of *P. lamarckii* has been misidentified and distributed in some herbaria as the very similar *P. cearaensis* Ruhl. On the other hand, the *Hallé 454*, so distributed, actually is *P. fasciculatus* (Rottb.) Körn., while *Granville 1409* and *Sastre 1500* are *P. leucocyaneus* f. *egleri* Mold. and *Raynal-Roques 20121* is *Syngonanthus caulescens* (Poir.) Ruhl. *C. Wright 3234* is a mixture with *P. seslerioides* Griseb., while *Schultes & Cabrera 14968* is a mixture with *P. fasciculatus* f. *tenellus* Herzog and *Syngonanthus caulescens* (Poir.) Ruhl.

Additional citations: BELIZE: *Bartlett 11263* in part (W--1493358). HONDURAS: Colón: *Saunders 968* (Ld). COLOMBIA: Magdalena: *Haught 2241* (W--1706916). Vaupés: *Schultes & Cabrera 14968* in part (W--2198877). VENEZUELA: Amazonas: *O. Huber 1034* (Ld), *1045* (Ld), *2145* (Ld), *5620* (Ld), *5717* (Ld); *Maguire, Cowan, & Wurdack 29499* (W--2046477); *Maguire, Wurdack, & Bunting 36138* (W--2168969); *Steyermark 58447* (W--1901774); *Thomas & Rogers 2566* (Ld). Bolívar: *Steyermark 90849* (W--2430198); *Wurdack & Monachino 39950* (W--2223430). Guárico: *Delascio, Montes, & Davidse 11093* (E--2993681),

11198 (Ld), *11297* (Ld). Táchira: *Steyermark & Liesner 119320* (Ld). GUYANA: *Maas, Westra, & al. 3778* (Ld, N). SURINAM: *Maguire, Schulz, Soderstrom, & Holmgren 53960* (W--2514873). FRENCH GUIANA: *Leeuwenberg 11644* (Cy, N); *Raynal-Roques AR.20200* (Cy); *Tucker s.n.* [28 Juin 1976] (Cy). BRAZIL: Amazonas: *Sastre 1545* (Cy). Maranhão: *Lisboa 4* [Herb. Jard. Bot. Rio Jan. 4764] (W--2928663). Mato Grosso: *Prance & Schaller 26285* (Ld, N). Pará: *Prance, Campbell, Daly, Maciel, Silva, Bahia, & Santos P.26353* (N); *Silva 2920* (N). Roraima: *Prance, Steward, Ramos, & Farias 9909* (W--2573051A). MOUNTED ILLUSTRATIONS: Lam., Tabl. Encycl. Bot. 1: pl. 50, fig. 3. 1791 (Ld); Meikle & Baldwin, Am. Journ. Bot. 39: 48, fig. 19--27. 1952 (Ld); Mold. in Humbert, Fl. Madag. 36: 31, fig. 4 (8--17). 1955 (Ld).

PAEPALANTHUS LANATO-ALBUS Mart.

Additional bibliography: Mold., Phytologia 30: 38--39. 1975; Mold., Phytol. Mem. 2: 155, 462, & 615. 1980.

PAEPALANTHUS LANATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 39--40 & 115. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 42--43, pl. 21. 1928 (Ld, N, W).

PAEPALANTHUS LANCEOLATUS Körn.

Additional bibliography: Mold., Phytologia 41: 476 & 484. 1979; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach & Koczicki 35332* (W--2839431).

PAEPALANTHUS LANGSDORFFII (Bong.) Körn.

Additional bibliography: Mold., Phytologia 37: 47. 1977; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

PAEPALANTHUS LANGSDORFFII var. *CARACENSIS* Mold.

Additional bibliography: Mold., Phytologia 37: 47. 1977; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

Additional citations: BRAZIL: Minas Gerais: *Irwin, Harley, & Onishi 29110* (W--2709887--isotype).

PAEPALANTHUS LATIPES Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 42. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 230--231, pl. 153. 1928 (Ld, N, W).

PAEPALANTHUS LAXIFOLIUS Körn.

Additional bibliography: Mold., Phytologia 37: 47. 1977; Mold., Phytol. Mem. 2: 155 & 615. 1980.

PAEPALANTHUS LEIOTHRICOIDES Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 48. 1976; Mold.,

Phytol. Mem. 2: 155 & 615. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 127--128, pl. 79. 1928 (Ld, N, W).

PAEPALANTHUS LEISERINGII Ruhl.
Additional bibliography: Mold., Phytologia 37: 47. 1977; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

PAEPALANTHUS LEISERINGII var. *KLEINII* Mold. & Sm.
Additional bibliography: Mold., Phytologia 37: 47. 1977; Mold., Phytol. Mem. 2: 155 & 615. 1980.

PAEPALANTHUS LEPIDUS Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 48. 1976; Mold., Phytol. Mem. 2: 155 & 615. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Serr. Min. 57, pl. 19. 1908 (W); Alv. Silv., Fl. Mont. 1: 241--243, pl. 161. 1928 (Ld, N, W).

PAEPALANTHUS LEUCOBLEPHARUS Körn.
Additional bibliography: Mold., Phytologia 37: 47. 1977; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

PAEPALANTHUS LEUCOCEPHALUS Ruhl.
Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 155 & 615. 1980.

PAEPALANTHUS LEUCOCYANEUS Tutin
Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 122, 124, 155, & 615. 1980; Mold., Phytologia 51: 244. 1982.
Recent collectors have found this plant growing on sunny emergent rocks, in both flower and fruit in July, describing the bracts as brown.
The *Irwin, Egler, & Murça Pires 47133*, distributed and previously cited by me as typical *P. leucocyaneus*, now is the type collection of its f. *egleri* Mold., while *Tillett, Tillett, & Boyan 43997* actually is *P. perplexans* Mold.
Additional & emended citations: GUYANA: *Maguire & Fanshawe 23264* (W--1907828); *Tutin 481* (W--1743596--isotype). SURINAM: *Maguire 24485* (W--1907839), *24750* (W--1907844). FRENCH GUIANA: *Granville 2689* (Cy, Ld).

PAEPALANTHUS LEUCOCYANEUS f. *EGLERI* Mold., Phytologia 51: 244. 1982.
Bibliography: Mold., Phytologia 51: 244. 1982.
Collectors describe this plant as an herb. 5--15 cm. tall, with white flower-heads, and have encountered it in wet places, in forests, and locally common in wet places among rocks, at 560 m. altitude, in both flower and fruit in July and August.
Material of this form has been misidentified and distributed in some herbaria as *P. lamarckii* Kunth; *Egler 47650* is a mixture

with *Syngonanthus glandulosus* f. *epapillosus* (Mold.) Mold. and *Utricularia* sp.

Citations: FRENCH GUIANA: *Cremers 7416* (Ld); *Granville 1409* (Cy); *Oldeman T.315* (Cy, Ld); *Sastre 1500* (Cy). BRAZIL: Amapá: *Egler 47650* in part (W--2435286); *Irwin, Egler, & Murça Pires 47133* (N--type, W--2435090--isotype).

PAEPALANTHUS LILLIPUTIANUS Mold.

Additional bibliography: Mold., Phytologia 30: 47. 1975; Mold., Phytol. Mem. 2: 122 & 615. 1980.

PAEPALANTHUS LINDENII Ruhl.

Additional bibliography: Mold., Phytologia 33: 48. 1976; Mold., Phytol. Mem. 2: 110 & 615. 1980.

Additional citations: COLOMBIA: Boyacá: *Fosberg 22242* (W--2109451).

PAEPALANTHUS LINEARIFOLIUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 48. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 57--58. 1928 (Ld, N, W).

PAEPALANTHUS LINGULATUS (Bong.) Kunth

Additional bibliography: Mold., Phytologia 30: 48--49. 1975; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 26. 1831 (W).

PAEPALANTHUS LODICULOIDES Mold.

Additional bibliography: Mold., Phytologia 41: 484. 1979; Mold., Phytol. Mem. 2: 110, 117, & 615. 1980; Mold., Phytologia 52: 119. 1982.

Recent collectors have described this plant as forming light-green cushions on paramos as well as in open wet sandy areas in banas (white sand areas with shrubs and small trees), from "120" (?) to 4380 m. altitude, in flower in April. It seems most likely that the "120" m. altitude recorded by Liesner is a typographic error made when the labels accompanying his collection were prepared. The species is otherwise known only as a very high altitude denizen.

The *Grubb & al. 762*, previously cited as typical *P. lodiculoides*, actually represented the more recently described var. *floccosus* Mold.

Additional citations: COLOMBIA: Boyacá: *Cleef 4364* (W--2850667), *4418* (W--2850664). Cundinamarca: *Cleef 5439* (W--2050668); *Cuatrecasas & Idrobo 27032* (W--2613363). VENEZUELA: Amazonas: *Liesner 6925* (Ld).

PAEPALANTHUS LODICULOIDES var. *FLOCCOSUS* Mold.

Additional bibliography: Mold., Phytologia 41: 484. 1979; Mold., Phytol. Mem. 2: 110 & 615. 1980; Mold., Phytologia 52: 119. 1982.

Recent collectors describe this plant as densely tufted, to 20 cm in diameter, the leaves very pale-green, lost in dense silvery tomentum, the bracts dark-brown, the inner ones very dark, all edged with white hairs, and have found it growing on paramos at altitudes of 3720--4380 m.

The *Grubb & al. 762*, cited below, was previously cited as typical *P. lodiculoides*.

Additional citations: COLOMBIA: Arauca: *Grubb, Curry, & Fernandez-Perez 762* (W--2322662). Boyacá: *Cleef, Cuatrecasas, & Jaramillo 9214* (W--2789386--isotype & photo of type); *Cleef & Florschütz 5550* (W--2850666); *Kieft & Becerra C. 139* (N, W--2908177). Cundinamarca: *Cuatrecasas & Idrobo 27054* (E--2613376).

PAEPALANTHUS LOEFGRENIANUS Ruhl.

Additional bibliography: Mold., Phytologia 30: 50--51. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

PAEPALANTHUS LOMBENSIS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 16 & 51. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 180--181, pl. 116. 1928 (Ld, N, W).

PAEPALANTHUS LONGICAULIS Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 48 (1977) and 41: 484. 1979; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980; Mold., Phytologia 53: 367 (1983) and 54: 236 & 243. 1983.

Material of this species has been misidentified and distributed in some herbaria as *P. planifolius* (Bong.) Körn. Hatschbach encountered it on sandy river margins, in flower in August.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 30189* (W--2705959). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 236--237, pl. 157. 1928 (Ld, N, W).

PAEPALANTHUS LONGICAULIS var. *GLABER* Mold.

This taxon is now regarded as identical with *P. macrocaulon* var. *glaber* Mold, which see.

PAEPALANTHUS LONGIFOLIUS Körn.

Additional bibliography: Mold., Phytologia 30: 52--53. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

PAEPALANTHUS LOXENSIS Mold.

Additional bibliography: Mold., Phytologia 30: 53. 1975; Mold., Phytol. Mem. 2: 129 & 615. 1980.

Additional citations: ECUADOR: Loja: *Steyermark 54452* (W--1901694--isotype).

PAEPALANTHUS LUNDII Körn.

Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Recent collectors have found this plant growing in wet campos,

describing the flowers as whitish. They have found it in both flower and fruit in October.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach & Kummrow 45637* (Ld).

PAEPALANTHUS LUTEOLUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 53--54. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 86--88, pl. 52. 1928 (Ld, N, W).

PAEPALANTHUS LÜTZELBURGII Herzog

Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

Recent collectors have found this plant growing in the "interior da mata sombria das encostas do morro", at 1150 m. altitude, in both flower and fruit in July.

Additional citations: BRAZIL: Bahia: *Hatschbach & Guimarães 42391* (Ld).

PAEPALANTHUS LYCOPODIOIDES Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 55. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 160--161, pl. 101. 1928 (Ld, N, W).

PAEPALANTHUS MACARENENSIS Mold.

Additional bibliography: Mold., Phytologia 30: 55. 1975; Mold., Phytol. Mem. 2: 110 & 615. 1980.

Additional citations: COLOMBIA: Magdalena: *Cuatrecasas & Castañeda 25025* (W--2339383).

PAEPALANTHUS MACROCAULON Alv. Silv.

Additional bibliography: Mold., Phytologia 41: 484 (1979) and 45: 38. 1980; Mold., Phytol. Mem. 2: 117, 155, & 615. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Hocking, Excerpt. Bot. A.35: 324 (1980) and A.36: 23. 1981.

Hatschbach has encountered this plant on sandy roadsides, in both flower and fruit in July.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 41524* (Ld, N). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 108 & 109. 1928 (Ld, Ld, N, N).

PAEPALANTHUS MACROCAULON var. *CONTASENSIS* Mold., Phytologia 43: 356. 1979.

Bibliography: Mold., Phytologia 43: 356. 1979; Mold., Phytol. Mem. 2: 155 & 615. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Hocking, Excerpt. Bot. A.36: 23. 1981.

Collectors describe this plant as an herb, to 50 cm. tall, with a rosette of rigid mid-green leaves and white flower-heads. They have found it growing in marshes, flowering in March.

Citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19804* (Ld--isotype, N--isotype, W--2936323--isotype).

PAEPALANTHUS MACROCAULON var. *KINGII* Mold., Phytologia 45: 38. 1980.

Bibliography: Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytologia 45: 38. 1980; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Citations: BRAZIL: Bahia: *Mori, King, Santos, & Hage 12478* (Ld--isotype, W--2854256--isotype).

PAEPALANTHUS MACROCAULON var. *VENAMENSIS* Mold.

Additional bibliography: Mold., Phytologia 41: 484. 1979; Mold., Phytol. Mem. 2: 117 & 615. 1980.

Additional citations: VENEZUELA: Bolívar: *Steyermark, Dunsterville, & Dunsterville 92308* (W--2584521--isotype).

PAEPALANTHUS MACROCEPHALUS (Bong.) Körn.

Additional bibliography: Mold., Phytologia 37: 48 (1977) and 41: 485. 1979; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

PAEPALANTHUS MACROCEPHALUS var. *MINARUM* (Körn.) Ruhl.

Additional bibliography: Mold., Phytologia 41: 485. 1979; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 41342* (W--2840050).

PAEPALANTHUS MACROCEPHALUS var. *PACHYPHYLLUS* (Körn.) Ruhl.

Additional bibliography: Mold., Phytologia 30: 58--59. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

PAEPALANTHUS MACROPODUS Ruhl.

Additional bibliography: Mold., Phytologia 33: 49. 1976; Mold., Phytol. Mem. 2: 155 & 615. 1980; Mold., Phytologia 53: 367 (1983) and 54: 237 & 243. 1983.

PAEPALANTHUS MACROPODUS var. *GLABER* (Mold.) Mold., Phytologia 53: 367. 1983.

Synonymy: *Paepalanthus longicaulis* var. *glaber* Mold., Phytologia 9: 266. 1963.

Bibliography: Mold., Phytologia 9: 266. 1963; Angely, Fl. Anal. S. Paulo 6: 1159. 1972; Mold., Phytologia 30: 52 (1975), 37: 48 (1977), 41: 484 (1979), 53: 367 (1983), and 54: 236, 237, & 243. 1983.

Mori & Benton found this plant growing in the shade of large rocks on campo rupestre, at 800 m. altitude, in both flower and fruit in December.

Citations: BRAZIL: Bahia: *Mori & Benton 13190* (Ld, N); *Santos 3111* (Ld, N). Minas Gerais: *Héringer & Castellanos 6096* (Ld--type); *Irwin, Maxwell, & Wasshausen 20249*(Ld, N, W--2752349); *Tryon & Tryon 6829* (Ac, Ld). São Paulo: *Pabst 4777* (Bd--10932).

PAEPALANTHUS MACRORRHIZUS (Bong.) Kunth

Additional bibliography: Mold., Phytologia 41: 485. 1979; Mold., Phytol. Mem. 2: 155, 398, & 615. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 40811* (N, W--2850674).

PAEPALANTHUS MACROTRICHUS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 49. 1976; Mold., Phytol. Mem. 2: 155 & 615. 1980; Mold., Phytologia 50: 247 (1982) and 54: 399. 1983.

Recent collectors describe this species as turf-forming, and have encountered it at 1400 m. altitude, in anthesis in March.

Additional citations: BRAZIL: Bahia: *Mori & Benton 13620* (Ld, N). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Serr. Min. 43. 1908 (W); Alv. Silv., Fl. Mont. 1: 69--70, pl. 40. 1928 (Ld, N, W).

PAEPALANTHUS MACROTRICHUS var. *PUBERULUS* Mold., Phytologia 54: 399. 1983.

Bibliography: Mold., Phytologia 54: 399. 1983.

Citations: BRAZIL: Bahia: *Hatschbach 46496* (Ld--type).

PAEPALANTHUS MACULATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 61. 1975; Mold., Phytol. Mem. 2: 155 & 615. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 167--169, pl. 107. 1928 (Ld, N, W).

PAEPALANTHUS MAGALHÃESII Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 51. 1976; Mold., Phytol. Mem. 2: 155, 426, & 615. 1980.

PAEPALANTHUS MANICATUS V. A. Pouls.

Additional synonymy: *Paepalanthus manicatus* "V. A. Pouls. ex Malme" ex Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Additional bibliography: Mold., Phytologia 41: 485. 1979; Mold., Phytol. Mem. 2: 155, 156, 175, 615, & 628. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980; Mold., Phytologia 50: 248 & 263 (1982) and 53: 328. 1983.

Recent collectors describe this plant as a tiny herb with rosettes of soft, pale-green leaves, the involucral bractlets brown. They have encountered it "inside horizontal rock crevices in shade of rocks with dripping water in some places" in a region of "rocky riversides with rapids, riverine vegetation, cerrado with sandstone outcrops, and some grassland areas subject to flooding", at 980 m. altitude, in both flower and fruit in March.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 20104* (Ld, N, W--2936322). Goiás: *Irwin, Grear, Souza, & Santos 13388* (W--2861721). Minas Gerais: *Hatschbach 41290* (N, W--2840103).

PAEPALANTHUS MANICATUS var. *PULCHELLUS* Beauverd
Additional bibliography: Mold., Phytologia 30: 74--75. 1975; Mold., Phytol. Mem. 2: 156 & 615. 1980.
Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 290. 1908 (W).

PAEPALANTHUS MANICATUS var. *PULVINATUS* Herzog
Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 175 & 615. 1980; Mold., Phytologia 50: 248 (1982) and 53: 328. 1983.
Material of this taxon has been misidentified and distributed in some herbaria as *Eriocaulon microcephalum* H.B.K.
Additional citations: BOLIVIA: Santa Cruz: *Cutler 7038* (W--2863035).

PAEPALANTHUS MANICATUS f. *ROBUSTUS* Ruhl.
Additional bibliography: Mold., Phytologia 30: 75 & 76. 1975; Mold., Phytol. Mem. 2: 156 & 615. 1980.

PAEPALANTHUS MARTIANUS Körn.
Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 156 & 615. 1980.

PAEPALANTHUS MELALEUCUS (Bong.) Kunth
Additional bibliography: Mold., Phytologia 37: 48. 1977; Mold., Phytol. Mem. 2: 156 & 615. 1980.
Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 29. 1831 (W); Kunth, Enum. Pl. 3: 575. 1841 (W).

PAEPALANTHUS MELANOLEPIS Alv. Silv.
Additional bibliography: Mold., Phytologia 33: 51. 1976; Mold., Phytol. Mem. 2: 156 & 615. 1980.

PAEPALANTHUS MELANTHUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 78--79. 1975; Mold., Phytol. Mem. 2: 156 & 615. 1980.
Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 74--76, pl. 43 ["63"]. 1928 (Ld, N, W).

PAEPALANTHUS MELLII Mold.
Additional bibliography: Mold., Phytologia 30: 79. 1975; Mold., Phytol. Mem. 2: 65 & 615. 1980.
Additional citations: MOUNTED CLIPPINGS: Mold., N. Am. Fl. 19: 41. 1937 (N, W).

PAEPALANTHUS MENDONCIANUS Ruhl.
Additional bibliography: Mold., Phytologia 30: 79. 1975; Mold., Phytol. Mem. 2: 156 & 615. 1980.

PAEPALANTHUS MERIDENSIS Klotzsch
Additional bibliography: Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 180. 1927; Mold., Phytologia 35: 28. 1976;

Mold., Phytol. Mem. 2: 110, 117, & 615. 1980; Mold., Phytologia 54: 149, 233, & 234. 1983.

Recent collectors describe this plant as having white flowerheads and have found it growing in woods and pantamo, as well as subparamo, on brushy hillsides, rocky ridges, ledges, and "in white sand oozing water here and there on paramo slopes", common on grass paramo with *Espeletia brassicoides*, especially abundant in wet seepage areas. They have encountered it at 2600--3200 m. altitude, in flower in October, and in both flower & fruit in November. On *Cuatrecasas & al. 28151* all the leaves are quite hirsute on both surfaces, just as they are on the original cotype collections.

Material of this species has been misidentified and distributed in some herbaria as the very similar *P. andicola* Lörn. Knuth (1927) cites only *Linden 1415* and *Moritz 1212* from Mérida, Venezuela.

Additional citations: COLOMBIA: Norte de Santander: *Fosberg 19174* (W--2108097). VENEZUELA: Mérida: *Cuatrecasas, Ruiz-Terán, & López-Figueiras 28151* (W--2585778A). Táchira: *Luteyn, Lebrón-Luteyn, & Ruiz-Terán 5885* (N), (N). Trujillo: *Cuatrecasas, Ruiz-Terán, & López-Figueiras 28236* (W--2585810).

PAEPALANTHUS MESETICOLA Mold. & Steyerm.

Additional bibliography: Mold., Phytologia 41: 485. 1979; Mold., Phytol. Mem. 2: 117 & 615. 1980.

Steyermark and his associates refer to this plant as having the leaves pale-green and subcoriaceous and have found it growing in wet ground at 2580--2600 m. altitude, in both flower and fruit in January, March, and April.

Material of this species has been misidentified and distributed in some herbaria as *Leiothrix turbinata* Gleason.

Additional citations: VENEZUELA: Amazonas: *Steyermark & Delascio 129249* (Ld); *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 125893* (Ld), *125911* (Ld), *125924* (Ld). Bolívar: *Steyermark, Espinoza, & Brewer-Carias 109389* (W--2813878--isotype). MOUNTED ILLUSTRATIONS: Steyerm. & Brewer-Carias, Bol. Soc. Venez. Cienc. Nat. 132/133: [282], fig. 3. 1967 (Ld).

PAEPALANTHUS MEXIAE Mold.

Additional bibliography: Mold., Phytologia 37: 48. 1977; Angely, S. Amer. Bot. Bibl. 2: 674. 1980; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MICHAELII Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 51. 1976; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 39--40, pl. 19. 1928 (Ld, N, W).

PAEPALANTHUS MICROCAULON Ruhl.

Additional bibliography: Mold., Phytologia 41: 485. 1979; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7:

44. 1979; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MICROPHORUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 82. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 149--151, pl. 94. 1928 (Ld, N, W).

PAEPALANTHUS MICROPHYLLUS (Guill.) Kunth
Additional bibliography: Mold., Phytologia 30: 82--83. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MILHO-VERDENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 83--84. 1975; Mold., Phytol. Mem. 2: 156, 426, & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 131--132, pl. 82. 1928 (Ld, N, W).

PAEPALANTHUS MINASENSIS Mold.
Additional bibliography: Mold., Phytologia 30: 84. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MINIMUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 84. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 107--108, pl. 66. 1928 (Ld, N, W).

PAEPALANTHUS MINUTULUS Mart.
Additional bibliography: Mold., Phytologia 30: 84--85. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MINUTUS Mold.
Additional bibliography: Mold., Phytologia 30: 86. 1975; Mold., Phytol. Mem. 2: 117 & 616. 1980.

PAEPALANTHUS MISER Ruhl.
Additional bibliography: Mold., Phytologia 30: 86. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MOEDENSIS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 86--87. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 234--236, pl. 156. 1928 (Ld, N, W).

PAEPALANTHUS MOLDENKEANUS R. E. Schultes
Additional bibliography: Mold., Phytologia 41: 485. 1979; Mold., Phytol. Mem. 2: 110 & 616. 1980.
Additional citations: COLOMBIA: Vaupés: *Zarucchi 2020* (W--2832331).

PAEPALANTHUS MONTANUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 88. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 76--77, pl. 44. 1928 (Ld, N, W).

PAEPALANTHUS MULTICOSTATUS Ruhl.
Additional bibliography: Mold., Phytologia 30: 88--89. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MUSCOSUS Körn.
Additional bibliography: Mold., Phytologia 41: 483 & 485. (1979) and 42: 29. 1979; Mold., Phytol. Mem. 2: 110, 117, 129, & 616. 1980; Hocking, Excerpt. Bot. A.36: 222. 1981.
The *Boeke 803* and *Pennell 2256* distributed and previously cited as *P. muscosus,* actually are *P. karstenii* f. *corei* Mold.

PAEPALANTHUS MUSCOSUS var. *TACHIRENSIS* Mold.
Additional bibliography: Mold., Phytologia 30: 90. 1975; Mold., Phytol. Mem. 2: 117 & 616. 1980.
Recent collectors describe this plant as an herb, the "inflorescence gray, pale-brown at base", and have encountered it on a subparamo with very wet rocks, at 2250--2880 m. altitude, in flower in January.
Additional citations: VENEZUELA: Táchira: *Maas & Tillett 5282* (Ld); *Steyermark, Dunsterville, & Dunsterville 101056* (N).

PAEPALANTHUS MYOCEPHALUS (Mart.) Körn.
Additional bibliography: Mold., Phytologia 37: 43 & 49. 1977; Mold., Phytol. Mem. 2: 156, 402, 404, & 616. 1980.
Recent collectors have found this plant growing in sandy soil of disturbed woods, in both flower and fruit in September.
Additional citations: BRAZIL: Bahia:
(Ld).

PAEPALANTHUS MYOCEPHALUS var. *MINOR* Körn.
Additional bibliography: Mold., Phytologia 30: 92--93 (1975) and 35: 125. 1977; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS MYRIOPHYLLUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 93--94 & 341. 1975; Mold., Phytol. Mem. 2: 156, 426, & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 147--148, pl. 93. 1928 (Ld, N, W).

PAEPALANTHUS NANUS Alv. Silv.
Additional bibliography: Mold., Phytologia 30: 94. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.
Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 52--53, pl. 28, fig. 2. 1928 (Ld, N, W).

PAEPALANTHUS NEGLECTUS Körn.

Additional bibliography: Mold., Phytologia 33: 33, 52, 53, & 144. 1976; Mold., Phytol. Mem. 2: 156 & 616. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 74. 1980.

Recent collectors have found this plant growing in sandy and wet sandy soil and wet places in general, from sealevel to 20 m. altitude, in both flower and fruit in January and August. Harley and his associates describe it as a small tufted herb, 10--15 cm. tall, growing singly or in groups. the leaves pale-green, the inflorescence heads white or black with white tomentum, the involucral bracts gray or white-hairy, and encountered it "in open areas normally wet in a region of restinga with scattered shrubs" and in white sand on campos.

Additional citations: BRAZIL: Bahia: *Brito & Vinha 70* (Ld); *Carvalho & Lewis 932* (Ld); *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 17961* (Ld, N, W--2936340), *18123* (Ld, N, W--2936330); *Mori, Mattos Silva, Kallunki, Santos, & Pereira dos Santos 9607* (Ld), *9669* (Ld); *Mori, Mattos Silva, & Santos 10505* (Ld).

PAEPALANTHUS NEOCALDENSIS Mold.

Additional bibliography: Mold., Phytologia 30: 95. 1975; Angely, S. Amer. Bot. Bibl. 2: 669. 1980; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 186--187, pl. 120. 1928 (Ld, N, W).

PAEPALANTHUS NEOPULVINATUS Mold.

Additional bibliography: Mold., Phytologia 30: 95--96. 1975; Angely, S. Amer. Bot. Bibl. 2: 669. 1980; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 37--39, pl. 18. 1928 (Ld, N, W).

PAEPALANTHUS NIGRESCENS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 52. 1976; Mold., Phytol. Mem. 2: 156, 426, & 616. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 266--268, pl. 177. 1928 (Ld, N, W).

PAEPALANTHUS NIGRESCENS var. *PILOSUS* Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 52. 1976; Mold., Phytol. Mem. 2: 156, 426, & 616. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Serr. Min. 63. 1908 (W).

PAEPALANTHUS NIGRICANS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 52. 1976; Mold., Phytol. Mem. 2: 156 & 616. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 75. 1980; Mold., Phytologia 50: 248. 1982.

Recent collectors have encountered this plant growing in seepage areas on granitic ourcrops and on campo rupestre, at 400--1000 m.

altitude, in flower in February and March.

Additional citations: BRAZIL: Bahia: Mori & Benton 13569 (Ld, N). Goiás: Plowman, Davidse, Rosa, Rosário, & Santos 8280 (Ld). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 89--91, pl. 54, fig. 2. 1928 (Ld, N, W).

PAEPALANTHUS NIGRICAULIS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 97. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv. Fl. Mont. 1: 88--89, pl. 53. 1928 (Ld, N, W).

PAEPALANTHUS NIGRIFLORUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 97--98. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 25--27, pl. 10. 1928 (Ld, N, W).

PAEPALANTHUS NIVEO-NIGER Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 98. 1975; Mold., Phytol. Mem. 2: 156, 426, & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 246--247, pl. 164. 1928 (Ld, N, W).

PAEPALANTHUS NODIFER Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 98. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 212--213, pl. 141. 1928 (Ld, N, W).

PAEPALANTHUS NUDUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 98--99 (1975) and 33: 191. 1976; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Additional citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 215--217, pl. 143. 1928 (Ld, N, W).

PAEPALANTHUS OBCONICUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 99. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 111--112, pl. 69. 1928 (Ld, N, W).

PAEPALANTHUS OBTUSIFOLIUS (Steud.) Körn.

Additional bibliography: Mold., Phytologia 33: 52--53 (1976) and 35: 125. 1977; Mold., Phytol. Mem. 2: 156, 426, & 616. 1980; Mold. in Harley & May, Toward Checklist Fl. Bahia 75. 1980.

Recent collectors have encountered this plant on riversides, in sandy soil of campo rupestre, at the margins of corrego, in "marshes in a region of rocky riversides with rapids, riverine vegetation, cerrado with sandstone outcrops, and some grassland areas subject to flooding", and in areas of closed cerrado and

adjoining grassland and marsh, at 850--1300 m. altitude, in both. flower and fruit in March and July, also in flower in May.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19812* (K), *20122* (K); *Harley, Renvoize, Erskine, Brighton, & Pinheiro in Harley 15275* (W--2771331); *Hatschbach 46485* (Ld); *Hatschbach & Guimaraes 42440* (Ld).

PAEPALANTHUS OCHROCEPHALUS Körn.

Additional bibliography: Mold., Phytologia 37: 49. 1977; Mold., Phytol. Mem. 2: Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS OCREATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 101 (1975) and 35: 259. 1977; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 165--166, pl. 105. 1928 (Ld, N, W).

PAEPALANTHUS OERSTEDIANUS Körn.

Additional bibliography: Mold., Phytologia 30: 101--102 (1975) and 35: 283. 1977; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS OLIGOCEPHALUS Körn.

Additional bibliography: Mold., Phytologia 30: 102--103. 1975; Mold., Phytol. Mem. 2: 110 & 616. 1980.

PAEPALANTHUS OLIVEIRAE Ruhl.

Additional bibliography: Mold., Phytologia 30: 103. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS ORTHOBLEPHARUS Alv. Silv.

Additional bibliography: Mold. Phytologia 30: 103. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 62--63, pl. 35. 1928 (Ld, N, W).

PAEPALANTHUS ORTHOGONALIS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 104. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 85--86, pl. 51. 1928 (Ld, N, W).

PAEPALANTHUS OVATUS Körn.

Additional bibliography: Mold., Phytologia 35: 28 (1976) and 35: 117, 255, 256, & 359. 1977; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: 44. 1979; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Additional citations: BRAZIL: Rio de Janeiro: *G. Gardner 5901* (W--1067078--isotype).

PAEPALANTHUS OXYPHYLLUS Körn.

Additional bibliography: Mold., Phytologia 37: 49. 1977; Mold., Phytol. Mem. 2: 156 & 616. 1980.

PAEPALANTHUS OYAPOCKENSIS Herzog

Additional bibliography: Mold., Phytologia 37: 49. 1977; Mold., Phytol. Mem. 2: 124, 156, 428, & 616. 1980.

Rosa & Santos describe this plant as an herb, to 20 cm. tall, with the inflorescence "cinze, esbranquicada" and have found it in flower and fruit in May.

Material of this species has been misidentified and distributed in some herbaria as *Syngonanthus* sp.

Additional citations: BRAZIL: Mato Grosso: *Rosa & Santos 1980* (N).

PAEPALANTHUS PALLIDUS Alv. Silv.

Additional bibliography: Mold., Phytologia 33: 53. 1976; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Additional citations: BRAZIL: Minas Gerais: *Anderson, Stieber, & Kirkbride 35819* (W--2709597). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 33. 1928 (Ld, N).

PAEPALANTHUS PARALLELINERVIUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 108. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATION: Alv. Silv., Fl. Mont. 1: 65--66, pl. 37. 1928 (Ld, N, W).

"*PAEPALANTHUS PARAMENSIS* Körn."

Additional bibliography: Mold., Phytologia 30: 108. 1975; Mold., Phytol. Mem. 2: 368 & 616. 1980.

PAEPALANTHUS PARAMENSIS Mold.

Additional bibliography: Mold., Phytologia 33: 53--54. 1976; Mold., Phytol. Mem. 2: 110, 134, & 616. 1980.

PAEPALANTHUS PARVIFOLIUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 109. 1975; Mold., Phytol. Mem. 2: 156 & 616. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 91--92, pl. 55. 1928 (Ld, N, W).

PAEPALANTHUS PARVUS Ruhl.

Additional bibliography: Mold., Phytologia 42: 29. 1979; Mold., Phytol. Mem. 2: 156 & 616. 1980; Mold. in Harley & Mayo, Toward Checklist Fl. Bahia 75. 1980.

Recent collectors describe this plant as a delicate, slender herb, a few to 10 cm. tall, with a rosette of spreading to erect pale-green leaves, spreading culms [=peduncles], the involucral bractlets stramineous, the inflorescence heads pale-brown, and the florets "off-white". They have found it growing in marshes in a region of sandstone, metamorphic, and quartzite rock outcrops with associated marshes and damp flushes, at 1500 m. altitude, in flower in February and March.

Additional citations: BRAZIL: Bahia: *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19557* (Ld, N, W--2936334) *19779* (Ld, N,

W--2936320).

PAEPALANTHUS PAUCIFLORUS Körn.
Additional bibliography: Mold., Phytologia 33: 48 & 54 (1976) and 35: 279. 1977; Mold., Phytol. Mem. 2: 157 & 616. 1980.

PAEPALANTHUS PAUCIFLORUS var. *GLAZIOVII* Ruhl.
Additional bibliography: Mold., Phytologia 30: 111. 1975; Mold., Phytol. Mem. 2: 157 & 616. 1980.

PAEPALANTHUS PAULENSIS Ruhl.
Additional bibliography: Mold., Phytologia 30: 111--112. 1975; Mold., Phytol. Mem. 2: 157 & 616. 1980.

PAEPALANTHUS PAULINUS Ruhl.
Additional bibliography: Mold., Phytologia 37: 49--50. 1977; Mold., Phytol. Mem. 2: 157 & 616. 1980.

PAEPALANTHUS PAUPER Mold.
Additional bibliography: Mold., Phytologia 30: 112--113. 1975; Mold., Phytol. Mem. 2: 117, 122, & 616. 1980.
Liesner describes this plant as forming cushions on white sand and encountered it at 120 m. altitude, in fruit in April.
Additional citations: VENEZUELA: Amazonas: *O. Huber 2685* (Ve); *Liesner 7034* (Ld).

PAEPALANTHUS PAUPERRIMUS Herzog
Synonymy: *Paepalanthus pauperrimus* Mold., Phytol. Mem. 2: 617 sphalm. 1980.
Additional bibliography: Mold., Phytologia 33: 54. 1976; Mold., Phytol. Mem. 2: 157, 428, & 617. 1980; Mold., Phytologia 50: 245, 263, & 270 (1982) and 54: 233. 1983.
Recent collectors have found this plant growing in water on sand savannas with a quartzite base and savannas in general, at 80--330 m. altitude, in flower in April.
The Schultes & Cabrera collections, cited below, were previously incorrectly cited by me as *P. polytrichoides* Kunth.
Additional citations: COLOMBIA: Vaupés: *Schultes & Cabrera 19129* (Ss, W--2198914), *19185* (Ss, W--2198917). VENEZUELA: Amazonas: *Maas & Huber 5137* (Ba).

PAEPALANTHUS PEDUNCULATUS (Bong.) Ruhl.
Additional bibliography: Mold., Phytologia 42: 29. 1979; Mold., Phytol. Mem. 2: 157, 425, 427, & 617. 1980.
Additional citations: BRAZIL: Minas Gerais: *G. Gardner 5284* (W--1067058); *Hatschbach 40925* (W--2850780); *L. B. Smith 6839* (W--2120200). MOUNTED CLIPPINGS: Bong., Mem. Acad. Sci. St.-Pétersb., ser. 6, 1: 183. 1831 (W); Kunth, Enum. Pl. 3: 576. 1841 (W).

PAEPALANTHUS PENDULUS Mold.
Additional bibliography: Mold., Phytologia 30: 115. 1975; Mold.,

Phytol. Mem. 2: 117 & 617. 1980.

The *Steyermark & al. 115920*, distributed as *P. pendulus*, appears, instead, to be *P. perplexans* Mold.

Additional citations: VENEZUELA: Bolívar: *Maguire 33538a* (W--2168913--isotype).

PAEPALANTHUS PERBRACCHIATUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 116. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 137--139, pl. 86. 1928 (Ld, N, W).

PAEPALANTHUS PERCRASSUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 116. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 214--215, pl. 152. 1928 (Ld, N, W).

PAEPALANTHUS PERPLEXANS Mold.

Additional bibliography: Mold., Phytologia 37: 50 (1977) and 44: 384. 1979; Mold., Phytol. Mem. 2: 117, 122, & 617. 1980; Mold., Phytologia 54: 273. 1983.

Recent collectors have found this plant growing in forests, at 1140--2740 m. altitude, in both flower and fruit in January, February, July, and September. Tillett and his associates refer to it as "frequent on sand and rocks of streambeds". Steyermark and his associates comment that the leaves are "green above".

Material of this species has been misidentified and distributed (and in some cases previously cited by me) as the very closely related and similar *P. fraternus* N. E. Br., *P. leucocyaneus* Tutin, and *P. pendulus* Mold.

Additional citations: VENEZUELA: Amazonas: *Steyermark, Guariglia, Holmgren, Luteyn, & Mori 125896* (Ld), *126324* (Ld). Bolívar: *Steyermark 58849* (F--1209392, N, W--1987395), *59748* (W--1901795--isotype); *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115920* (Ld); *Steyermark & Nilsson 352* (W--2400129, W--2486663); *Steyermark & Wurdack 750* (W--2168523), *764* (W--2407727). GUYANA: *Tillett, Tillett, & Boyan 43997* (Ld, N).

PAEPALANTHUS PERPLEXANS var. *STEYERMARKII* Mold., Phytologia 44: 384. 1979.

Bibliography: Mold., Phytologia 44: 384. 1979; Mold., Phytol. Mem. 2: 117 & 617. 1980.

Collectors describe this plant as having silvery-green leaves [in distinction from the typical form with its "green" leaves], the flowering-heads white "with black involucre". They have found it growing in dense tufts bordering rocks and on open rocky plateaus, at 2360--2420 m. altitude, in both flower and fruit in February. Steyermark comments on the label accompanying *Steyermark & al. 115690* "n. sp. aff. *perplexans* and *cumbricola* but upper leaf-surface appressed-silvery; =*115715*".

Citations: VENEZUELA: Bolívar: *Steyermark, Espinosa, McDiarmid, & Brewer-Carías 115640* (Ld--type), *115690* (Ld), *115715* (Ld).

PAEPALANTHUS PERPLEXANS var. *WURDACKI* Mold.

Additional bibliography: Mold., Phytologia 30: 117. 1975; Mold., Phytol. Mem. 2: 117 & 617. 1980.

Steyermark & Nilsson describe this plant as having subcoriaceous leaves, rich deep-green above, paler beneath, black involucres, with the rest of the inflorescence-head dull-white "with brown-black". They have found it growing on moist stretches of sandy alluvium and forming dense colonies on sandstone bluffs at the base of waterfall spray, at ll--==1200 m. altitude, in both flower and fruit in April. It has previously been confused with typical *P. perplexans* Mold.

Citations: VENEZUELA: Amazonas: *Cowan & Wurdack 31141* (W--2046526--isotype). Bolívar: *Steyermark & Nilsson 440* (Mi, N, W--2400065), *722* (W--2400111, W--2486643); *Wurdack 34275* (W--2168926).

PAEPALANTHUS PERPUSILLUS Kunth

Additional bibliography: Mold., Phytologia 42: 29. 1979; Mold., Phytol. Mem. 2: 117, 157, 172, 183, & 617. 1980; Mold., Phytologia 50: 245. 1982.

Maas & Tillett have encountered this plant at 2250 m. altitude.

Additional citations: VENEZUELA: Táchira: *Maas & Tillett 5283* (Ba).

PAEPALANTHUS PETRAEUS Körn.

Additional bibliography: Mold., Phytologia 33: 54. 1976; Mold., Phytol. Mem. 2: 110 & 617. 1980.

Additional citations: COLOMBIA: Cundinamarca: *Haught 5775* (W--1709805).

PAEPALANTHUS PHAEOCEPHALUS Ruhl.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 388. 1974; Mold., Phytologia 42: 29. 1979; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Recent collectors describe this plant as growing to 50 cm. tall, with white inflorescences, and have encountered it in sandy soil of campo rupestre, in both flower and fruit in March.

Additional citations: BRAZIL: Goias: *W. R. Anderson 6610* (W--2755482); *Duarte 10709* (Mu); *Irwin, Harley, & Smith 32154* (W--2709586); *Oliveira & Anderson 493* (N).

PAEPALANTHUS PHAEOCEPHALUS var. *FOLIOSUS* Mold.

Additional bibliography: Hocking, Excerpt. Bot. A.23: 388. 1974; Mold., Phytologia 33: 54. 1976; Mold., Phytol. Mem. 2: 157 & 6;7. 1980.

PAEPALANTHUS PHELPSAE Mold.

Additional bibliography: Mold., Phytologia 42: 30. 1979; Mold., Phytol. Mem. 2: 117, 427, & 617. 1980.

Steyermark and his associates found this plant growing at 2020 m.

altitude, in both flower and fruit in February.

Additional citations: VENEZUELA: Bolívar: *Steyermark, Brewer-Carías, & Liesner 124310* (E--2901866).

PAEPALANTHUS PILIFER (Bong.) Kunth

Additional & emended bibliography: Bong., Mem. Acad. Imp. Sci. St.-Pétersb., ser. 6, 1: 631--632. 1831; Mold., Phytologia 30: 121--122. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach 40919* (N, W--2850779). MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 31--32. 1831 (N, W); Kunth, Enum. Pl. 3: 524--525 & 577. 1841 (N, W).

PAEPALANTHUS PILOSUS (H.B.K.) Kunth

Additional synonymy: *Eriocaulon dendroïde* H. B. & K. ex Bedevian, Illust. Polyglot. Dict. 260. 1936. *Paepalanthus dentroides* (H.B.K.) Kunth ex Mold., Phytologia 52: 128 in syn. 1982. *Pipalanthus pilosus* (H.B.K.) Kunth, in herb.

Additional bibliography: Bedevian, Illust. Polyglot. Dict. 260. 19361 Mold., Phytologia 42: 30. 1979; Mold., Phytol. Mem. 2: 110, 117, 134, 401, & 617. 1980; Mold., Phytologia 52: 119. 1982.

Bedevian (1936) lists the following vernacular names for this species: "bürdi", "eckenhalm", "joncinelle", and "pipewort", but it is most probable that he intended these as names for the members of the genus [and family] as a whole.

Stuessy & Funk report the species locally abundant in wet meadows, at 3330 m. altitude, in both flower and fruit in July.

The *Steyermark 55727*, distributed and previously cited as *P. pilosus*, actually is *P. karstenii* f. *corei* (Mold.) Mold.

Additional citations: COLOMBIA: Antioquia: *Barkley 18A146* (W--1999316). Cundinamarca: *Core 5* (W--2105122); *Pennell 1997* (W--1042045); *R. E. Schultes 18788* (W--21989090). Putumayo: *Ewan 16369* (W--2106125). Santander: *Araque Molina & Barkley 18S351* (W--1999456); *Stuessy & Funk 5612* (Mi). MOUNTED CLIPPINGS & ILLUSTRATIONS: Anon., pl. 2, fig. 1--6 (Ba); Benth., Pl. Hartw. 260. 1839 (W); Kunth, Enum. Pl. 3: 506--507. 1841 (N, W).

PAEPALANTHUS PIRESI Mold.

Additional bibliography: Galvão & Cavalcante, Bol. Mus. Para. Goeldi, ser. 2 Bot. Ind. 15. 1975; Mold., Phytologia 30: 251--252. 1975; Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytologia 45: 38. 1980; Mold., Phytol. Mem. 2: 157, 427, & 617. 1980.

PAEPALANTHUS PIRESI var. *VILLOSUS* Mold., Phytologia 45: 38. 1980.

Bibliography: Hocking, Excerpt. Bot. A.35: 324. 1980; Mold., Phytologia 45: 38. 1980; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: BRAZIL: Pará: *Murça Pires 16097* (Ld--isotype, N--isotype).

PAEPALANTHUS PLAGIOSTIGMA Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 252. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 117--118, pl. 73. 1928 (Ld, N, W).

PAEPALANTHUS PLANIFOLIUS (Bong.) Körn.

Additional synonymy: *Paepalanthus planifolius* Bong. apud Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908.

Additional bibliography: Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908; Klein, Sellowia 31: 132. 1979; Mold., Phytologia 42: 30. 1979; Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: [43], 45, 46, 52, & 57, fig. 57--62. 1979; Angely, S. Amer. Bot. Bibl.]: 679. 1980; Mold., Phytol. Mem. 2: 110, 134, 157, 178, 357, 401, 402, 404, 425, 427, & 617. 1980; Mold., Phytologia 53: 475 (1983) and 54: 148. 1983.

Additional illustrations: Monteiro, Giulietti, Mazzoni, & Castro, Bol. Bot. Univ. S. Paulo 7: 57, fig. 57--62. 1979.

Recent collectors refer to this plant as rhizomatous and have encountered it in brejo, in flower in February.

The *Smith, Reitz, & Klein 7959*, cited by me in a previous installment of these notes as typical *P. planifolius*, actually represents its var. *globulifer* (Alv. Silv.) Mold. & Sm., while *Hatschbach 30189* is *P. longicaulis* Alv. Silv.

Additional & emended citations: BRAZIL: Minas Gerais: *Krapovickas & Cristóbal 33492* (Ld); *Maguire, Mendes Magalhães, & Maguire 49145* (W--2435287), *49300* (W--2435324); *Widgren s.n.* [1845] (N). São Paulo: *Fosberg 43330* (W--2724073). PARAGUAY: *Casas & Molero FC.3827* (N). MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 502. 1841 (N, W).

PAEPALANTHUS PLANIFOLIUS var. *ALPESTRIS* Körn.

Additional bibliography: Mold., Phytologia 30: 255, 257, & 260. 1975; Mold., Phytol. Mem. 2: 110, 157, 427, & 617. 1980; Mold., Phytologia 54: 148. 1983.

The *Killip 34148*, previously cited by me as *P. planifolius* var. *alpestris*, actually is *P. andicola* Körn.

Additional citations: COLOMBIA: Antioquia: *Araque Molina & Barkley 18A020* (W--1999296); *Valderrama V. & Barkley 18A119* (W--1999309).

PAEPALANTHUS PLANIFOLIUS var. *CONDUPLICATUS* Ruhl.

Additional bibliography: Mold., Phytologia 42: 30. 1979; Mold., Phytol. Mem. 2: 157, 427, & 617. 1980.

PAEPALANTHUS PLANIFOLIUS var. *CONSANGUINEUS* (Körn.) Ruhl.

Additional bibliography: Mold., Phytologia 35: 29. 1976; Mold., Phytol. Mem. 2: 157, 425, 427, & 617. 1980.

PAEPALANTHUS PLANIFOLIUS var. *GLOBULIFER* (Alv. Silv.) Mold. & Sm.

Additional bibliography: Mold., Phytologia 42: 30. 1979; Angely, S. Amer. Bot. Bibl. 2: 679. 1980; Mold., Phytol. Mem. 2:

157, 425, & 617. 1980.

Recent collectors describe this plant as frequent on dry campos, the inflorescence-heads white, and have found it in both flower and fruit in January.

The *Smith, Reitz, & Klein 7959*, cited below, was previously incorrectly cited as typical *P. planifolius* (Bong.) Körn.

Additional citations: BRAZIL: Minas Gerais: *Hatschbach, Smith, & Ayensu 28870* (W--2653340); *Irwin, Maxwell, & Wasshausen 20184* (W--2569049A); *Maguire, Mendes Magalhães, & Maguire 49092* (W--2435299). Paraná: *Gottsberger & Poelt s.n.* [21.7.1979] (Gr--196-80). Rio de Janeiro: *Occhioni 8696* (Ld). Santa Catarina: *Reitz & Klein 5376* (W--2258994), *10060* (N); *Smith, Reitz, & Klein 7959* (Ok, W--2251330). MOUNTED ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: pl. 160. 1928 (Ld, N).

PAEPALANTHUS PLANIFOLIUS var. *PUBERULUS* (Körn.) Ruhl.

Additional synonymy: *Paepalanthus planifolius* var. *puberula* Körn. apud Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908.

Additional bibliography: Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908; Mold., Phytologia 37: 51. 1977; Mold., Phytol. Mem. 2: 157, 427, & 617. 1980.

Wettstein collected this plant at 1800 m. altitude.

PAEPALANTHUS PLANIFOLIUS var. *VILLOSUS* Mold.

Additional bibliography: Mold., Phytologia 42: 30. 1979; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Additional citations: BRAZIL: São Paulo: *Fosberg 43331* (W--2724079).

PAEPALANTHUS PLANTAGINEUS (Bong.) Körn.

Additional bibliography: Mold., Phytologia 37: 44 & 51. 1977; Mold., Phytol. Mem. 2: 157, 427, & 617. 1980.

Additional citations: MOUNTED CLIPPINGS: Kunth, Enum. Pl. 3: 504 & 572. 1841 (N, W);Steud., Syn. Pl. Glum. 2: [Cyp.] 277. 1855 (N, W).

PAEPALANTHUS PLANTAGINEUS f. *LUXURIANS* Beauverd

Additional bibliography: Mold., Phytologia 30: 264--265. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: MOUNTED CLIPPINGS: Beauverd, Bull. Herb. Boiss., ser. 2, 8: 287. 1908 (N, W).

PAEPALANTHUS PLANTAGINIOIDES (Desv.) Körn.

Additional bibliography: Mold., Phytologia 30: 265--266. 1975; Mold., Phytol. Mem. 2: 122, 298, 402, 403, 427, & 617. 1980.

Citations: MOUNTED CLIPPINGS: W. Hamilt., Prodr. Ind. Occ. 16. 1825 (W); Kunth, Enum. Pl. 3: 572. 1841 (N, W).

PAEPALANTHUS PLATYCAULIS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 266. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 27--28, pl. 11. 1928 (Ld, N, W).

PAEPALANTHUS PLUMIPES Alv. Silv.

Additional bibliography: Mold., Phytologia 37: 51. 1977; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Additional citations: BRAZIL: Minas Gerais: *Irwin, Maxwell, & Wasshausen 20031* in part (W--2598328); *Maguire, Maguire, & Murça Pires 44706a* (Ld, N, N); *L. B. Smith 6834* (W--2120208). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 201--203, pl. 133. 1928 (Ld, N, W).

PAEPALANTHUS PLUMOSUS (Bong.) Körn.

Additional synonymy: *Paepalanthus plumosus* (Bong.) Ruhl. ex Mold., Phytologia 54: 243 in syn. 1983.

Additional bibliography: Mold., Phytologia 33: 56. 1976; Mold., Phytol. Mem. 2: 157, 427, & 617. 1980; Mold., Phytologia 54: 243. 1983.

Additional citations: MOUNTED CLIPPINGS: Bong., Ess. Monog. Erioc. 32. 1831 (N, W); Kunth, Enum. Pl. 3: 577. 1841 (N, W).

PAEPALANTHUS POLYANDRUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 271. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Citations: MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 140--142, pl. 88. 1928 (Ld, N, W).

PAEPALANTHUS POLYANTHUS (Bong.) Kunth

Additional synonymy: *Paepalanthus polyanthus* Bong. apud Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908. *Paepalanthus potyanthus* Angely, S. Am. Bot. Bibl. 2: 678 sphalm. 1980.

Additional bibliography: Ruhl. in Wettstein, Denkschr. K. Akad. Wiss. Wien Math.-nat. 79: 87. 1908; Domin, Ann. Jard. Bot. Buitenz. 24 [ser. 2, 9]: 247. 1911; Arber, Bot. Gaz. 74: 84. 1922; Mold., Phytologia 42: 31. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 208. 1979; Angely, S. Amer. Bot. Bibl. 2: 678. 1980; Mold., Phytol. Mem. 2: 157, 427, 428, & 617. 1980; Mold., Phytologia 54: 243. 1983.

Recent collectors have found this plant growing at 1160--2500 m. altitude, describing it as not monocarpic, erect on a caudex to 3 dm. long and 5 cm. thick, the inflorescence axillary and terminal, in flower in January. King & Bishop note that their 2 collections, cited below, were growing "in association with *no. 8494* and *8495*", the leaves seen on their *no. 8497* were taken from a non-flowering plant. Wettstein collected the species on the border of Minas Gerais and Rio de Janeiro.

Additional citations: BRAZIL: Minas Gerais: *Irwin, Harley, & Onishi 30388* (W--2709308); *Irwin, Maxwell, & Wasshausen 20662* (W--2598434); *Irwin, Santos, Souza, & Fonsêca 22026* (W--2582562A); *King & Bishop 8496* (W--2908915), *8497* (W--2908916). Paraná: *Reitz & Klein 17478* (W--2548355); *Smith, Klein, & Hatschbach*

14441 (W--2573037). Rio de Janeiro: *Casari 9* [Herb. FEEMA 15056] (Ld). Santa Catarina: *Reitz 4687* [Herb. Reitz 4738] (W--2141746, W--2971132); *Smith & Reitz 8630* (W--2251418, W--2251419), *10072* (W--2251644). MOUNTED CLIPPINGS & ILLUSTRATIONS: Kunth, Enum. Pl. 3: 572. 1841 (N, W); Mold. & Sm. in Reitz, Fl. Ilust. Catar. I Erioc. 59, pl. 7. 1976 (Ld).

PAEPALANTHUS POLYANTHUS var. *TOMENTOSUS* Alv. Silv.

Additional bibliography: Mold., Phytologia 35: 30. 1976; Mold., Phytol. Mem. 2: 157, 428, & 617. 1980.

Citations: MOUNTED CLIPPINGS: Alv. Silv., Fl. Mont. 1: 222. 1928 (N, W).

PAEPALANTHUS POLYANTHUS f. *VILLOSUS* (Beauverd) Mold. & Sm.

Additional synonymy: *Paepalanthus potyanthus* var. *villosus* Angely, S. Amer. Bot. Bibl. 2: 678 sphalm. 1980.

Additional bibliography: Mold., Phytologia 42: 31. 1979; Angely, S. Amer. Bot. Bibl. 2: 678. 1980; Mold., Phytol. Mem. 2: 157, 427, & 617. 1980; Mold., Phytologia 54: 243. 1983.

PAEPALANTHUS POLYCLADUS Alv. Silv.

Additional bibliography: Mold., Phytologia 30: 278. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Hatschbach describes this plant as producing inflorescences to 1 m. tall, and found it growing in rocky soil of campo rupestre, in both flower and fruit in May.

Citations: BRAZIL: Bahia: *Hatschbach 46652* (Ld). MOUNTED CLIPPINGS & ILLUSTRATIONS: Alv. Silv., Fl. Mont. 1: 189--190, pl. 122--124. 1928 (Ld, N, W).

PAEPALANTHUS POLYGONUS Körn.

Additional bibliography: Mold., Phytologia 30: 278--279. 1975; Mold., Phytol. Mem. 2: 157 & 617. 1980.

Recent collectors have encountered this curious plant at 3800 feet altitude, in both flower and fruit in December.

Additional citations: BRAZIL: Minas Gerais: *Maguire & Maguire 44747* (N, N, N).

PAEPALANTHUS POLYTRICHOIDES Kunth

Additional synonymy: *Paepalanthus polytrichoides* Benth. ex Mold., Phytologia 54: 243 in syn. 1983.

Additional bibliography: Mold., Phytologia 42: 31, 34, & 205. 1979; Mold., Phytol. Mem. 2: 110, 117, 122, 129, 134, 157, 172, 427, & 617. 1980; Øllgaard & Balslev, Rep. Bot. Inst. Univ. Aarhus 4: 97. 1980; Mold., Phytologia 50: 245 (1982) and 54: 235, 237, & 243. 1983.

Recent collectors describe this plant as growing to 15 cm. tall, with grayish inflorescences, and have encountered it on open campos, savannas, and white-sand campinas, in marshes and wet caatinga, in small dense mats on white sand banks, and "cortada por diversos igarapés", at 90 m. altitude, in both flower and fruit in May and October.

[to be continued]

A NEW SPECIES OF DECUSSOCARPUS DE LAUB. (PODOCARPACEAE) FROM BRAZIL

John Silba*
State University, Farmingdale, New York

In August 1976 an unidentified species of Decussocarpus De Laub. was collected by N.A. Rosa and J.M. Pires of the Museu Paraense "Emilio Goeldi" in Belém, Pará, Brazil. A specimen from this collection was then deposited in the Smithsonian (US).

Dr. Pires had concluded this specimen might represent a new species, but needed confirmation. In due course of this pursuit, Dr. Wurdack (US) sent this specimen on loan to Dr. David J. DeLaubenfels of Syracuse University, Syracuse, New York.

DeLaubenfels (1969) had already revised the nomenclature of several South American Podocarpaceae taxa. In this paper he designated some new generic names on key distinctions in leaf anatomy and cone morphology.

In March 1977 Dr. DeLaubenfels had sent a letter to Dr. Pires indicating that his determinations of this specimen as a new distinct species were correct. However, this species has not been published since then and no further information was obtained from Dr. Pires.

In an attempt to clarify the situation, a latin diagnosis and type specimen are designated here as Decussocarpus piresii Silba, in honour of Dr. Pires.

*198 W. Hoffman Ave., Lindenhurst, N.Y. 11757

DECUSSOCARPUS PIRESII Silba, species nova.

Arbor ad 30 m. alta. Folia aequaliter dispositis, acuta, 9.5-11 mm. longa, 2-3 mm. lata, viridia-glaucis. Strobili feminei ovata, 2 cm. longis, 0.8-1.2 cm. latis, brunneo-rubescens.

Type: Brazil, Território de Rondonia, Serra Pacas Novos, Seringal S. Luiz, 50 km. east of Rio Pacas Novos, 14 Aug. 1976, Rosa & Pires 586 (111294), female (US- Holotype).

Tree to 30 m. tall with a trunk to 2.5 m. in circumference. Primary branches appearing 15 m. above the base of the trunk. Leaves bluntly acute; nearly parallel to each other, not lanceolate as in D. rospigliosii (Pilg.) DeLaub.; 9.5-11 mm. long by 2-3 mm. wide, green with glaucous stomata present. Female cone oval, wrinkled; base does not narrow as in D. rospigliosii; 2 cm. long by 0.8- 1.2 cm. wide, pecan-brown tinted red.

The Pires Decussocarp (Decussocarpus piresii Silba) differs its close relative the Rospiglios Decussocarp (Decussocarpus rospigliosii (Pilg.) De Laub.) in its leaves being nearly parallel, not lanceolate and its brown, oval cones which do not narrow at the base. Decussocarpus rospigliosii differs in its somewhat globose cones, which narrow at the base, it is distinctly glaucous and measures 2-3 cm. long. Its leaves are also larger, 11-12 mm. long by 2.5-5 mm. wide (Gray & Buchholz, 1948).

It is interesting to note that D.rospigliosii is a native of western Venezuela, eastern Columbia and central Peru at 1700-2600 m. altitude. Compared to D. piresii, it occurs at rather higher elevations (De Laubenfels to Pires, pers. comm., 1977).

A fossil species, Podocarpus araucoensis (Berry) Kungl. was described from the Chilean Eocene (Florin, 1940). Gaussen (1976) referred to this extinct species as being closely related to D. rospigliosii, however in leaf anatomy is appears more closely related to D. piresii (DeLaubenfels, pers. comm. 1983).

I gratefully acknowledge the assistance of David J. DeLaubenfels in reviewing the taxonomy of the Podocarpaceae family with me during my visit to Syracuse University during July 11th & 12th, 1983.

Fig. 1. Decussocarpus piresii Silba, portion of the holotype, Rosa & Pires 586 (US).

Literature Cited

De Laubenfels, D. J. 1969. A Revision of the Malesian and Pacific Rainforest Conifers, 1. Podocarpaceae, in Part., Journ. Arn. Arb. 50 (2 & 3): 274-364.

Florin, R. 1940. The Tertiary Fossil Conifers of South Chile and their Phytogeographical Significance. Stockholm. et in K. Svensk. Vetenskapakad. Handl., ser. 3, 19, no. 2.

Gaussen, H. 1976. Les Gymnospermes Actualles et Fossiles, Trav. Lab. For. Toulouse, Tome 2, vol.2, partie 2-3, fasc. 14., chap. 21.- Podocarpus.

Gray, N. E & Buchholz, J. T. 1948. A Taxonomic Revision of Podocarpus: section Polypodiopsis. Journ. Arn. Arb. 29: 117-123.

BOOK REVIEWS

Alma L. Moldenke

"SEASHORE LIFE OF THE NORTHERN PACIFIC COAST: An Illustrated Guide To Northern California, Oregon, Washington and British Columbia" by Eugene N. Kozloff, vii & 370 pp., 299 color photo, 401 b/w photo & fig. University of Washington Press, London & Seattle, Washington 98105. 1983. $19.95 paperbound, $40.00 clothbound.

In 1973 much of the material in this book appeared under the title of "Seashore Life of Puget Sound, the Strait of Georgia, and the San Juan Archipelago" treating about 300 species of common plants and animals. "The result of my labors is a guide that will provide interested amateurs, students, and professional biologists with information about more than 650 species found in marine and maritime habitats from British Columbia to San Mateo County, California.....The text is organized according to habitats": floating docks and piles, rocky shores of Puget Sound and of the open coast, sandy beaches, quiet bays and salt marshes. The illustrations, both in color and in black and white, and the descriptive text materials are very effectively presented, making this publication a quantitative and a qualitative improvement on the 1973 issue which itself was excellent.

"A FIELD GUIDE TO THE BEETLES OF NORTH AMERICA" by Richard E. White, x & 372 pp., 12 multicolor pl. and 146 b/w multi-fig. Houghton Mifflin Company, Boston, Massachusetts 02108. 1983. $10.95 paperbound.

This is the 29th member of the Peterson Field Guide Series edited by Roger Tory Peterson, sponsored by the National Audubon Society, and both authored and illustrated by the well-known coleoptologist of the U. S. Department of Agriculture. There are helpful introductory and interesting chapters with directions for collecting, preparing and identifying beetles in 111 families in North America. The illustrations are excellently executed. This guide has much of help and value to offer the amateur naturalist, the collecting-stage youngster who is ready for further checking, the practical and training agriculturist, and the student and professional entomologist.

"THE MISSING LINK - The Emergence Of Man" by Maitland A. Edey & the editors of TIME-LIFE BOOKS, 160 pp., 54 color & 47 b/w photos, 20 color & 3 b/w charts, 1 color map & 3 b/w tabl. TIME-LIFE BOOKS Inc., New York, N. Y. 10020. 1972. $9.95.

Any book in this series is sure to have many excellent illus-

trations very effectively presented. An unusual display on a series of pages superimposes paintings of fleshed-out Australopithecines onto photographs of landscapes like those that existed when they lived. The very logical, expansively reasoned and clearly written text can be read with understanding and interest by the general public and the scientifically trained. The various chapters discuss the deduced daily life of these creatures as they diverged from their tree-dwelling, fruit-eating ancestors to adapt to the savannas, eating grain, other seeds and their captured prey or its scavenged remains. They also discuss their possible social life, weapons and tools. Evidence is given not only from "stones and bones" but also from present day primate behavior, DNA comparisons, comparison tests on protein molecular sequencing and immunological serum reactions. This successful book must have been reprinted several times to keep it still available.

"A POST CARD PORTRAIT WITH MEMORABILIA OF JOHN BURROUGHS, LITERARY NATURALIST" by Dorothy Unruh Bloodgood, 47 pp., 42 b/w photos. Available from the author, P. O. Box 111, Bogota, New Jersey 07603. 1983. $6.00 paperbound.

This nostalgic and attractively organized tribute is compiled from the author's private post card collection "in commemoration of April ['83] being declared John Burroughs Month in Delaware County [New York]". Some of these cards are newer copies purchasable at Slabside meetings and some are long out of print but remembered by me because they were placed as bookmarks in my mother's copies of some of Burroughs' famous books.

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Notes on Begoniaceae -- III

Lyman B. Smith and Dieter C. Wasshausen

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

In continuing preparation of an illustrated key to all the natural species of Begoniaceae we are again indebted to Jack Golding and Carrie Karegeannes for careful editing of our manuscript and also for the discovery of many points that need the clarification which we are now giving here.

BEGONIA

albomaculata C. de Candolle, Bot. Mus. Paraense Hist. Nat. 4: 593. 1906, emend L. B. Smith & D. C. Wasshausen.

Planta glabra, caulescens. Caulis erectus; internodia 4-6 cm longa. Foliorum stipulae mox deciduae; petioli ad 4 cm longae; laminae obliquae, ellipticae, 12-16 cm longae, 6-9 cm latae, basi truncatae vel emarginatae, apice late rotundatae apiculataeque, duplicato-dentatae. Inflorescentiae multae, bisexuales, dichotome ramosae sed dense pauciflorae ergo pseudumbellatae; pedunculus brevissimus; bracteae deciduae, late ellipticae, 4 mm longae, integrae. Florum masculinorum tepala 4, alba vel rosea, exteriora orbiculata, 4 mm longa, interiora oblonga, breviora. Stamina pauca, libera; filamenta brevissima; antherae oblongae, connectivum breviter productum, obtusum. Florum femineorum tepala 2, elliptica, 6 mm longa. Ovarium ellipsoideum, tripartitum; placentae bilamellatae, ubique ovuliferae; stili bipartiti, alte connati. Pedicelli fructiferae crassi, 1 mm longi. Capsulae 9 mm longae; alae aequales, marginiformes, 3 mm latae; semina late rotundata. Pl. 1.

PERU: Loreto: Hills in the Rio Ucayali region, collector (?), 25 November 1898, cultivated in the Horto Botanico of the Museu Goeldi (MG, holotype).

The emended description drawn from the following material:

ECUADOR: EL ORO: In dense rain forest, Moro-Moro region (about 21 miles west of Portovelo), alt. (3,400-4,200 ft.) 1100-1400 m, 1 October 1944, Camp E-618 (NY, US); partly primary mountain rain forest, road Piñas to Santa Rosa, above El Placer, alt. 800-1000 m, 15 November 1977, Harling, Eliasson & Andersson 15551 (S, US); creek bed, road from Piñas to Santa Rosa, km. 19, alt. 460 m, 7 October 1979, Dodson, Gentry & Shupp 8914 (SEL, US).

albopicta W. Bull, Rare Plants Catalogue 210:13 London 1855; Gartenflora 35:402. 1886; Irmscher, Parey Blumengart. 79. 1960.

= maculata Raddi var. maculata 1820.

asteroides L. B. Smith & B. G. Schubert, Contr. Gray Herb. 127: 30. 1939; 154:31. 1945.

= uruapensis Sessé & Mociño 1890.

barahonensis (O. E. Schulz) Urban in Fedde, Repert. 18: 193. 1922.
= plumieri var. barahonensis O. E. Schulz 1911.
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Planta acaulis, tuberosa, verisimiliter glabra. Folium solitarium; stipulae deciduae, ignotae; petioli graciles, ca. 8 cm longi; laminae oblongo-ovatae, ca. 25 cm longae, 10 cm latae, pinnato-nervatae, base late cordatae, apice longe attenuatae; 3-5-lobatae, bullatae. Inflorescentiae unisexuales, 1-2-dichotomae; pedunculus ca. 15 cm longus; bracteae persistentes, ovatae, ca. 5 mm longae. Florum masculinorum tepala 4, subaequalia, ovata, ca. 1 cm longa, alba; femineorum ignota. Fructus, capsula, aequaliter trialata, alae apice truncatae, triangulares.

TIBET-BURMA frontier: forest, 27° 30' N, 97° 50' E, alt. 1500-1800 m, 24 August 1926, F. K. Ward 7334 (K).

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vitifolia Schott var. bahiensis A. de Candolle in Martius, Fl. Bras. 4(1):369. 1861.
= reniformis Dryander 1791.
vitifolia Schott var. grandis A. de Candolle in Martius, Fl. Bras. 4(1):369. 1861.
= reniformis Dryander 1791.

GENERIC SYNONYMS

Casparya

robusta A. de Candolle var. rubra A de Candolle, Prodr. 15(1): 275. 1864.
= Begonia muricata Blume 1823.

Diploclinium

rubrum (Blume) Miquel, Fl. Ned. Ind. 1:689. 1856.
= Begonia muricata Blume 1823.
tuberosum Miquel, Fl. Ned. Ind. 1:685. 1856.
= Begonia muricata Blume 1823.

Doratometra

bowringiana Seemann, Bot. Voy. Herald 379. 1857.
= Begonia bowringiana Champion ex Bentham 1852.

Empetrum

acetosum forma alba Rumphius, Herb. Amboin. 5:457, pl. 169, fig. 2. 1747 (typical); Merrill, Interpretation Rumphius's Herb. Amboin. 379. 1917.
= Begonia muricata Blume
acetosum forma cordiformia Rumphius, Herb. Amboin. 5:457. 1747.
= Begonia mollis A. de Candolle?
acetosum forma rubra Rumphius, Herb. Amboin. 5:457. 1747.
= Begonia muricata Blume 1823.

Gireoudia

fibrillosa Klotzsch, Begoniac. 86. 1855; K. Burt-Utley, ms. ined.
= Begonia sericoneura Liebmann 1853.
lobulata Klotzsch, Begoniac. 88, pl. 7C. 1855; A. de Candolle, Prodr. 15(1):337. 1864.
= Begonia sarchophylla Liebmann 1855.
pilifera Klotzsch, Begoniac. 86. 1855; K. Burt-Utley, ms. ined.

= Begonia sericoneura Liebmann 1855.
sarchophylla (Liebmann) Klotzsch, Begoniac. 88. 1855.
= Begonia sarchophylla Liebmann 1853.
setosa Klotzsch, Begoniac. 92. 1855; K. Burt-Utley ms. ined.
= Begonia urophylla W. J. Hooker 1855.

Knesebeckia

crenatiflora Klotzsch & Putzeys, Begoniac. 45. 1855.
= Begonia pedata Liebmann 1853.

Lepsia

poeppigiana Klotzsch, Begoniac. 63. 1855.
= Begonia foliosa Humboldt, Bonpland & Kunth var. australis L. B. Smith & B. G. Schubert.

Semibegoniella

sodiroi C. de Candolle, Bull. Herb. Boissier II. 8:327. 1908.
= Begonia longirostris Bentham 1845.

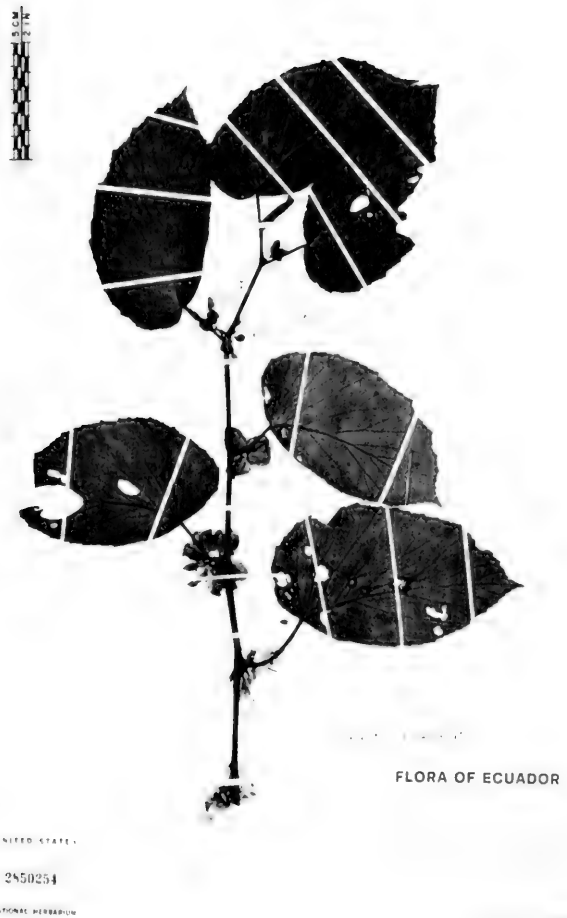
Sphenanthera

robusta Hasskarl ex Klotzsch var. rubra Hasskarl, Hort. Bogor. Descr. 349. 1858.
= Begonia muricata Blume 1823.

Wageneria

vitifolia (Schott) Klotzsch, Begoniac. 116. 1855.
= Begonia reniformis Dryander 1791.

Plate I



Begonia albomaculata

RHYNCHOSIA SENNA VAR. TEXANA, NEW COMBINATION MADE NECESSARY BY THE DEMOULIN RULE

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Rhynchosia senna Gillies ex Hooker **var. texana** (Torrey & Gray) M. C. Johnston, comb. nov. based on *R. texana* T. & G., Fl. N.A. 1:687. 1840 and the autonymic var. *texana* established by the publication of *R. texana* var. *angustifolia* A. Gray, Pl. Wright. 1:44. 1852.

In John W. Grear's monograph (Memoirs N.Y. Bot. Gard. 31:1-168. 1978) this taxon is named *R. senna* var. *angustifolia* (A. Gray) Grear, a correct combination under the code current in 1978. The destabilizing effects of the Demoulin Rule subsequently adopted by the International Botanical Congress in Sydney are only now becoming widely apparent, as in the present example.

No new biological information has been adduced to support Grear's lowering of *R. texana* to varietal rank, but his judgement, based on herbarium study, seems likely to be correct.

TWO NEW SPECIES FROM JAUNECHE, ECUADOR: INGA JAUNECHENSIS (LEGUMINOSAE) AND ANNONA HYSTRICOIDES (ANNONACEAE)

Alwyn H. Gentry[1]
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Three undescribed species have been discovered during field work associated with preparation of the Flora of Jauneche, Los Rios, Ecuador (C. Dodson, A. Gentry, and F. Valverde, in press). One of these, Aspidosperma jaunechense A. Gentry, has already been described. The other two are described here.

It is interesting that only three undescribed species have been discovered at Jauneche, the last patch of coastal moist forest in western Ecuador. This compares to the almost 100 new species described from nearby Rio Palenque in a wet forest habitat. In general, the moist forest flora of coastal Ecuador is much less endemic than the wet forest one. Several previously described local endemics do occur at Jauneche, however, including some species described from Ruiz and Pavon collections labelled "Peru" which have previously been thought to be Peruvian endemics.

ANNONA HYSTRICOIDES A. Gentry, sp. nov.

Frutex scandens. Folia oblongo-elliptica, ad apicem basimque rotundata, infra glauca venis ferrugineis, molliter puberula. Flos ignotus. Fructus oblongo-ellipsoideus, echinatus, spinis vulgo 4-6 mm longis.

Canopy liana, the branchlets terete, reddish puberulous when young, glabrescent. Leaves oblong-elliptic, rounded at base and apex, 2-11 cm long, 1.5-6 cm wide, drying dark olive above, glaucous gray below with contrastingly rufescent main veins, the surface below puberulous with soft flexuous hyaline trichomes, the main veins puberulous with stiffer reddish trichomes, sparsely puberulous with flexuous trichomes above, with 6-8 lateral nerves on each side running out indistinctly toward leaf margin; petiole 2-8 mm long, reddish puberulous. Inflorescence (only 1 seen) with

1. Supported by NSF Grant INT-7906840.

a terminal fruit. Flowers not known. Fruit oblong-ellipsoid, 5.5 cm long, 2.5 cm wide, echinate spiny with spines mostly 4-6 mm long, the spine tips mostly slightly recurved, rufous puberulous.

Type: ECUADOR: Los Rios: Jauneche Forest, km. 70 Quevedo-Palenque via Mocachi, Canton Vinces, alt. ca. 100 m, 26 Mar 1980, Dodson & Gentry 9918 (holotype, MO; isotypes ECU, RPSC, SEL, US).

This species is very unusual in the genus on account of its scandent habit. Only six other scandent species of Annona are known, four of them treated by Fries (Act. Hort. Berg. 10: 1-341. 1931) and two described subsequently. All are poorly collected; Fries (1931; Act. Hort. Berg. 12: 214. 1934) had seen a total of only 13 collections to represent five of them and the fruits of only two of the climbing species have been described. Although I have seen material of only two of the scandent Annona species plus photographs of two others, all except A. scandens Diels seem well differentiated from A. hystricoides in being described as having acuminate generally narrower leaves. Four of the scandent Annona species occur in lowland Guiana or lower Amazonian Brazil, while A. volubilis Lundell is from Guatemala and A. scandens from Amazonian Peru. Annona scandens, probably the closest relative of A. hystricoides, differs most strikingly in having a non-echinate fruit very different from the spiny porcupine-like fruit of A. hystricoides. More or less topotypic material of A. scandens at MO (Gentry et al. 25656 from the Huallaga Valley of Peru's San Martin Department) has a much finer pubescence on the leaf veins and undersurface than in A. hystricoides.

INGA JAUNECHENSIS A. Gentry, sp. nov.

Arbor parva, ramulis hispidis; stipulae amplae foliaceae persistentes. Folia pro parte maxima 6-foliolata, rachidibus non alatis, petiolis plerumque alatis, foliolis ellipticis, subbullatis, infra pubescentibus. Inflorescentia congesta, capitato-spicata. Flores sessiles, calyce dentato, 14-15 mm longo, corolla ca. 2 cm longa. Fructus complanatus, oblongus, sparsim puberulus.

Small tree to 8 m tall, the branchlets hispid with reddish trichomes often ca. 2 mm long, the stipules foliaceous, persistent, ovate, acuminate, 1.5-3 x 0.5-2 cm.

Leaves mostly 6-foliolate, the rachis unwinged, rufous hirsute, the petiole 2-7 cm long, usually conspicuously winged, sometimes winged and unwinged on the same plant, the leaflets large, elliptic, obtuse to abruptly acuminate at apex, often more or less apiculate, rounded at base, the terminal pair 23-38 x 11-18 cm, the basal leaflets 12-17 x 6-8 cm, pubescent throughout below with long suberect trichomes, glabrescent above except along main veins, subbullate with the secondary and usually the tertiary venation impressed above and raised below. Inflorescence a congested capitate spike, the pilose peduncle 5-7 cm long, the floriferous portion 2-2.5 cm long. Flowers sessile, the calyx tubular-campanulate, 14-15 mm long, 4-5 mm wide, bluntly dentate with teeth 1-2 mm long, tending to split spathaceously, essentially glabrous except for a few scattered appressed trichomes, the corolla ca. 2 cm long, appressed pilose, the staminal tube exserted. Fruit flat, curved, oblong, 8-11 cm long, 3-3.4 cm wide, the margin very slightly thicker, minutely and sparsely appressed puberulous, subtended by remnants of spathaceously split calyx.

Type: ECUADOR: Los Rios: Jauneche Forest, Jauneche, km. 70, Quevedo-Palenque via Mocache, Canton Vinces, 100 m alt.; tree to 6 m, flowers white, 24 Mar 1980, Dodson & Gentry 9857 (holotype, MO; isotypes ECU, RPSC, SEL).

Additional collections examined: (all from type locality): 4 Feb 1979, Dodson et al. 7461 (MO, RPSC, SEL). 14 Jul 1979, Dodson et al. 7984 (ECU, MO, RPSC, SEL). 1 Apr 1980, Dodson & Gentry 10111 (MO, QCA, SEL).

This plant keys to Inga setosa G. Don in the Flora of Peru if the rachis is taken as winged (on account of the winged petiole), but differs from that species in the pubescent acute-toothed calyx, and conspicuous inflorescence bracts, fewer larger leaflets, and consistently unwinged rachis proper among other characters. If the rachis is taken as unwinged (ignoring the petiole), it keys to I. stipulacea G. Don in the Flora of Peru. The Ecuadorian plant is probably most closely related to I. stipulacea, also of Amazonian Peru, but differs in the usually winged petiole, larger broader leaflets, pubescent corolla, lack of conspicuous calyx glands, and shorter blunter calyx teeth. While I have not seen type material of I. stipulacea, collected by Ruiz and Pavon at an unspecified locality in "Peru" and thus potentially from western Ecuador, its incomplete description matches the Amazonian material re-

ferred here by Macbride (I. rufiseta Benth., I. setigera Poepp. & Endl., I. chaetophora Harms) better than the Ecuadorian material in having the leaflets "attenuated at the base" and the "tube of stamens much exserted". Moreover, I found a species of this complex to be common at Pozuzo, Peru (Gentry et al. 40072) in an area extensively collected by Ruiz and Pavon. This plant, which lacks the winged petiole and large leaflets of the Jauneche species, is no doubt the real I. stipulacea. Thus Macbride was evidently correct in referring the species of upper Amazonia to I. stipulacea; the wing-petioled Jauneche plant remains to be described.

THE GENUS CONDALIA (RHAMNACEAE) IN VENEZUELA: C.HENRIQUEZII AND C.BUXIFOLIA.

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Summary: Condalia, first reported for Venezuela in 1980, has two species native there, and first collected scientifically there in 1939 and 1970 respectively. New observations are given on their distributions, habitats, morphologies, phenologies and uses.

Rodríguez-Carrasquero (1980) states that this genus had not been collected in Venezuela before the two collections by me of C.henriquezii in 1978 which he identified and cites. In fact, this species was collected from the same site by Francisco Tamayo as long ago as January 1939, as I mentioned in the letter I sent with the specimens to MO in 1978; and at least 4 other collections of it from nearby were made before mine, though identified later than mine.

Tamayo's collection is not mentioned in his account (1941) of his collecting trip, but it is cited, wrongly, as Bumelia celastrina (Sapotaceae) by Pittier in Pittier et al.(1947:283). His specimen at VEN had been annotated (in sequence) only as B.affinis (a syn. of B.celastrina), Castela (Simaroubaceae), and 'cf.Flacourtiaceae', when I found it there and annotated it as C.henriquezii (genus new for the herbarium) in 1978. Since then, several other collections of the genus from nearby in Venezuela have appeared in the herbaria of VEN and Coro, as listed below. (I could not find at VEN the other 2 collections of B.celastrina cited in Pittier et al., viz. Curran & Haman 534 & 802, of 1917; they may well be correctly identified, as that species does grow at the Falcón site mentioned.) Also, the 'Erythroxylon sp.'(Erythroxylaceae) of Lasser & Vareschi (1957)'s study of Tamayo's site, the Coro dunes, is really C.henriquezii (Lasser 2728).

Both of the Venezuelan Condalia spp., when lacking flowers (which are inconspicuous) or fruits, as is often the case, are rather readily confusable with B.celastrina, which grows nearby but differs in being glabrous (except occasionally on extremely young shoots), with non-retuse non-mucronate leaves, and flat (not grooved) petioles, or with Castela erecta, which sometimes grows with C.henriquezii but differs in the leaves having a conspicuously downcurved margin and a conspicuously pale (densely pubescent) undersurface. I agree with Rodríguez-C. that C.henriquezii is probably native to the dry parts of NW. Venezuela (and not introduced from Curacao or Bonaire), but in this case its apparent absence from Aruba, the Paraguaná peninsula and the area west of Coro is puzzling. Both may well occur elsewhere in Venezuela and outside it, overlooked because of their vegetative resemblance to Bumelia and Castela, and their extreme spininess which (together with a tendency for leaves, flowers and fruits to fall off during processing) makes the preparation of good specimens a little difficult.

The vernacular name for both of the Condalia spp. in Falcón is 'caimito', the same name as is used there (both near Coro and on the Paraguaná peninsula) for Bumelia celastrina and B.obtusifolia, which genus likewise has edible black drupes. However, people who know both genera by the same vernacular name do not confuse them. On the south slope of the Serranía San Luis, where C.buxifolia and B.obtusifolia sometimes grow together, the former is sometimes called 'caimito negro' and the latter 'caimito blanco'.

The story of the discovery in Venezuela of this genus has a moral, which needs emphasising, namely that it is still very premature for tropical countries to try to be independent in taxonomic botany, and still very necessary to send specimens out of the country for identification. E.g. Venezuela's two main botanical libraries, at VEN (Caracas) and MY(Maracay) both seem to lack Boldingh (1914)'s Flora of Curacao, Aruba and Bonaire, in which C.henriquezii was first scientifically named, and their herbaria seem to contain almost no specimens from these very nearby but Dutch islands. This species, common only 1.7 km from the historic centre of Venezuela's second oldest town and first described from an island only 64 km from Venezuela, was collected by a Venezuelan and then lay unidentified in Venezuela's main herbarium for 39 years until recollected by a foreigner and sent to a foreign institution, where identified by a Venezuelan. Though xenophobia may at times be locally fashionable, cooperation with appropriate foreign institutions and individuals is in general much more useful. (Incidentally, the locality of my first collections is about 110 km from the nearest point of Curacaco, i.e. 68 miles, not 20 miles as stated by Rodríguez.) The following observations are based on my experience of Venezuelan material.

1. C.henriquezii Boldingh (1914, p.61, plate 7).

Distribution: Previously known to science only from Curacao & Bonaire, this is frequent and locally common on more or less loose sand in the dune area N. of Coro, and on firm soil on dry shrub-covered hill slopes and tops eastwards from Coro for at least 62 km. The furthest north record so far for Venezuela (and the furthest west for the world) is 31 km NNW. of Coro (near the N.end of the Paraguaná isthmus, c.50m ESE of the water-pumping station Isiro II; W8741; the isthmus is only 1 km wide if the bare periodically-flooded salt-flat area is disregarded). The furthest east record for Venezuela is the promontory of Sabanas Altas (W8142). The furthest south record for the world is 1.7 km NNW of Coro cathedral (W5322).

Habitat: It ranges from ± to 300m above sea level (W7600), in dry mostly-thorny bushland, in sunlight or moderate shade, exposed to a dense population of ± free-ranging goats and donkeys (to which it is clearly resistant), on a variety of well-drained soils, including sand-dunes (near their base), practically bare limestone, firm somewhat sandy reddish-brown soil, and even alluvial clay on river-bank top. The annual rainfall of its area is probably c.370-500mm.

Description: It is a much-branched evergreen shrub (0.2-)0.4-3(-4) m tall, with trunk to 25cm (sic) diameter at base, and with spine-tipped twigs; leaves alternate, leaf-blades obovate, c.8-14 x 6-8 mm, mucronate (rarely not), apex rounded (to slightly retuse), base

cuneate, petiole 1-2mm long, leaf-margin entire; but (a new observation, like many others here) the juvenile foliage of young plants in shade has (1-)2-3(-4) conspicuous teeth on the distal half of each side (W10215, see fig.). Pedicels 1-2(-2½)mm long in flower (to 3mm rarely in fruit). Flowers 5mm across, green (slightly yellowish), with filaments pale green, anthers pale orange-brown, ovary green; disc yellowish green at anthesis, becoming orange-brown then red-brown, and finally almost black in old flowers. (Boldingh does not mention flower-colour. Johnston 1962 states sepals pale purplish olive, disk & ovary dark purple. Arnoldo 1964 states flowers greenish.) Ripe fruit a black drupe (with purple finger-staining juice), wider than long, 5x7 to 7x10 mm, widest at the base, with an apical dimple. Unripe fruit (seen very much more commonly than ripe fruit) is longer than wide, ellipsoid to almost spherical, c.5x4 to 6x5mm, passing from green through yellowish (with a network of darker green veins visible through the surface), becoming red from base upwards; (it is often eaten by animals while the distal half is still yellow-green). The Venezuelan material matches well a specimen I collected on Curacao with green ± mature flower-buds and green young to very young fruits (W7005, Rif, 24.8.79, Coro herbarium; this specimen has stems and leaves less hairy, and petiole-hairs shorter (c.0.1-0.15mm) than in much Venezuelan material - trivial inconstant overlapping differences certainly not worth taxonomic recognition at any level).

Phenology: It probably flowers and fruits rather irregularly throughout the year, depending on the rainfall pattern which can vary considerably from year to year and place to place, and perhaps (as a native affirmed) fruits heavily some weeks after heavy rain. So far, I've seen flowers in all months except January, green fruits in all but April, ± red fruits from at least July to March, and ripe fruits in July and August. (The only mention by Boldingh, Arnoldo or Johnston of flowering or fruiting time is that Johnston 1962 states it flowers in March.)

Use: The plant is conspicuous only when in full fruit, when it can be quite showy, its branches heavily laden with the black near-spherical juicy sweet-tasting drupes, which fall readily when the branches are knocked. Birds and people (especially children) eat the fruit fresh; people sometimes collect the fruit by placing a sheet on the ground under the bush and then beating the branches. The fruits are sometimes made into a drink, and could be cooked or preserved. They seem not sold, nor the plant cultivated, probably because the fruits are neither tasty enough nor plentiful enough. The fruit juice is said to have been used as ink, and to stain shoes etc., but seems not very suitable for this, the stain washing off the hands fairly easily when fresh (though not from paper when left to dry). The leaves, very young shoots and ripe fruits are frequently eaten by goats, acc. to V.Vargas of IUTAG who studies what goats eat.

Collections seen from Venezuela (all from Falcón State), in order of collection; (CORO is the herbarium of Proyecto Flora Falcón at IUTAG; f = with flowers, tj = with unripe fruit; s = sterile):
F.Tamayo 703, arbusto armado de los médanos de las inmediaciones de Coro, Jan.1939 (tj; VEN).

T.Lasser 2728, dunas de Coro, 28.12.50, frutos rojos o color vino tinto;(VEN).
E.Walter s.n.(herbarium no.77144,VEN), médanos, Paraguaná, 25.2.68 (f; probably same site as the 2 previous colls., just N.of Coro).
T.Ruiz y Equipo de Ecología 1297, Qda.Manglar, 10km W.of Puerto Cumarebo, 27km ENE of Coro, 150m, tree 3m, 12.4.77(s; CORO).
T.Ruiz y Eq.Ec.1503, mouth of Qda.Sta Juana, 5km W.of Pto.Cumarebo, 10m, 31.5.77(f; CORO).
Wingfield 5322, 1.7km NNW of Coro cathedral, 19.4.78(f; CORO,U,MO).
" 5322A, same loc., 27.9.78(f,tj; MO,K; a duplicate given to VEN in 10.78 seems not yet incorporated).
T.Ruiz & F.Tamayo 3509, Istmo de Paraguaná near Animas de Guasare, 1.8.78(f,tj; CORO,K,?MY).
Burandt & Wingfield 574, dunes N.of Coro, 6.4.79(f; UCOB).
Wingfield & López-Figueiras 7606, 7km SW.of Pto.Cumarebo, top of the ridge near the cross of La Soledad, on ± bare limestone, 300m, 11.3.80 (s; CORO).
Wingfield 8142, Sabanas Altas, 27km E of Pto.Cumarebo, 21.2.81(s;CORO).
" 8741, Istmo de Paraguaná, 31km NNW of Coro, 25.2.81(s; CORO).
" 10218, 2km N.of Guaibacoa, 22km ENE of Coro, 200m, ridge-top in mainly decid.bushland on red-brown soil; to 4m tall; 11.11.82 (f,tj; CORO).
" 10215, National Park médanos de Coro, bank of river Coro 1 km N. of bridge; on alluvial clay on top of river-bank in shade of Prosopis forest; with juvenile foliage; 18.12.82(s; CORO).

2. C.buxifolia Reissek 1861; fig.Flora Brasiliensis 11(1) t.28.
This species, hitherto known only from S.Brazil and N.Argentina, is now known also from Falcón & Lara States of NW.Venezuela, about 3800km NNW. Venezuelan material was identified by F.G.Davies of Kew (W.&Sm.6941; by comparison with specimens from Brazil), and fits well the description in Johnston 1962 and the drawing in Flora Brasiliensis. This remarkably disjunct distribution is not unique among Falcón's native plants. E.g. Mimosa hexandra of Paraguay, S.Brazil & N.Argentina is now also known from N.Falcón at 10-200m in natural dry deciduous bushland(specimens collected & det.by Lourdes Cárdenas, me & others). And Capparis 'magnifica' Ule (nomen) of Amazonian Brazil & Peru is also in the rainforest of E.Falcón at 150-1000m, where it extends over an area at least 69km long (specimens collected by Ruiz-Terán & me, one det. by H.Iltis).
C.buxifolia in Venezuela is so far known only from near Barquisimeto (Lara) and from the Serranía de San Luis (Falcón). At the latter site, it has a ± continuous population (and is locally common) on the western, drier, rain-shadowed part of the Serranía (from N. to S.slope across the ridge top), from at least 11 km W.of Carrizalito, through La Ciénega, Carrizalito and La Tabla to 5km NE of Carrizalito (along the road to Cerro Galicia) and S. to Maripiota (5 km SSW of Carrizalito), thus ranging at least 15 km east to west and 8km north to south.
Habitat: In Venezuela it is so far known from 580 to 1250m altitude on dry sometimes stony or rocky well-drained hill slopes and tops in semi-deciduous bushland and woodland, often over limestone, some-

times on ± bare limestone, but sometimes on possibly acid soils e.g. over sandstone. Its habitat is considerably higher and with higher rainfall (probably c.600-1000mm annually) than that of C.henriquezii, though seemingly less wet than in Brazil where, acc.to Johnston 1972, it is a hygrophyte of very moist soils principally in gallery forest. It is frequent in ± natural short open cloud-forest on the ± bare limestone ridgetop 3km W.of Carrizalito at 1200-1250m (with other rare native spp. known in Falcón only from this site (or in some cases very nearby also), e.g. Echeveria bicolor, Mentzelia aff.scabra, Senecio cobrensis, Zanthoxylum ciliatum), but also thrives in the considerably disturbed ± secondary bushland (shifting cultivation, goats & cattle) which now occupies most of its area.

Description: It differs from C.henriquezii in having the leaves longer (usually) and relatively narrower, to 36x13mm (incl.petiole; not to 17x11mm), over (not under) twice as long as wide, conspicuously retuse (to occasionally obtuse; not obtuse to occasionally slightly retuse), drying darker green or darker brown with the secondary nerves usually less conspicuous, the terciary nerves forming a network of ± isodiametric areolae (not elongated areolae ± at right angles to midrib); petioles 1-5mm long (not 1-1½mm); twigs dark somewhat purplish brown (not pale brown,unless obscured by microlichen); hairs on young twigs, petioles and extreme base of leaf-blade c.0.1mm long (not c. 0.15 - 0.2mm), those on leaf-blade-base being on upper surface only (not on the lower surface only, with sometimes a few along base of midrib on upper surface); pedicels 2-4mm long (to 8mm in fruit; not 1-2(-2½mm; to 3mm rarely in fruit); immature fruit more elongated, c.6x4 to 8.7 x 6mm (not 5x4 to 6x5mm), with longer style (sometimes persisting; c.0.6(-0.8)mm, not 0.3-0.5mm), and passing from green to black via dull brown-red-mauve (not via yellowish-green with darker veins, then red); ripe fruit ellipsoid, longer than wide (occasionally as long as wide), c.6½-8 x 6-7mm, persisting & shrivelling on the plant (not 5-7 x 7-10mm, wider than long, widest near base, readily falling), its flesh much thinner & less sweet. Also, the plant grows slightly larger, 1.2 -4(-6)m tall, trunk to 30cm wide at base; this could be a climatic rather than genetic difference. The flowers are yellowish green, ovary green, anthers cream, filaments becoming whitish.

Phenology: It may well flower and fruit irregularly and intermittently throughout the year, like C.henriquezii, as the populations do not seem well synchronised in this respect. The records so far are: Lara: flowers and unripe fruit July-Sept.; Falcón: fls.Jan.-March,July, Oct.- Nov. ; unripe fruits Sept.-March,May-July; ripe fruits Feb.-March, Oct.-Nov.

Use: The cut branches are used to make dead fences against livestock; and the fresh fruits are eaten, mainly by children.

Collections seen from Venezuela, in order of collection:

(a) Lara State:

Steyermark 103267B, Dto.Palavecino, 700-1000m, dry chaparral slopes, NW-facing above Capudare on road to Terepaima, 10.8.70(VEN,US).

R.F.Smith V7791, Barquisimeto, vía Terepaima, 900m, 18.7.85(f,tj;VEN).

Wingfield & R.F.Smith 6941, 7km N.of Barquisimeto, 580m, hillside on alluvial soil with stones, 4.9.79 (f,tj; CORO,K).

(b) Falcón State (Sierra San Luis; all at CORO):
Wingfield 10197, common on limestone ½-2½km W.of Carrizalito (near the cave), 1050-1200m, 9.12.82 (tj).
" 10242, Carrizalito, ridge-top by road, 1170m, 24.12.82 (tj).
" 10354, La Tabla-Cerro Galicia, scattered from 950-1100m, on limestone & sandstone, to 4(4½)m tall, 28.1.83 (f,tj).
" 10477, 1 km SW of Carrizalito, 1.2-6m tall, 8.2.83(tj,ripe fruit).
" 10500, ½km E.of Maripiota, 3km SO.of La Peña, 580m, 12.10.83 (s).

No intermediates have been seen so far between the two species in morphology, locality, habitat or altitude; they seem good distinct species. Both are in cultivation at the Botanic Garden of Maracaibo, Venezuela; it would be interesting to see if they can be hybridized.

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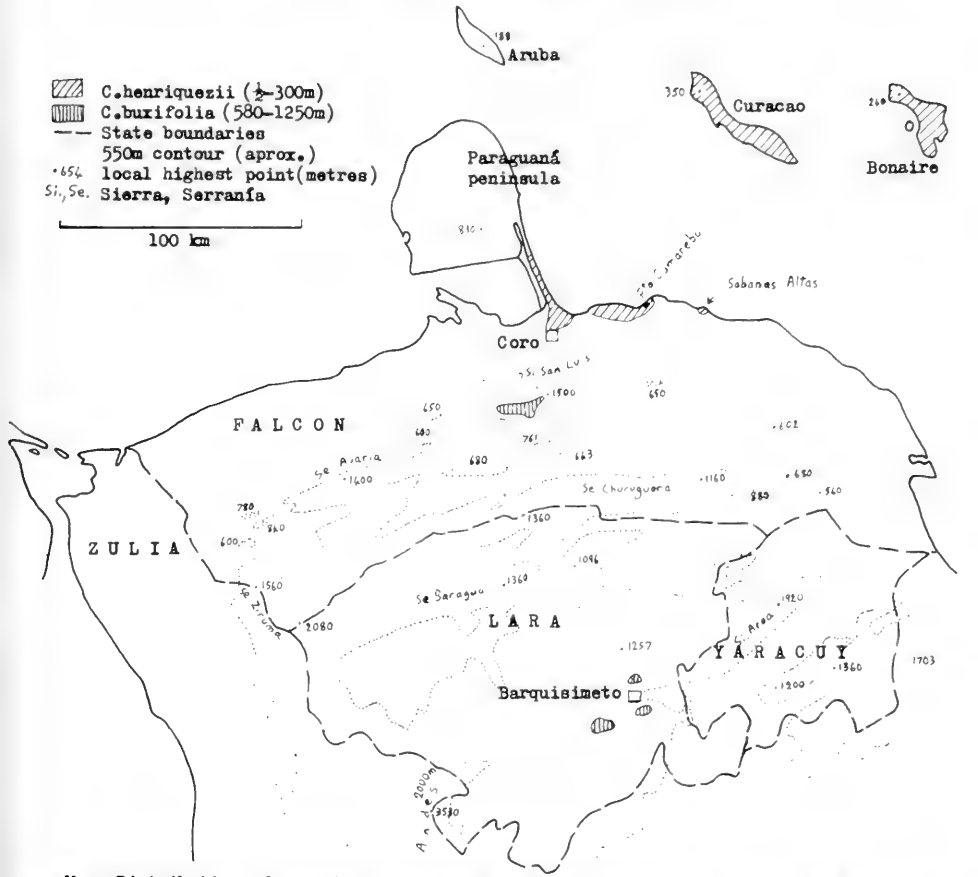
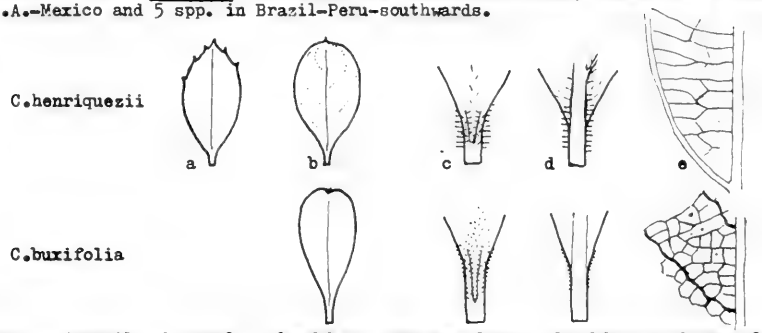


Map: Distribution of Condalia in the world as far as yet known, apart from 12 spp. in U.S.A.–Mexico and 5 spp. in Brazil–Peru–southwards.



Leaves: a, juvenile; b, usual; c, leaf-base upper-surface; d, leaf-base under-surface, e, venation of leaf undersurface.

NOTES ON MESOAMERICAN BEGONIA

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During a study of Begonia section Gireoudia (Kl.) A.DC. (Burt-Utley, 1981) and ongoing revisionary and floristic work with Mesoamerican Begonia, new taxa have been discovered and others reinterpreted. One new species, B. molinana, is described herein and two widely ranging Central American taxa, B. hirsuta Aubl. and B. sericoneura Liebm., are discussed.

BEGONIA MOLINANA Burt-Utley, sp. nov. (Fig. 1)

Herbae suffrutescentes internodia glanduloso-villosa. Laminae obliquae vel transversae supra et subtus glanduloso-hirsutae; 7-8 palmatinerves. Florum ♂ sepala 2 petala 2 stamina 37 monodelpha. Florum ♀ sepala 2 petala 1 stigmata 3 bicornuta.

Suffrutescent herb to 1.5 m; STEMS with internodes 1.6-4 cm X 3.5-6mm, glandular-villous with frequently glandular-tipped trichomes 0.5-1.5 mm long intermixed with minute glandular trichomes. LEAF BLADES chartaceous to subcoriaceous, oblique to transverse, asymmetrically ovate, 20-25 X 11.2-15 cm, basally cordate, apically acuminate, marginally irregularly shallowly lobed at ends of major nerves, ciliate-denticulate and dentate; glandular-hirsute above and beneath with trichomes 0.2-0.9 mm long; 7-8-palmately nerved. PETIOLES 12-17 cm X 2.5-3.5 mm, villous with trichomes similar in size and form to internodal trichomes. STIPULES caducous, narrowly ovate, 2.3 X 0.9-1.1 cm, weakly keeled, apically obtuse, marginally entire, glabrous. INFLORESCENCES axillary, shorter than the foliage, regularly cymose. PEDUNCLES 12-18.5 cm X 1-9 mm, sparsely glandular-villous, but glabrate with age. BRACTS caducous, the lowermost not seen. FLOWERS ♂: sepals 2, ovate, larger than 9 X 8 mm, externally glabrous; petals 2, narrowly obovate or elliptic, larger than 4 x 3 mm; stamens about 37, monadelphous, anthers narrowly obovate to oblong. FLOWERS ♀: bracteoles wanting; sepals 2, broadly ovate, larger than 7 x 7 mm, glabrous; petals 1, obovate to elliptic, larger than 3 x 2 mm; ovary densely glandular, trilocular with bipartite placentae; styles 3, stigmas bicornute. CAPSULES not seen.

TYPE: HONDURAS: OCOTEPEQUE: cloud forest El Portillo on Cordillera Merendón, 20 km from Nueva Ocotepeque, 1800 m, 28 Aug 1968. Molina 22356 (HOLOTYPE: F; ISOTYPE: NY).

Begonia molinana is readily distinguished from other Begonia species occurring in Honduras by its suffrutescent habit coupled with its glandular-villous internodes, hirsute leaf blades, regularly cymose inflorescences and ebracteolate pistillate

flowers with two sepals and a petal.

Further collections of Begonia molinana are necessary before morphometric aspects of floral morphology and sectional affiliation can be unequivocally established. Although B. molinana can not be placed in a section with certainty, its pistillate and staminate flowers with one or two petals respectively suggest an affinity with either section Knesebeckia (Kl.) A.DC. or section Gireoudia (Kl.) A.DC. Supporting its placement in sect. Knesebeckia are its immature staminate flowers with apparently monadelphous stamens, a character associated with sect. Knesebeckia, but otherwise uncommon among Middle American taxa. Since flowers of some species in section Gireoudia occasionally bear petals, relationship with section Gireoudia must be considered until it can be determined that flowers of B. molinana characteristically have two perianth series. While stamens of species in this latter section are typically borne on a low torus and have been described as submonadelphous (Candolle, 1864) monadelphy is observed in at least one species, B. quaternata Smith & Schubert from Panama.

BEGONIA HIRSUTA Aubl., Hist. pl. Guian. 2: 913, t. 348. 1775.
Begonia hygrophila C.DC., Bull. Soc. Bot. Belg. 35: 265. 1896.
Begonia hygrophila var. puberula C.DC., Bull. Soc. Bot. Belg. 35: 266. 1896.
Begonia mameiana C.DC., Smithson. Misc. Coll. 69: 4. 1919.
Begonia leptopoda C.DC., Smithson. Misc. Coll. 69: 6. 1919.
Begonia chepoensis C.DC., Smithson. Misc. Coll. 69: 8. 1919.

Aublet described Begonia hirsuta from material he collected in Cayenne, French Guiana. Although the Aublet specimen at British Museum lacks capsules, Aublet's illustration coupled with information from the type material leaves little doubt that the taxon recognized by Smith and Schubert (1946, 1958) as B. filipes Benth. is conspecific with B. hirsuta. Capsules depicted in the illustration closely conform to those observed on specimens treated as B. filipes from Central and South America, but differ from those of other species in section Doratometra (Kl.) A.DC. in their larger dorsal wings. Central American taxa placed in synonymy with B. filipes (Smith and Schubert 1946, 1958) are conspecific with B. hirsuta. Attempts to locate the type of B. filipes to determine if it also should be synonymized with B. hirsuta have thus far been unsuccessful. However, based on Bentham's description of B. filipes capsules (Bentham, 1845) and collections of B. hirsuta from the type locality of B. filipes, it seems likely that the taxa are conspecific.

BEGONIA SERICONEURA Liebm., Vidensk. Meddl. Dansk. Naturhist. Foren. Kjøbenhavn 1852: 13.
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Gireoudia fibrillosa Kl., Abh. Königl. Akad. Wiss. Berlin 1854. 206. 1855.

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Begonia nicaraguensis Standl., Field Mus. Nat. Hist. Bot. Ser. 4: 237. 1929.
Begonia hypolipara Sandwith, Kew Bulletin 1931: 99.

Begonia sericoneura formed the major element in B. lindleyana Walp. as circumscribed by Smith and Schubert (1946, 1961), a species to which it bears no apparent relationship. It can be distinguished form this latter taxon by vegetative characters alone. In both its rhizomatous habit and basally cordate leaves B. sericoneura differs markedly from B. lindleyana which is characterized by its suffrutescent habit and peltate leaves. Flora characters also conclusively establish that B. sericoneura is distinct from B. lindleyana. The bracteolate pistillate flowers with three stigmas observed on B. sericoneura are a marked contrast to the ebracteolate flowers with four stigmas found on B. lindleyana. With the exception of B. cardiocarpa Liebm. and B. sarcophylla Liebm., the remaining taxa Smith and Schubert (1946, 1961) included in B. sarcophylla belong in B. sericoneura. Begonia cardiocarpa is a distinct species closely allied with B. manicata Brongn. ex Cels and B. sarcophylla should be considered a synonym of B. sartorii Liebm. (Burt-Utley, 1981).

ACKNOWLEDGMENTS

I am grateful to the curators of the following herbaria for loans of specimens or use of facilities important in this study: B, BM, BR, C, CAS, CGE, CR, DUKE, F, G, GH, K, MEXU, MICH, MO, NY, P, TEX, US, VT.

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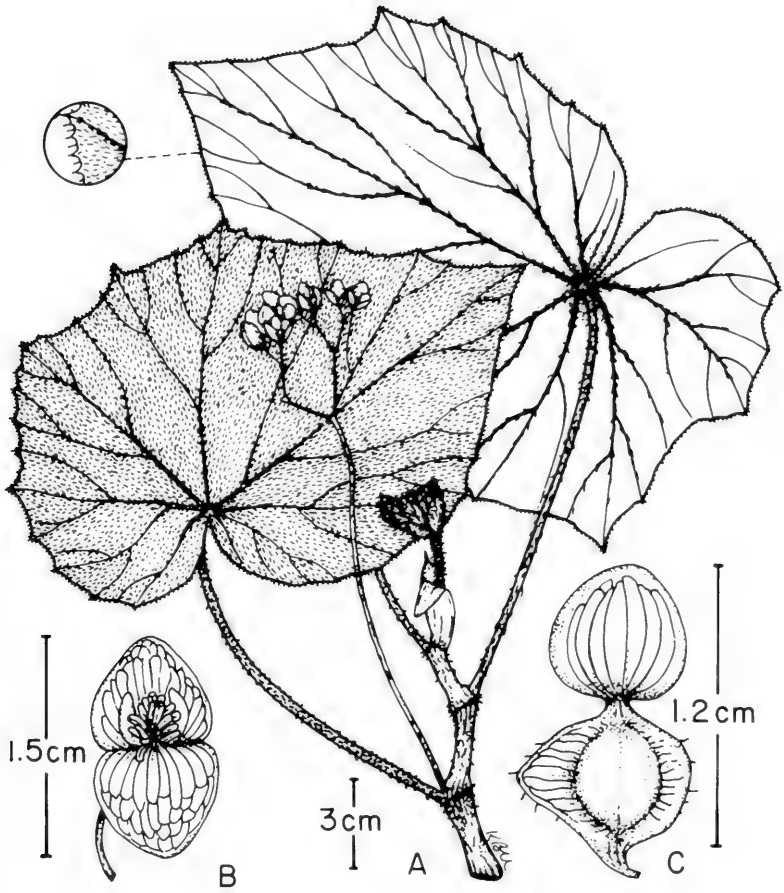
Figure 1. Begonia molinana Burt-Utley. A. Habit. B. Staminate flower. C. Pistillate flower. (from Molina 22356).


1.5cm
3cm
1.2cm
B
A
C

FOUR NOTEWORTHY WISCONSIN PLANTS

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During several summers of botanizing in northeast Wisconsin, four vascular plant species new to the state's flora were discovered: two introductions, one native, and one problematic station.

Two European annual grasses, APERA INTERRUPTA (L.) Beauv. and VENTENATA DUBIA (Leers) Coss. & Dur. (both of subfamily Pooideae, tribe Aveneae) were collected in a grassy ditch in Sobieski, a village in Oconto County, Wisconsin, about 25 km north of Green Bay. Spartina pectinata was dominant in the moist, clayey soil, and fill had been dumped in a vacant lot a few meters away. Other associates included Agrostis stolonifera, Asclepias syriaca, Carex vulpinoidea, Dactylis glomerata, Festuca pratensis, Lolium perenne, Medicago lupulina, Odontites serotina, Poa pratensis, and Salix interior. On 14 June 1981, plants of Apera and Ventenata from this site were in near-flowering condition, but by 5 July all individuals were dead and bore mature fruit.

Apera interrupta (long known as Agrostis interrupta L.), though well-established as a weed in the Pacific Northwest since the 1920s (Hitchcock & Cronquist 1973), has been collected only rarely east of the Rocky Mountains (McNeill 1981); the junior author has examined plants from Illinois, Missouri, Ontario, and Quebec. Apera interrupta might be confused with A. spica-venti (L.) Beauv., another casual European introduction into the United States, but can be distinguished by its erect (not spreading) panicle branches which tend to bear spikelets to their bases. In A. interrupta, the anthers do not exceed 0.5 mm in length, whereas in A. spica-venti they are at least 1 mm long.

Ventenata dubia is apparently new to the eastern United States. Baker (1964) first collected it for this continent from Kootenai County in northern Idaho; it has become locally well-established there and in neighboring Washington (Hitchcock & Cronquist 1973). Attempts to fit Ventenata into generic keys have not been too successful, probably because the plant combines characters of both tribes Poeae and Aveneae: the largest glume may be either shorter or longer than the lowest lemma, and the lemma-awns are both dorsal and (in the lower floret) terminal. The species bears a superficial resemblance to Danthonia spicata, Schizachne purpurascens, or a miniature Avena, but it can be distinguished from these and other grasses in our flora by the following characters: glumes with wide scarious margins, strongly 5-many nerved; upper floret(s) disarticulating below the bearded callus, the lemma with prominent apical teeth and a dorsal geniculate awn; and lemma of the lowest floret terminally awned (not awnless as reported by Gould, 1968, and in

generic treatments of Ventenata by Komarov, 1934, and Tutin et al., 1980), the awn of the same texture as the apical teeth of the lemma(s) of the upper floret(s). The lowermost floret is perfect-flowered, not staminate as reported. If the spikelets are 3-flowered, however, the small uppermost floret may have reduced sexual organs indicating sterility.

Both Apera interrupta and Ventenata dubia may be spreading in eastern North America; 1979 collections (J.-P. Bernard 79-86 & 79-87) of both species growing together at a golf course in Missiquoi County, Quebec were examined last year at US. The collector noted that the seed mixture for the area turf was probably introduced from the Pacific Coast.

JUNCUS STYGIUS L. was discovered on 4 July 1982 in Florence County, where a population of probably several thousand individuals grew in an open, boggy, possibly alkaline meadow just northeast of Grandma Lake. While bogs are quite common in northeast Wisconsin, this site is unusual for its abundance of tussocks of Scirpus hudsonianus and the extreme wetness of the sphagnum-sedge mat, this mostly under one to several inches of water. Besides the typical bog sedges, Drosera spp., and Sarracenia purpurea, uncommon associates include Arethusa bulbosa, Calopogon tuberosus, Carex livida (rare in Wisconsin), Lycopodium inundatum, Rhynchospora capillacea, Triglochin maritimum, and Xyris sp. Juncus stygius is a circumboreal plant represented in the New World by variety americanus Buchenau. This Wisconsin station is at the southern limit for the taxon, only about a dozen stations known for the extreme northern continental United States.

POLEMONIUM OCCIDENTALE Greene was also discovered on 4 July 1982 in Florence County, where a thriving and apparently spreading population of several hundred flowering and perhaps a thousand immature plants grow scattered throughout cut and uncut strips of a boggy Thuja occidentalis-Larix laricina-Picea mariana swamp. The species prefers the very wet, Picea mariana-dominated southern part of the tract, where groundlayer associates include Calla palustris, Carex lacustris, Equisetum fluviatile, and Saxifraga pensylvanica. "Western Jacob's-ladder" is a widespread variable species (sometimes included in the Old World P. caeruleum L. as a variety) that had been previously recorded only once east of the Rockies, in a Thuja occidentalis swamp in northern Minnesota (Lakela 1965). Dr. Gerald B. Ownbey reports (1983 pers. comm.) that this station has not been relocated and may have represented a transient population. He also states that the Wisconsin plants appear to be identical to the Minnesota specimens, which have been described as Polemonium occidentale var. lacustre (Wherry) Lakela.

Whether the Wisconsin plants represent a native or accidentally introduced population is problematical. The tract was strip-cut for cedar in 1972 (U.S.F.S. personnel pers. comm.) and in the subsequent decade many forest rangers have visited the site to implement techniques that might encourage Thuja reproduction in the cut strips. Since many rangers are often flown on short notice to the western U.S. to help fight forest fires, the possibility of

accidental introduction of seeds of Polemonium by way of human agency is not negligible. That the plants are undergoing a manifest population explosion and are commoner in cut than in uncut strips lends credence to this suspicion. Arguing for nativity is the fact that the plants grow in a remote swamp far from any houses, and that rare, doubtlessly native species such as Carex gynocrates, C. tenuiflora, and Valeriana sitchensis ssp. uliginosa are also present.

Citations of specimens on which this report is based:

Apera interrupta (L.) Beauv.

OCONTO COUNTY, village of Sobieski, T26N, R20E, NW¼ NW¼ Sec 22, at SE corner of junction of Co. Hwy. S and Cross Rd., Judziewicz 2161 (WIS) and 2231 (WIS,GH).

Ventenata dubia (Leers) Coss. & Dur.

Same locality as previous species, Judziewicz 2162 (WIS) and 2232 (WIS,GH).

Juncus stygius L. var. americanus Buchenau

FLORENCE COUNTY, open bog on north end of Grandma Lake, T39N, R15E, Sec 34, Judziewicz & Solheim 3843 (WIS,MICH) and 3898 (WIS).

Polemonium occidentale Greene

FLORENCE COUNTY, swamp about one mile west of Lost Lake, T39N, R15E, NE¼ Sec 11, Judziewicz & Solheim 3841 (WIS) and 3889 (WIS, MIN).

ACKNOWLEDGMENTS

We are grateful to Dr. Hugh H. Iltis for confirming the identifications of the grasses. The stations for Juncus stygius and Polemonium occidentale were discovered while the authors were employed by the Scientific Areas Section, Bureau of Endangered Resources, Wisconsin Department of Natural Resources under a contract from the United States Forest Service.

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Gould, F.W. 1968. Grass systematics. McGraw-Hill, New York. 382 pp.

Hitchcock, C.L., and A. Cronquist. 1973. Flora of the Pacific Northwest. Univ. of Washington Press, Seattle. xix + 730 pp.

Komarov, V.L., ed. 1934. Flora of the U.S.S.R. Vol. II.

Lakela, O. 1965. A flora of Northeastern Minnesota. Univ. of Minnesota Press, Minneapolis. 541 pp.

McNeill, J. 1981. Apera, silky-bent or windgrass, an important weed genus recently discovered in Ontario, Canada. Can. J. Plant Sci. 61:479-485.

Tutin, T.G. et al., eds. 1980. Flora Europaea. Vol. 5. Univ. Press, Cambridge, England. xxxvi + 452 pp.

BEGONIA NOMENCLATURE NOTES, 7

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These Notes were originally intended to correct the citations and synonomy listed from the literature in *The Species of the Begoniaceae*, ed. 2 (1974) by Fred A. Barkley and Jack Golding. The literature has been reviewed and the citations verified. Because of the resulting numerous corrections and my changes in the method of listing the names, a new title, The Begoniaceae Species List, will be used. This will be a companion part and index for the Illustrated Key to the Species of Begoniaceae, in preparation by Lyman B. Smith and Dieter C. Wasshausen.

Carrie Karegeannes has contributed considerable research and editorial assistance for this work and she will be co-author of the new List. J.G.

During our review of the literature a number of changes in nomenclature have been found necessary and are corrected here.

BEGONIA

anamalayana Beddome, Trans. Linn. Soc. 25: 217. 1865.
= anaimalaiensis Beddome, Madras J. Lit. Sci. III. 1: 48. 1864. India.
reniformis Beddome, Madras, J. Lit. 22: 72 (1861) non Dryander (1791) = *anaimalaiensis* Beddome (1864). *anamalayana* Beddome, Trans. Linn. Soc. 25: 217 (1865) was published with the same description as *reniformis* Beddome.

aptera Decaisne, Nouv. Ann. Mus. Hist. Nat. (Paris) III. 3: 451 (1834), non Blume (1827), non Roxburgh (1832); Miquel, Fl. Ned. Ind. 1.1: 692 (1856) [=*Diplociinium timorense* Miquel 1856]; A. de Candolle, Prodr. 15(1): 407 (1864) [=*Mezierea salaziensis* Gaudichaud, Voy. Bonite, Bot. *pl. 32* 1841]; non fide Gagnepain, Bull. Mus. Hist. Nat. (Paris)

25: 281 (1919) [=*decaisneana* Gagnepain 1919].
= timorensis (Miquel) J. Golding & C. Karegeannes. comb. nov. Timor.

Miquel transferred the illegitimate *aptera* Decaisne to *Diploclinium timorense* Miquel (1856). A. de Candolle listed both *aptera* Roxburgh (1832) and *Diploclinium tomorense* Miquel (1856) as synonyms of *Mezierea salaziensis* Gaudichaud (1841). But Gagnepain in his discussion of "The four different *Begonia aptera*" explained that *Mezierea salaziensis* Gaudichaud (1841) is a synonym of *aptera* Roxburgh (1832) which was transferred by Warburg in Engler & Prantl. Nat. Pflanzenfam. III. 6A: 139 (1894) to *salaziensis* Warburg (1894). Gagnepain also noted that *aptera* Decaisne (1834) was different and he gave it a new name, *decaisneana* Gagnepain (1919), but this epithet is superfluous because of the earlier *Diploclinium timorense*. A. de Candolle, Ann. Sci. Nat. Bot. IV. 11: 129 (1859) changed *Diploclinium* Wight to a section of *Begonia*. Therefore the epithet *timorense* has priority and is transferred to *Begonia* as *timorensis*.

attenuata (Klotzsch) A. de Candolle in Martius, Fl. Bras. 4(1): 383. 1861.
= lanceolata Vellozo, Fl. Flum. Icon. 10: *pl. 33* 1831. Brazil.

A. de Candolle gave a new name to his specimens because he considered *lanceolata* a doubtful species, too poorly drawn, but that is not sufficient cause for rejection and *attenuata* is superfluous.

bowringiana Champion ex Bentham, J. Bot. Kew Gard. Misc. 4: 120 (1852); W. J. Hooker, Bot. Mag. 86 *pl. 5182* (1860); A. de Candolle, Prodr. 15(1): 348 (1864) [=*laciniata* var. *bowringiana* A. de Candolle 1864]; Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 533 *pl. 11* (1939) [=*laciniata* subsp. *bowringiana* Irmscher 1939 '*laciniata* euta. reg. *bowringiana*'].
= palmata D. Don var. bowringiana (Champion ex Bentham) J. Golding & C. Karegeannes. comb. nov. Hong Kong.

bracteata Jack var. bracteata, Malay Misc. 2(7): 13. 1822. nomen legitimum. Sumatra.

Koorders, Exkurs.-Fl. Jav. 2: 645 (1912) listed *bracteata* Jack as a synonym of *lepida* Blume, Enum.

Pl. Javae 1: 98 (1827). Lyman B. Smith compared the herbarium specimen of *lepida* Blume with the description of *bracteata* Jack and advised they are distinct, with quite different leaf bases. They will be listed as separate species.

laciniata subsp. *crassisetulosa* Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 532. *pl. 10* (1939) '*laciniata*' euta. *crassisetulosa*'.
= palmata D. Don var. crassisetulosa (Irmscher) J. Golding & C. Karegeannes. comb. nov. China.

laciniata subsp. *difformis* Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 531. *pl. 8* (1939) '*laciniata* euta. loc. *difformis*'.
= palmata D. Don var. difformis (Irmscher) J. Golding & C. Karegeannes. comb. nov. China.

laciniata subsp. *khasiana* Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 529. *pl. 6* (1939) '*laciniata* conta. reg. *khasiana*'.
= palmata D. Don var. khasiana (Irmscher) J. Golding & C. Karegeannes. comb. nov. India.

laciniata subsp. *principalis* Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 530. *pl. 7* (1939) '*laciniata* euta. *principalis*'.
= palmata D. Don var. principalis (Irmscher) J. Golding & C. Karegeannes. comb. nov. China.

laciniata subsp. *laevifolia* Irmscher, Notes Roy. Bot. Gard. Edinburgh 21: 43 (1951) '*laciniata* euta. loc. *laevifolia*'.
= palmata D. Don var. laevifolia (Irmscher) J. Golding & C. Karegeannes. comb. nov. China.

H. Hara, Fl. E. Himalaya 215 (1966), transferred *laciniata* Roxburgh, Fl. Ind. 3: 649 (1832), to *palmata* D. Don var. *palmata*, Prodr. Fl. Nep. 223 (1825). The above varieties and subspecies of *laciniata* are closest to and transferred as varieties of *palmata* D. Don.

laciniata var. *flava* C. B. Clarke in J. D. Hooker, Fl. Brit. Ind. 2: 645 (1879); Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 529. *pl. 4 & 5* (1939) [=*laciniata* subsp. *flava* Irmscher 1939 pro parte; = *laciniata* subsp. *gamblei* Irmscher 1939 pro parte]; H. Hara,

J. Jap. Bot. 45: 91 (1970).
= flaviflora H. Hara var. flaviflora 1970 pro parte. India.
= flaviflora H. Hara var. gamblei (Irmscher) J. Golding & C. Karegeannes pro parte. India.

laciniata subsp. *flaviflora* Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 531. *pl. 9* (1939) '*laciniata* euta. loc. *flaviflora*'.
= flaviflora H. Hara var. vivida J. Golding & C. Karegeannes. nom. nov. Burma.

laciniata subsp. *gamblei* Irmscher, Mitt. Inst. Allg. Bot. Hamburg 10: 528. *pl. 3* (1939) '*laciniata* euta. loc. *gamblei*'; H. Hara, Fl. E. Himalaya 215 (1966) [=*palmata* var. *gamblei* H. Hara 1966].
= flaviflora H. Hara var. gamblei (Irmscher) J. Golding & C. Karegeannes. comb. nov. India, Burma & China.

The above yellow-flowered varieties of *laciniata* are closest to *flaviflora* H. Hara, which he noted "... differs from *palmata* in having yellow flowers with acute thin tepals, scarlet bracts, leaves with white short thick hairs, softly pubescent stems, petioles and peduncles with appressed brownish hairs, and sparsely hairy outer tepals and ovary."

longipetiolata E. G. Baker, J. Bot. 62. Suppl.: 44 (1924) 'longepetiolata', non Gilg (1905).
= longipedunculata J. Golding & C. Karegeannes. nom. nov. Sumatra.

lucida Parodi, Anales Soc. Ci. Argent. 5: 208 (1878), non Haworth (1821), non Otto & Dietrich (1848), non Kunth & Bouché (1848).
= lucidissima J. Golding & C. Karegeannes. nom. nov. Paraguay.

macrophylla var. *concolor* (Klotzsch) Doorenbos ex F. A. Barkley & J. Golding, Sp. Begoniaceae ed. 2: 74 (1974).
= barkeri Knowles & Wescott 1840. Mexico.

In his letters Jan Doorenbos, Dept. of Hort. of the Agricultural Univ., Wageningen, Netherlands, had advised that Klotzsch's description of var. *concolor* corresponds with *barkeri* as he knows it.

macrophylla var. *discolor* Doorenbos ex F. A. Barkley & J. Golding, Sp. Begoniaceae ed. 2: 74 (1974) [=*peponifolia* Visiani 1847].
= barkeri Knowles & Wescott 1840. Mexico.

In his letters Jan Doorenbos has advised that var. *discolor* was grown in the Berlin Botanic Garden as *peponifolia*. A. de Candolle, Prodr. 15(1): 341 (1864) cited *peponifolia* Visiani with *Gireoudia macrophylla* Klotzsch as a synonym (excluding *macrophylla* Dryander, actually Lamarck). Visiani's description appears to us to = *barkeri* Knowles & Wescott.

nitida var. *pilosula* A. de Candolle, Prodr. 15(1): 294 (1864).
= obliqua Linnaeus 1753? West Indies.

Schulz in Urban, Symb. Antil. 7: 10 (1911), returned *nitida* Dryander in Aiton, Hort. Kew 3: 352 (1789) to *minor* Jacquin, Collectanea 1: 128 "1786" (1787). But he excluded var. *pilosula*, probably because A. de Candolle distinguished it "with shaggy hairs here and there toward the tip of the petiole and on the veins underneath." *B. minor* is distinguished by being completely glabrous. Comparing this brief description of var. *pilosula* with Golding's live plants indicates it could possibly be = *obliqua* Linnaeus (1753).

pauciflora Lindley, Bot. Reg. 6: *pl. 471*. Notes CC (1820); Haworth, Saxifrag. Enum. 196 (1821); J. Golding, Begonian 44: 329 (1977) [=fischeri Schrank 1820, sphalma].
= dubia Haworth, Succ. Pl. Suppl. 101. 1819. Brazil.

J. Golding, Begonian 44: 329 (1977), advised that *pauciflora* Lindley was not a synonym of *patula* Haworth (1819) and, based on the synonomy published by others, wrote that it was a synonym of *fischeri* Schrank (1820). However, Haworth, Saxifrag. Enum. 196 (1821), observed that he believed *pauciflora* Lindley (1820) was the same as *dubia* Haworth 1819. His description of *dubia* is very brief, but since he actually saw both plants it is best to accept his determination.

pennellii L. B. Smith & B. G. Schubert subsp. *lobato-ovata* Irmscher, Bot. Jahrb. Syst. 76: 84. 1953.
= erythrocarpa A. de Candolle, Ann. Sci. Nat. IV. 11: 121. 1859. Bolivia, Peru.
pennellii L. B. Smith & B. G. Schubert var. *longiloba* Irmscher, Bot. Jahrb. Syst. 76: 85 (1953).
= erythrocarpa A. de Candolle 1859.
pennellii L. B. Smith & B. G. Schubert f. *macrantha* Irmscher, Bot. Jahrb. Syst. 76: 86 (1983).
= erythrocarpa A. de Candolle 1859.

L. B. Smith & B. G. Schubert, J. Wash. Acad. Sci. 45: 114 (1955) transferred *pennellii* L. B. Smith & B. G. Schubert, Field Mus. Nat. Hist. Bot. Ser., 13: 196 (1941) to *erythrocarpa* A. de Candolle 1859. L. B. Smith has advised that there are many intergradations in the herbarium specimens of *pennellii* and *erythrocarpa* and that the characteristics used by Irmscher for his combinations are not really distinctive.

peponifolia A. T. Brongniart ex F. Cels, Ann. Fl. Pomone 105. 1842.
= barkeri Knowles & Wescott, Flor. Cab. 3: 179 *pl. 135*. 1840. Mexico.
peponifolia A. T. Brongniart var. *beta* A. T. Brongniart ex F. Cels, Ann. Fl. Pomone 106. 1842.
= barkeri Knowles & Wescott 1840.
peponifolia hort. ex Schlechtendal, Linnaea 24: 180. 1851.
= barkeri Knowles & Wescott 1840.
peponifolia hort. Berol. ex Klotzsch, Abh. Konigl. Akad. Wiss. Berlin "1854" (1855); -- Begoniac. 96 (1855) pro syn. *Gireoudia macrophylla* var. *discolor* Klotzsch (1855); A. de Candolle, Prodr. 15(1): 341 (1864) [=*peponifolia* Visiani ex A. de Candolle 1864].
= barkeri Knowles & Wescott 1840.
peponifolia Visiani ex A. de Candolle, Prodr. 15(1): 341. 1864.
= barkeri Knowles & Wescott 1840.

The earliest citation for the epithet *peponifolia* was in Ann. Fl. Pomone 105 (1842) describing a species from Mexico. Klotzsch in 1855 listed *peponifolia* hort. Berol. as a synonym of *Gireoudia macrophylla* var. *discolor*, but in error listed the habitat as Jamaica. A. de Candolle listed

Gireoudia macrophylla Klotzsch as a synonym of *peponifolia* Visiani and continued to list the habitat as Jamaica. His citation of Visiani as the author and the habitat are not correct. From a comparison of the descriptions they are all = *barkeri* Knowles & Wescott from Mexico.

sootepensis Craib var. *thorelii* Gagnepain in Lecomte, Fl. Indo-Chine 2: 1104. 1921.
= yunnanensis Léveillé var. thorelii (Gagnepain) J. Golding & C. Karegeannes. comb. nov. Laos.

Craib, Bull. Misc. Inform. 57 (1911), named *sootepensis* Craib. Later, Craib, Aberd. Univ. Stud. 47: 96 (1912), noted that after the examination of additional material he was disposed to regard *sootepensis* Craib as a variety of *yunnanensis* Léveillé, Repert. Nov. Sp. 7: 20 (1909). Gagnepain in Lecomte, Fl. Indo-Chine 2: 1104 (1921), established *sootepensis* Craib var. *thorelii* Gagnepain. But this is illegitimate because of the earlier transfer by Craib and we establish this new combination.

verticillata W. J. Hooker, Icon. Pl. 9: *pl. 811* (1851), non Vellozo (1831); A. de Candolle, Prodr. 15(1): 353 (1864).
= adenopoda Lemaire 1852. Burma.

B. verticillata W. J. Hooker is illegitimate because of the earlier *verticillata* Vellozo 1831 and is replaced by the next earliest name.

GENERIC SYNONYMS

Diploclinium

areolatum Miquel, Fl. Ned. Ind. 1. 1: 1091 (1858) quoad pl. Sumatra, non Miquel (1856); -- Fl. Ned. Ind. Eerste biju 332 (1861) [=*Platycentrum robustum* var. *hirsutior* Miquel 1861].
= Begonia robusta Blume var. hirsutior J. Golding & C. Karegeannes. comb. nov. Sumatra.

ACKNOWLEDGEMENT

We thank Lyman B. Smith for his assistance and critique of our draft manuscript.

BOOK REVIEWS

Alma L. Moldenke

"PHENETICS AND ECOLOGY OF HYBRIDIZATION IN BUCKEYE BUTTERFLIES (*Lepidoptera: Nymphalidae*)" by John E. Hafernik, Jr., 118 pp., 15 b/w photos., 35 draw., 5 maps & 15 tab. University of California Publications in Entomology Volume 96, Berkeley, California 94720. [1982] 1983. $16.50 paper bund.

"This paper analyzes [carefully and effectively the] interrelationships among the North and Central American representatives of *Junonia* exclusive of the Caribbean region." Among others there are chapters on intra- and inter-specific crosses, courtship behavior, and larval resource partitioning. The page of conclusions, before all the documenting evidence, states that pheromones are far less important in courtship since the males choose prospective mates by color patterns similar to their own except for the later stages when they are less discriminating, leading to hybridization with F_1 and backcrosses highly fertile. Phenetic studies show clonal variation connecting typical *J. zonalis* and *J. nigrosuffusa* phenotypes which should be considered conspecific and combined as *J. evarete*.

"PROGRESS IN BOTANY: Morphology, Physiology, Genetics, Taxonomy, Geobotany. 43" or "FORTSCHRITTE DER BOTANIK: Morphologie, Physiologie, Genetik. Systematik, Geobotanik. 43" edited by H. E. Ellenberg, K. Esser, K. Kubitzki, E. Schnepf & H. Ziegler, xiv & 382 pp., 25 b/w fig. & 1 tab. Springer Verlag, New York, Heidelberg & D-1000 Berlin 33, West Germany. 1981. DM.129 or $60.00.

Characteristically this valuable volume offers effectively condensed recent information with full bibliographic references under each of these major topics listed in the title with most of the résumés in English.

"NATIVE HARVESTS - Recipes And Botanicals Of The American Indians" by Barrie Kavasch, xviii & 204 pp. & 127 b/w draw. Random House, New York, N. Y. 10022. 1979. $10.00 clothbound & $15.95 paperbound.

The earlier edition of this book, prepared for the American Indian Archaeological Institute in Washington, Connecticut, has been augmented with additional chapters on ferns, lichens, mosses, mushrooms and poisonous plants, many new recipes of ancestral origin, several botanicals and illustrations. The drawings are basically very pleasing to see and certainly help in plant identification. The recipes indicate how much our kitchen culture has absorbed from the Amerinds.

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