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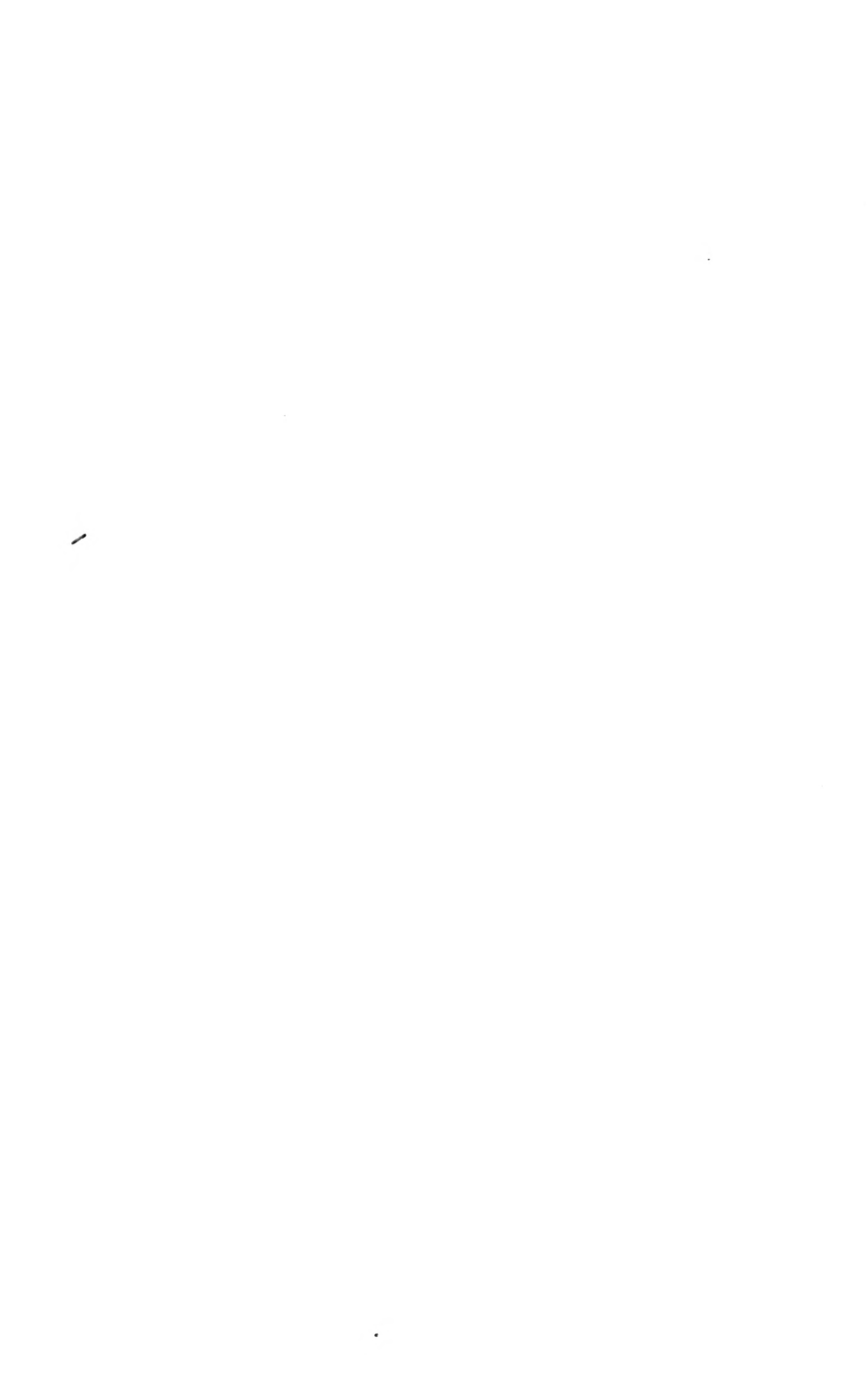
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# FLORA OF GUATEMALA

PAUL C. STANDLEY

LOUIS O. WILLIAMS

AND

DOROTHY NASH GIBSON

FIELDIANA: BOTANY

VOLUME 24, PART X, NUMBERS 3 and 4

*Published by*

FIELD MUSEUM OF NATURAL HISTORY

JUNE 17, 1974





FLORA OF GUATEMALA  
PART X



# FLORA OF GUATEMALA

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## Flora of Guatemala - Part X, Number 3

### BIGNONIACEAE. Bignonia Family

PAUL C. STANDLEY AND LOUIS O. WILLIAMS

*Reference:* Russell J. Seibert, The Bignoniaceae of the Maya area, (including Yucatan, Campeche, Quintana Roo, Chiapas, Tabasco, British Honduras, and Guatemala) Carnegie Inst. Wash. Publ. 522: 377-434, *tt.* 5-7. 1940; Use of glands in a taxonomic consideration of the family Bignoniaceae, Ann. Mo. Bot. Gard. 35: 123-136, *tt.* 1948.

Trees, shrubs, or woody vines, rarely herbs, the branchlets terete or angulate; nodes with interpetiolar glandular fields of small impressed plate-like glands or interpetiolar ridges, sometimes with both, rarely without either; axillary buds with the outer scales pseudostipular or frequently foliaceous; leaves generally opposite, without stipules, simple, unifoliolate, or variously digitately or pinnately compound, in most of the scandent plants often trifoliolate, with the terminal leaflet often replaced by a tendril; leaflets usually entire; inflorescence a terminal or axillary raceme, thyrses, dichasium, or reduced to a single flower; bracts and bractlets present, caducous; calyx gamosepalous, usually campanulate or tubular, 5-lobate, in *Crescentia* bilabiate, spathaceous, or truncate; corolla gamopetalous, the tube usually dilated above, the limb somewhat bilabiate, the 5 lobes usually imbricate; fertile stamens 4, rarely 2, didynamous, generally inserted below the middle of the tube; anthers glabrous or villous, the cells divergent or parallel; staminode usually very short and inconspicuous; disc pulvinate to cupuliform or almost patelliform; ovary 2-celled, rarely 1-celled; ovules numerous, attached in each cell to axial placentae or to 2 parietal placentae when 1-celled; style simple, the 2 stigmas usually lamelliform; fruit capsular and bivalvate, or baccate and indehiscent; seeds usually compressed, often broadly winged, or thick and wingless and imbedded in pulp.

Genera 100 or more, widely dispersed in tropical regions. Apparently only one other genus, *Tanaecium*, is represented in Central America and almost all the Central American species of the family are covered by the following treatment.

Vines of this family constitute a large part of the vegetation of the thickets on the Pacific plains, as well as in other lowland areas. There is scarcely a tree or large shrub on these plains that is not covered with bignoniaceous vines. Because of their great abundance,

one would expect ampler material in herbaria but, as a matter of fact, it is not easy to find plants in good condition for collecting, or accessible. Fruits can be found with little difficulty, but the flowers apparently are open for only a very few days each year, and often they are produced so high on the trees that their collection is not worth the labor involved, unless there is reason to believe that some especially rare species is represented.

The Bignoniaceae of Guatemala, along with those of Mexico, the rest of Central America and Panama, may be divided into four easily distinguished tribes, as is done in the key that follows. The Tourrettieae, with a single genus, the Crescentieae with three genera, the Tecomeae with ten genera, are not complicated, at least not unduly so. The tribe Bignonieae, on the other hand, with about 28 genera but relatively few species, is difficult and much in need of a friend.

A look at the characters by which the genera of the tribe Bignonieae are said to be separated leaves one with the impression that often flimsy or even nebulous characters have been used. This impression is strengthened by two other sources—the number of genera into which a single species may have been placed by perfectly competent botanists in the course of time and the large number of genera that are monotypic. These considerations may indicate that the lines that separate these genera are all too vague and consequently that the “solid morphological characters” are capable of being combined in about as many ways as there are characters.

In the preparation of floras it is not possible to take the time to do monographic work, if one wishes to finish. The work presented here is certainly not the final word on Guatemalan Bignoniaceae but we do hope that it is as complete as our specimens would permit.

We have followed Dr. Seibert's account of the Bignoniaceae of the Maya area, making those modifications and emendations that seem to be justified by more adequate material and studies by Mr. Sandwith and Mr. Gentry. Our herbarium now has perhaps more than twice as many specimens from Guatemala as Dr. Seibert saw from all herbaria. This increased representation has made it possible to add to the “Flora” and in some cases to simplify the generic concepts. The junior author believes that the true number of genera is fewer than those presented here.

---

A few days before this portion of the “Flora” was to go to press, and well more than a year after the last of this manuscript had been

prepared, Dr. Alwyn Gentry, the friend that the family needs, gave me some still unpublished notes on Guatemalan Bignoniaceae. These notes have been incorporated where possible since they reflect a healthy and much needed look at generic limits. In addition, Dr. Gentry has prepared the following generic key, based on his recent studies. I have changed the key in two or three places to reflect my opinions where they differ from his.—L. Wms., May 1973.

## KEY TO GENERA OF GUATEMALAN BIGNONIACEAE

Key contributed by Dr. Alwyn Gentry\*

- Herbaceous vines; inflorescence subspicate, the upper flowers mostly sterile; ovary 4-locular; capsule densely uncate-spiny, burrlike, the valves not splitting to base (Tribe: TOURRETTIEAE) . . . . . *Tourrettia*.
- Woody lianas, shrubs, or trees; inflorescence never spicate, without sterile flowers; ovary 1-2-locular, capsule not spiny with uncate barbs or if spiny not burrlike and the two valves completely dehiscent.
- Trees or shrubs (*Podranea*, *Pandorea*, and *Tecomaria*, all cultivated, are often vines); leaves various but not 2-foliolate and never tendrillate; stems without phloem arms in cross-section; fruits dehiscent perpendicular to the septum (TECOMEAE) or indehiscent (CRESCENTIEAE).
- Leaves pinnately compound (Tribe: TECOMEAE, in part)
- Leaves bipinnate; flowers purplish-blue; staminode longer than fertile stamens . . . . . *Jacaranda*.
- Leaves once compound; flowers not bluish; staminode much shorter than fertile stamens.
- Calyx spathaceous; exotic trees; corolla large (more than 7 cm. long and 4 cm. wide), broadly campanulate . . . . . *Spathodea*.
- Calyx not spathaceous; shrubs, vines, or small trees; corolla relatively small (less than 6 cm. long and 2 cm. wide), tubular-infundibuliform to tubular-campanulate.
- Usually vines; flowers pink to lavender or white; cultivated.
- Leaflets entire, acute or obtuse; calyx 6-7 mm. long, shallowly lobate with broad, obtuse lobes . . . . . *Pandorea*.
- Leaflets usually serrate; narrowly long-acuminate; calyx 1-2 cm. long, deeply lobate, the lobes subulate-mucronate . . . *Podranea*.
- Usually trees or shrubs; flowers yellow to orange-red; cultivated or native.
- Stamens included; flowers yellow; native shrub or small tree. *Tecoma*.
- Stamens exerted; flowers usually orange-red; exotic shrub or vine . . . . . *Tecomaria*.
- Leaves simple, 3-foliolate, or palmately compound.
- Fruits indehiscent, pulpy with a hard shell or fibrous-fleshy; leaves alternate, opposite, or fasciculate; corolla thick, usually with a transverse fold in throat, whitish or greenish, the flowers borne singly or in fascicles. (Tribe: CRESCENTIEAE).
- Calyx spathaceously split; fruits cylindric with a fleshy pericarp; branchlets often armed with short spines; leaves 3-foliolate . . . *Parmentiera*.
- Calyx irregularly cleft or bilabiate; fruits globose or ovoid with a hard shell; branchlets unarmed; leaves simple except in *Crescentia alata*.

\* Minor changes in the key have been made by the junior author to conform to names which he has followed in this flora. Notably *Distictis* has been changed to *Pithecoctenium* and *Dendrosicus* to *Amphitecna*.

- Leaves alternate; placentation axile at extreme base of ovary, parietal on two placentae at top; seeds large (greater than 12 by 14 mm.)  
*Amphitecna*.
- Leaves fasciculate; placentation parietal on four placentae; seeds small (less than 8 by 6 mm.) . . . . . *Crescentia*.
- Fruit a dehiscent capsule; leaves opposite; corolla thin, more or less tubular without a transverse fold in throat, color various; inflorescence a raceme or panicle or reduced to a few flowers (Tribe: TECOMEAE, in part)
- Leaves simple; seeds minute (less than 2 by 4 mm); fruit less than 7 cm. long. . . . . *Astianthus*.
- Leaves palmately compound; seeds larger; fruit more than 11 cm. long.
- Flowers less than 1.8 cm. long; anthers pilose; fruits spirally twisted; leaflets often attenuate. . . . . *Godmania*.
- Flowers more than 2 cm. long; anthers glabrous; fruits more or less straight; leaflets conspicuously petiolulate.
- Capsule costate; calyx thin and membranaceous, bilabiate. . . . . *Roseodendron*.
- Capsule not costate; calyx thicker, bilabiate, truncate, or dentate  
*Tabebuia*.
- Lianas (some species shrubs when young or open-grown); leaves simple to 3-foliolate, often with tendrils and commonly 2-foliolate in part; stems with 4-16 phloem arms in cross-section; fruits dehiscing parallel to the septum (Tribe: BIGNONIEAE).
- Corolla very small (less than 0.7 cm. long), conspicuously bilabiate with open mouth; capsule with longitudinal wings. . . . . *Tynanthus*.
- Corolla usually much larger (always more than 0.8 cm. long), if conspicuously bilabiate, with closed mouth; capsule not winged.
- Corolla orange, the lobes valvate in bud; cultivated exotic. . . . *Pyrostegia*.
- Corolla not orange, the lobes imbricate in bud; native plants (though sometimes also cultivated).
- Tendrils uncate-trifid, the branches claw-like; stem irregularly many-armed in cross-section; corolla yellow; calyx thinly membranaceous.
- Capsule oblong, the valves very thick, splitting in half at maturity; calyx with a short recurved apiculation. . . . . *Melloa*.
- Capsule linear, the valves thin, not splitting in two; calyx with an incurved apiculus or not apiculate. . . . . *Macfadyena*.
- Tendrils not uncate; flowers lavender, white, or yellow; stem evenly 4-16-armed in cross section.
- Branchlets six-sided (sometimes rather inconspicuously so in *Pithecoctenium*) with ribbed angles; tendrils 3-15-fid; capsules elliptic-oblong; corolla thick, white to magenta or reddish; interpetiolar glandular fields lacking.
- Calyx double; corolla bilabiate, the lobes not reflexed, upper 2 and lower 3 lobes fused; tendrils 3-forked at tip; leaves usually with dendroid trichomes; capsule neither echinate nor reticulated.  
*Amphilophium*.
- Calyx simple; corolla lobes separate, reflexed; tendrils 3-15-forked at tip; trichomes all simple; capsule echinate or reticulately ridged. . . . . *Pithecoctenium*.
- Branchlets terete to tetragonal, not 6-ribbed; tendrils simple or trifid; capsules various, often linear; corolla usually thinner, its color various; interpetiolar glandular fields present or absent.
- Leaves conspicuously punctate; fruit very narrow (less than 7 mm. wide), almost terete, pencil-like; stem hollow. . . . *Stizophyllum*.
- Leaves not punctate; fruit more than 8 mm. wide, usually strongly compressed; stem not hollow.
- Leaves dendroid-pubescent, at least in axils beneath (if restricted to axils, the main veins drying conspicuously reddish below);

capsule oblong, the valves woody, compressed, smooth, the seeds with thin bodies and broad wings; tendrils simple.

Interpetiolar glandular fields present; calyx small (less than 9 mm. by 5 mm.); corolla lavender; seed wings hyaline.

*Xylophragma*.

Interpetiolar glandular fields absent; calyx large (more than 22 mm. by 22 mm.); corolla yellow; seed wings brown.

*Callichlamys*.

Leaf pubescence, if any, of simple trichomes or lepidote scales; capsule and seeds various but without above combination of characters; tendrils simple or trifid.

Flowers yellow or cream, sometimes with reddish streaks; capsule valves more or less woody, greater than 3 cm. wide, not echinate or tuberculate; pseudostipules not vertically 3-seriate.

Twigs sharply tetragonal, the angles ribbed; corolla small (less than 2 cm. long); calyx shallowly campanulate, less than 2 mm. long . . . . . *Mussatia*.

Twigs subterete; corolla greater than 2.5 cm. long; calyx cupular, greater than 5 mm. long.

Capsule oblong or linear-oblong; ovary stipitate; corolla glabrous or lepidote without . . . . . *Anemopaegma*.

Capsule oblong or linear-oblong; ovary not stipitate; corolla pubescent without.

Interpetiolar glandular fields present; tendrils trifid.

*Ceratophytum*.

Interpetiolar glandular fields absent; tendrils simple.

*Adenocalymma*.

Flowers magenta to lavender or white; capsule valves not woody unless echinate or tuberculate (except in one variety of *Pachyptera kerere* with vertically 3-seriate pseudostipules), mostly narrower.

Capsule suborbicular, echinate; pseudostipules resembling miniature bromeliads . . . . . *Clytostoma*.

Capsule linear or oblong, not echinate (sometimes tuberculate or verrucose); pseudostipules not a bromeliad-like cluster of subulate scales.

Tendrils conspicuously trifid; capsule uniformly very flat or thick and oblong; branchlets terete.

Capsule verrucose-tuberculate; calyx with narrow, elongate (to 5 mm.) twisted teeth; without interpetiolar glandular fields . . . . . *Adenocalymma*.

Capsule smooth; calyx with marginal teeth lacking or less than 1 mm. long; with or without interpetiolar glandular fields.

Petiolar and interpetiolar glandular fields absent; corolla glabrous or very inconspicuously lepidote; capsule compressed, less than 1.8 cm. wide.

*Martinella*.

Petiolar and interpetiolar glandular fields present (sometimes inconspicuous); corolla puberulent without, at least on lobes; capsule thick and oblong or compressed but more than 2.5 cm. wide.

Thecae of anthers glabrous . . . . . *Pseudocalymma*.

Thecae of anthers pubescent . . . . . *Pachyptera*.

Tendrils simple or minutely bifid; capsule linear, compressed but with edges or midline usually thicker; stems often angulate.

Anthers pubescent; capsule pubescent with raised midrib.

*Lundia*.

Anthers glabrous; capsule glabrous or lepidote (pubescent in *Arrabidaea mollissima* with median nerve not raised).

Capsule verrucose; calyx large (more than 18 mm. long) and evenly bilabiate. . . . . *Scobinaria*.

Capsule not verrucose; calyx smaller, subspathaceous or less than 9 mm. and usually more or less truncate.

Calyx subspathaceous, 12-18 mm. long; capsule lepidote with margins but not midline somewhat raised; leaves simple or 2-foliolate; stems terete . . . . . *Neomacfadya*.

Calyx more or less truncate or slightly bilabiate, less than 9 mm. long; capsule as above only in *Cydista aequinoctialis* with 2-foliolate leaves and usually tetragonal stems.

Fertile stamens 2; corolla glandular lepidote; capsule extremely compressed, glabrous, without raised midline; some leaves 3-foliolate. . . . . *Mussatia*.

Fertile stamens 4; corolla pubescent or glandular lepidote; capsule with raised median nerve or lepidote or pubescent or the leaves simple or 2-foliolate.

Disc lacking; interpetiolar glands never present; stems with 8-16 phloem arms in cross-section; branchlets often tetragonal; corolla somewhat lepidote without. . . . . *Cydista*.

Disc present; interpetiolar glands often present; stems with 4 phloem arms in cross-section; branchlets never tetragonal; corolla puberulous at least on lobes but not lepidote.

Interpetiolar glandular fields almost always absent; petiolar glandular fields present; tendril usually minutely bifid; capsule valves convex, sandpaper-surfaced.

*Paragonia*.

Interpetiolar glandular fields usually present; petiolar glandular fields absent; tendril simple; capsule valves neither convex nor rough-surfaced. . . . . *Arrabidaea*.

## ADENOCALYMMA Martius

Woody vines with tendrils, the branches terete, with interpetiolar ridges at the nodes; leaves 3-2-foliolate, the tendrils simple or rarely trifid; pseudostipules subulate, not foliaceous; inflorescence a narrow, axillary or terminal raceme or panicle or thyrses; bracts usually large and conspicuous, caducous; calyx cupular-campanulate, truncate or denticulate, irregularly lobate or somewhat spathaceously split, usually with conspicuous plate-shaped glands; corolla funnelform or campanulate-funnelform, densely pubescent outside; stamens included, the anthers glabrous; disc pulvinate or cupular, large; ovary glandular-lepidote; capsule oblong or oblong-linear, thick and somewhat flattened, ligneous, smooth, tuberculate or rugose, septicidally dehiscent; seeds with hyaline wings, the body always very thick.

About 50 species in tropical America, mostly in South America. Probably only the following are known from Central America.

Corolla yellow; capsule smooth; calyx irregularly and shallowly lobate; leaves without plate-shaped glands in the axils of the nerves. . . . . *A. calderonii*.

Corolla pinkish; capsule tuberculate; calyx 5-costate, with 5 tortuous, subulate teeth; leaflets with plate-shaped glands in the axils of the 2 basal lateral nerves. . . . . *A. fissum*.

**Adenocalymma calderonii** (Standl.) Seibert, Carnegie Inst. Wash. Publ. 522: 428. 1940. *Tabebuia calderonii* Standl. Journ. Wash. Acad. Sci. 14: 244. 1924 (type from El Salvador). *A. hintonii* Sandw. Kew Bull. 10. 1936.

Dry thickets, 500 m. or less; Peten; Alta Verapaz; Zacapa; Retalhuleu; Santa Rosa; Escuintla. Southern and central Mexico; British Honduras; El Salvador; Honduras; Costa Rica.

A large woody vine, drying fuscous, the branchlets with numerous pale elevated lenticels, almost glabrous; leaves 2-3-foliolate, the leaflets ovate to elliptic or oblong, 3-13 cm. long, 2-7 cm. broad, obtuse to short-acuminate, obtuse to shallowly cordate at the base, lustrous, with a distinct cartilaginous margin, sparsely glandular-lepidote when young, later minutely punctate, otherwise glabrous; inflorescence of axillary and terminal, narrow racemes or panicles, somewhat furfuraceous-pubescent; calyx 4-8 mm. long, puberulent-tomentulose, irregularly lobate or cleft, with a few plate-shaped black glands; corolla yellow, 4-6 cm. long, glabrate near the base, the limb and lobes densely furfuraceous-pubescent; capsule 10-18 cm. long, 2-3 cm. broad, short-attenuate, rounded at the base, ligneous, smooth or slightly rugose; seeds transversely oblong, 16-21 mm. long, 5-8 cm. broad, with membranaceous wings.

Called "bejuco blanco" and "canilla de zopilote" in Tabasco. The vine apparently is a common one in thickets along the Pacific coast of Guatemala.

**Adenocalymma fissum** Loes. Verh. Bot. Ver. Brandenb. 65: 102. 1923. *A. seleri* Loes. l.c. 101. 1923. *Onohualcoa fissa* Sandwith, Kew Bull. 1946: 88. 1947. *O. seleri* Lundell, Contr. Univ. Mich. Herb. 7: 52. 1942.

Moist or dry thickets, 1,200 m. or less; Petén; Guatemala. Southern Mexico.

Branchlets subterete, striate, pale-lenticellate; leaflets 2-3, ovate or ovate-lanceolate, acute or short-acuminate, obtuse or rounded at the base, 6-14 cm. long, 2.5-8 cm. broad, coriaceous, not darkening when dried, densely punctate beneath and sometimes puberulent; axils of the basal lateral nerves with fields of conspicuous plate-shaped glands; tendrils trifid; inflorescence usually a long, narrow, terminal or axillary thyrses; calyx 5-10 mm. long, with 5 distinct longitudinal costae, these terminating in subulate teeth 1-2 mm. long, glandular-lepidote

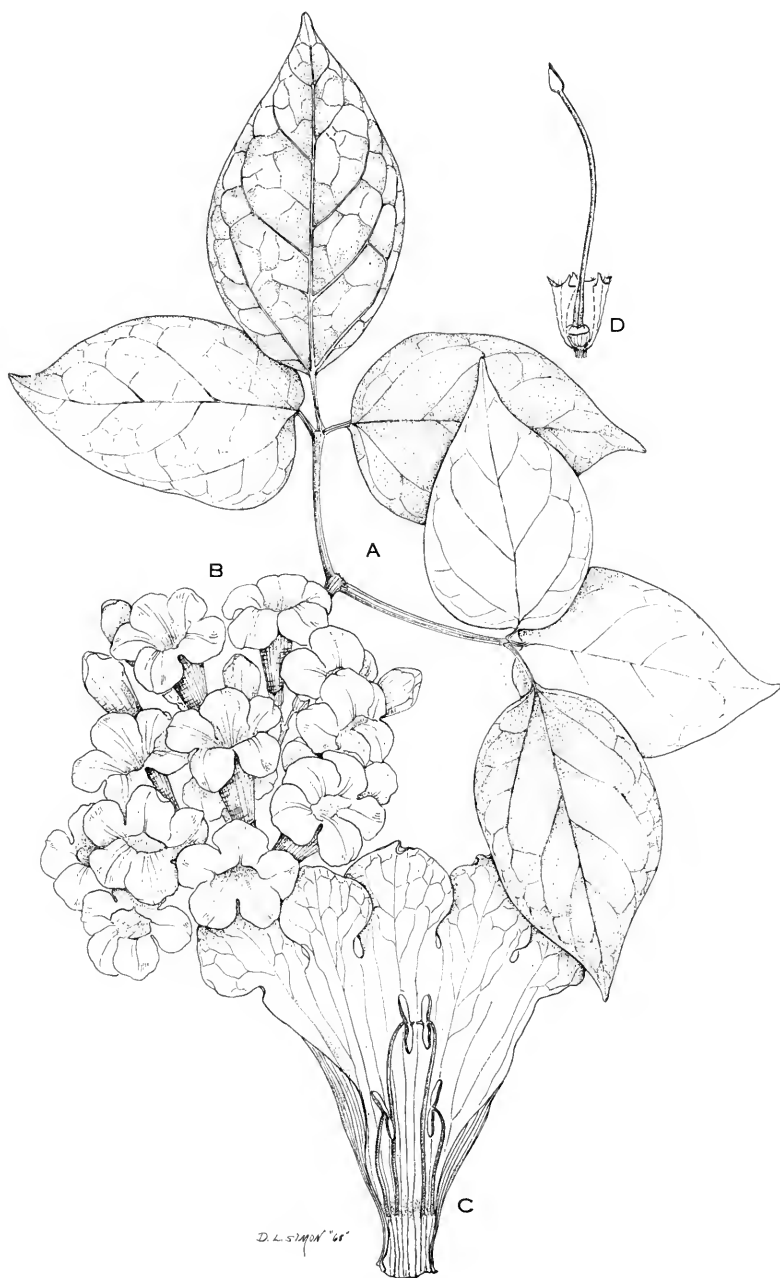


FIG. 21. *Adenocalyma fissum*. A, pair of leaves about one-half natural size; B, inflorescence about one-half natural size; C, corolla dissected,  $\times 1$ ; D, calyx and pistil,  $\times 1$ .



and puberulent; corolla pinkish lavender, 4-9 cm. long, minutely puberulent and somewhat lepidote; ovary densely glandular-lepidote; capsule about 19 cm. long and 2.5-3 cm. in diameter, subcylindric, densely tuberculate-verruucose with tubercles 2-3 mm. long; seeds 1.5 cm. long and 6 cm. broad.

Maya names are reported from Yucatan as "chacanicab" and "oppol-che."

This species was segregated from *Adenocalymma* by Dr. Lundell based largely upon the verrucose capsule and calyx, as *Onohualcoa*. Mr. Sandwith, specialist in the family, seems to agree that the plant is different and that the species here accounted for may be the same as the South American *Adenocalymma heliocalyx* O. Kuntze or, if you wish, *Onohualcoa heliocalyx* Sandwith. The characters used to separate *Onohualcoa* seem not very impressive and we prefer to keep it in *Adenocalymma* but call attention to the other generic name.

### AMPHILOPHIUM Kunth

Woody vines with tendrils; branches hexagonal, the costae distinct, easily separable, the nodes with interpetiolar ridges; leaves opposite, 2-3-foliolate, the terminal leaflet sometimes replaced by a trifid tendril; pubescence glandular-lepidote and often also of stellate or simple hairs; pseudostipules small, foliaceous; inflorescence a terminal thyrse (or axillary 2-flowered peduncle); calyx campanulate or subglobose, the orifice somewhat constricted, 2-3-lobate, the limb broad, undulating and spreading; corolla subcoriaceous, glabrous or finely pubescent, at least on the lobes, the tube cylindric, the limb bilabiate, with valvate lobes; stamens included, the anthers glabrous, oblong-oval; disc large, annular and somewhat pulvinate; ovary ovate, finely pubescent; capsule oblong-elliptic, somewhat compressed, ligneous, slightly rugose, septicidally dehiscent; seeds transverse-oblong, with large membranaceous wings.

Perhaps 10 species, in tropical America. Two others have been described from Central America, one of which, *A. pilosum* Standl. of Honduras, might well be expected in the North Coast of Guatemala.

***Amphilophium paniculatum* (L.) HBK.** Nov. Gen. & Sp. 3: 116. 1819. *Bignonia paniculata* L. Sp. Pl. 623. 1753. *A. purpureum* Brandegee, Zoe 5: 220. 1905. *Cucharillo*.

Dry or moist thickets, 1,200 m. or less; Petén; Alta Verapaz; Izabal; Chiquimula; Santa Rosa; Escuintla; Jalapa; Sacatepéquez; El Quiché; Suchitpéquez; Huehuetenango. Southern Mexico; British Honduras to Panama; West Indies; South America.

A large or small vine, the branchlets glandular-lepidote, the angles short-ciliate, the nodes with a pubescent interpetiolar ridge; leaves bifoliolate, the leaflets pellucid-punctate, ovate to broadly ovate or almost rounded, obtusely short-

acuminate, obtuse to cordate at the base, entire, glandular-lepidote on both surfaces, slightly paler beneath, with a few cup-shaped glands in the axils of the nerves; pseudostipules foliaceous, 5 mm. long or less, sickle-shaped; thyrses long and narrow, with 1-2 flowers aborted in many of the cymes; calyx 13 mm. long or less, densely glandular-lepidote, the interior appendages 3-5 mm. long, obtuse; corolla 3-4 cm. long, pinkish or purplish, turning white in age, the limb very short, puberulent to glabrous; capsule 8 cm. long and 3.5 cm. broad, minutely pubescent or furfuraceous, obtuse at each end.

Known in Tabasco as "pico de pato," in allusion to the fruit, which suggests a duck's bill; "sac-ac" (Yucatan, Maya). The flowers are not at all showy nor are they handsome.

**Amphilophium paniculatum** var. **molle** (Schlecht. & Cham.) Standl. Field Mus. Bot. 18: 1114. 1938. *A. molle* Schlecht. & Cham. Linnaea 5: 120. 1830. *Bejuco de cuchamper* (probably an erroneous name); *sohbach* (Petén, Maya).

Dry to wet thickets, 2,500 m. or lower; Petén; Alta Verapaz; Zacapa; Chiquimula; Jalapa; Jutiapa; Guatemala; Sacatepéquez; El Quiché; Huehuetenango; San Marcos. Southern Mexico; British Honduras to El Salvador and Costa Rica.

Like the typical form of the species except in pubescence; branches, petioles, and inflorescences with evident stellate pubescence; leaflets glandular-lepidote, minutely stellate-puberulent above or almost glabrous, densely stellate-pubescent beneath with short hairs.

This has generally been considered a distinct species, but the typical form intergrades with typical *A. paniculatum*, and leaves with both types of pubescence are found upon the same plant.

Called "pico de pato" in Honduras and El Salvador; "cuchara de pico," "cuchara de pato," "cucharillo" (El Salvador).

## AMPHITECNA Miers

*Reference:* Louis O. Williams, *Amphitecna* and *Enallagma*, Fieldiana, Bot. 36 (4): 21-29. 1973.

Trees or sometimes shrubs, the trunks simple or few-branched, the branchlets angulate at first, becoming subterete, the bark gray or grayish-white, glabrous, the nodes often enlarged, pulviniform; inflorescences terminal and 1-few-flowered or lateral, the lateral sometimes on short-shoots on the branches and 1-few-flowered, or single flowers in the leaf axils of new wood, the flowers conspicuously pedicellate; calyx closed in bud, bilaterally or rarely trilaterally cleft at anthesis, rarely (?) circumscissile at the base; corolla usually white or greenish and somewhat fleshy, funnellform or campanulate-funnelform, 5-lobate or crenate-lobate; stamens 4 in two subequal pairs, with a small staminode, all inserted near base of corolla,

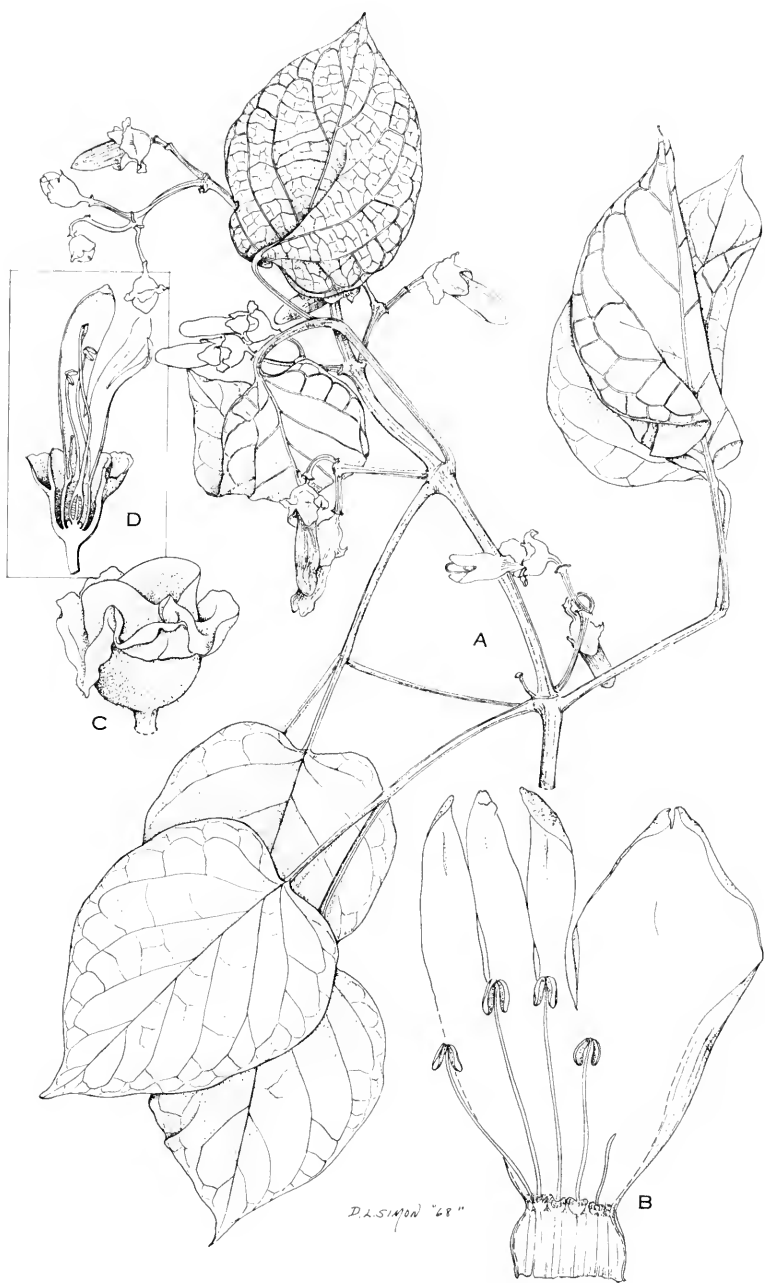


FIG. 22. *Amphiphium paniculatum*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 1\frac{1}{2}$ ; C, calyx,  $\times 2$ ; D, longitudinal section of flower after Bureau,  $\times \frac{3}{4}$ .

anthers reaching to throat of corolla, the disc large and persistent on the fruit; ovary 1-celled or perhaps falsely 2-celled; fruit baccate, ovoid to ellipsoidal, the pericarp thin (less than 2 mm.) and coriaceous or thick ( $\pm$  5 mm.) and bony.

The center of distribution of this small genus is Guatemala. It includes eight species of which six are found in Guatemala. They are all small trees or shrubs found in the forest, often along streams.

Flowers fasciculate on short bracteolate shoots on old wood; veins on lower surface of leaves appearing marginate.

Leaves 40–80 cm. long; flowers borne near base of thick stem. . . . . *A. macrophylla*.

Leaves 6–12 cm. long; flowers borne on defoliated branches. . . . . *A. silvicola*.

Flowers in terminal bracteolate fascicles or in (usually singly) the axils of leaves; veins on lower leaf surfaces prominent but not appearing marginate.

Corolla less than 3 cm. long; calyx to 1.7 cm. long, bilabiate with the lobes obscurely lobulate; species of the eastern lowlands. . . . . *A. donnell-smithii*.

Corolla more than 3 cm. long, calyx more than 2 cm. long.

Leaves coriaceous, oblong-elliptic to usually obovate or sometimes oblanceolate; plants of Caribbean coastal swamps or rivers; fruits subglobose.

*A. obovata*.

Leaves chartaceous or subcoriaceous, oblanceolate to obovate-elliptic; plants of the highlands or interior Atlantic forests; fruits ovate-cylindric, oblongoid or elliptic-ovate.

Petioles 2–4 cm. long; inflorescence a single flower in axil of leaves; calyx circumscissile at base; fruit oblongoid or elliptic-ovate; montane species in western highlands. . . . . *A. montana*.

Petioles very short, 0.2–0.5 cm. long; inflorescence terminal, usually a single flower; calyx not circumscissile; fruit ovate-cylindric; forest species of the lowland interior. . . . . *A. oblanceolata*.

***Amphitecna donnell-smithii*** (Sprague) L. Wms. *Fieldiana: Bot.* 36: 22. 1973. *Crescentia donnell-smithii* Sprague, *Bull. Herb. Boiss. ser. 2.* 6: 376. 1906. *Enallagma donnell-smithii* Standl. *Field Mus. Bot.* 12: 361. 1936.

Wet mixed forests, 300 m. or less; Alta Verapaz (type, *Tuerckheim 7953*); Petén. British Honduras.

Shrubs or small trees with slender branches, the nodes not enlarged, about 9 m. tall; leaves papyraceous, oblanceolate, attenuate-acuminate, attenuate to the base, 7–16 cm. long, 1.5–4 cm. broad, sparsely glandular-lepidote; flowers solitary, usually axillary; calyx cleft almost to the base, narrow, bilabiate, one lobe minutely tridentate, the other bidentate, 12–17 mm. long, glabrous; corolla 2.5–3 cm. long, the tube very narrow, the limb spreading, sparsely glandular-lepidote; ovary densely glandular-lepidote.

The smallest-flowered of all the species of this group to be found in our area. It is uncommon and several of the specimens seen and presumed to belong here are sterile.

***Amphitecna macrophylla*** (Seem.) Miers ex Baill. *Rev. Hort.* 465. 1882. *Crescentia macrophylla* Seem. in Hook. *Journ. Bot. Kew*

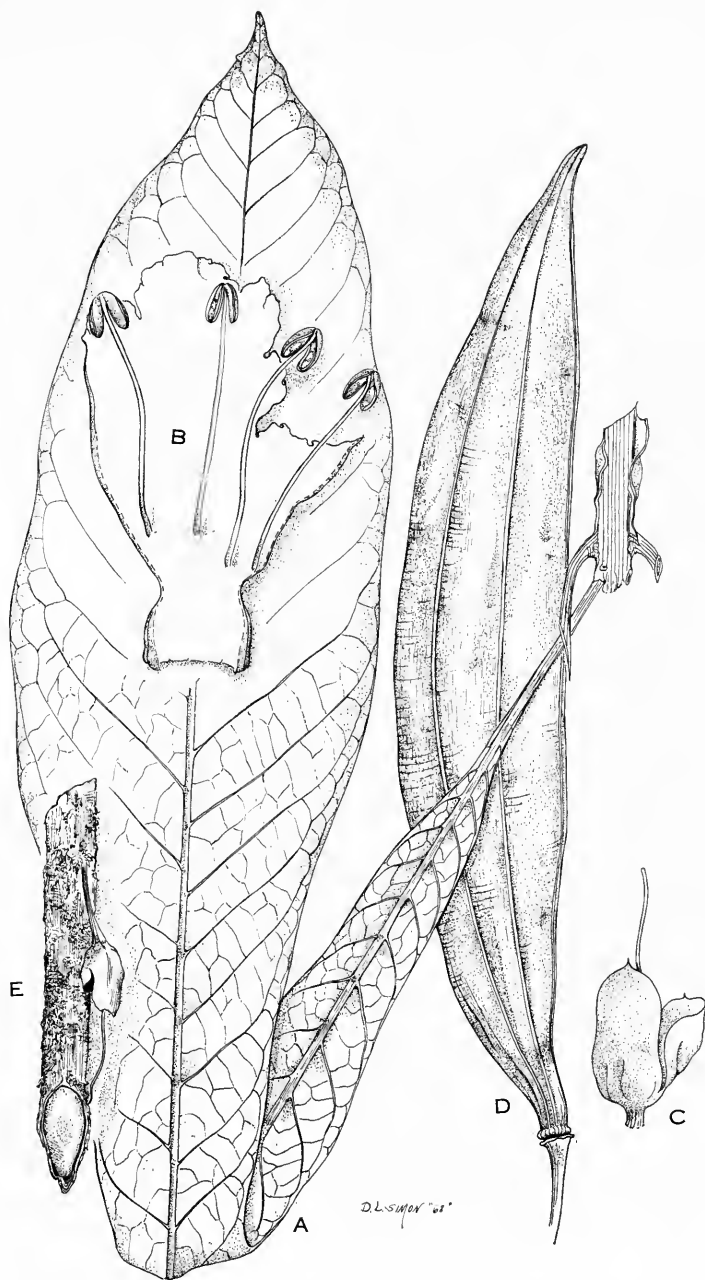


FIG. 23. *Amphitecna macrophylla*. A, leaf,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 1$ ; C, calyx,  $\times 1$ ; D, capsule,  $\times \frac{1}{2}$ ; E, section of stem showing cauliflorous inflorescence,  $\times \pm \frac{1}{2}$ .

Misc. 6: 274. 1854. *Neotuerckheimia megalophylla* Donn.-Sm. Bot. Gaz. 47: 258, f. 1. 1909 (type from Cobán, Alta Verapaz, *Tuerckheim II 2278*). *Enallagma macrophylla* Lundell, Wrightia 4: 170. 1971.

Moist or wet forest, usually growing on limestone at the edges of streams, 1,300 meters or less; Alta Verapaz; Izabal. Mexico (Veracruz and Tabasco; type from Teapa, Tabasco).

Shrubs or trees 4.5–12 m. high, simple or with few branches; leaves very large, clustered near the top of the trunk, almost sessile, oblanceolate or oblong-oblanceolate, 40–80 cm. long and 6–16 cm. broad or probably even larger, obtuse to acuminate, long-attenuate to the base, papyraceous, blackening when dried, glabrous; flowers borne on the thick trunk usually near its base; calyx 1.5–2.5 cm. long, pale green, splitting bilabiate halfway to the base, somewhat glandular-lepidote; corolla 2–5 cm. long, pale green, the lobes pale lilac-pinkish, glabrous; ovary oblong, punctate-glandular; anthers dull purplish brown; fruit pendent, ellipsoid, 26 cm. long or probably even larger, short-acuminate at the apex, narrowed at the base, with 8 unevenly spaced longitudinal ridges, filled with white, spongy or finally soft pulp.

Called “guiro de montaña” in Tabasco and “morro cimarrón” in Oaxaca. This plant is striking in appearance. It is plentiful along the Río Carchá between Cobán and Carchá, probably the type locality of *Neotuerckheimia*, where it forms thick stands on the jagged limestone rocks, the trunks often leaning out across the water. Pittier compares the mature fruits to those of *cacao criollo* (*Theobroma cacao*), but the younger ones suggest a small wild papaya (*Carica*). When cut, they show a solid spongy white mass in which the seeds, although large, are scarcely distinguishable from the pulp. In the locality mentioned, at the end of March the trees bore young flower buds and almost ripe fruits. The huge leaves form a single cluster at the end of the trunk or its branches or are arranged in several whorls at the top of the plant.

***Amphitecna montana*** L. Wms. Fieldiana, Bot. 36: 22. 1973.

Small tree in the montane forests on the slopes of Tajumulco and Tacana volcanoes, mostly at 2,000 m. or higher; San Marcos (type, *Steyermark 36704*). Mexico (Chiapas).

Small forest trees 10–15 m. tall, the branches angulate at first, becoming terete with age, glabrous; leaves alternate and scattered along the branches or sometimes clustered toward the apex, oblanceolate to narrowly obovate-elliptic, acuminate, cuneate to the base and rather long petiolate (for genus), with 15–20 prominent lateral nerves anastomosing toward the margins, blades subcoriaceous, 12–30 cm. long and 3–10 cm. broad, the petioles mostly 2–4 cm. long; inflorescences of single flowers in axils of leaves; flowers pendent, the pedicel slender, to about 10 cm. long; calyx fleshy, coriaceous, bilobate or possibly also trilobate to the middle,

about 3 cm. long, circumscissile at the base and falling away leaving the pedicel and young ovary; corolla light green, narrowly campanulate, shallowly crenate-lobate, slightly zygomorphic, about 4.5 cm. long and about 2.5 cm. broad at throat; fruits oblongoid or elliptic-ovoid, to 15 cm. long and 8 cm. in diameter, shell thin and fragile, the flesh hard and slightly bitter; seeds thick and the cotyledons fleshy, notched at both top and bottom, about 18 mm. broad, 12 mm. high and 8–10 mm. thick.

A distinctive and perhaps not uncommon tree in the rather restricted area where known. The pendent fruits are outstanding, the petiolate leaves and circumscissile calyx distinguish it from the several other species of the alliance.

**Amphitecna oblanceolata** L. Wms. Fieldiana, Bot. 36: 23. 1973.

Wet lowland forests of the Atlantic coastal plain; Petén (type, *Tún 1459*); Alta Verapaz; Izabal. Endemic.

Shrubs or small trees to 10 m. tall; branches slender, terete or angulate, whitish, glabrous; leaves oblanceolate or elliptic-oblanceolate, acuminate, cuneate to the base, glabrous, secondary nerves 10–15 pairs at nearly a right angle to mid-nerves, the tips anastomosing, the blades often with small plate-shaped glands, 9–25 cm. long and 2–7 cm. broad, petiole very short, 2–8 mm. long; inflorescence terminal on young branches, mostly a single pedicellate flower, the pedicel 2–3 cm. long; calyx bilabiate at anthesis, 1.5–2 cm. long and 0.5–0.8 cm. broad at the base, the lobes broadly oblong-ovate to narrowly obovate, obtuse; corolla campanulate-funnelform, zygomorphic, 5-lobate, 2.5–4.5 cm. long; fruit narrowly ovate-cylindric, probably more than 15 cm. long and about 3.5–5 cm. in diameter; seeds (nearly mature) immersed in the whitish pulp, subreniform in outline with the embryo at the center and with lateral wings thin and obtuse.

The long narrowly ovate-cylindric fruit is distinctive.

**Amphitecna obovata** (Benth.) L. Wms. Fieldiana, Bot. 36: 25. 1973. *Crescentia obovata* Benth. Bot. Voy. Sulph. 130. t. 46. 1845. *Enallagma obovata* Schumann in Engler & Prantl, Pflanzenf. IV. 3b: 247. 1895. *Morrito del rio*; *wild calabash*.

Usually in forests along rivers or in mangrove swamps near sea level or but little above. Southern Mexico; British Honduras to Panama and the West Indies to northern South America; southern Florida.

Large shrubs or trees, sometimes 15 m. high but usually lower, the trunk often crooked, the crown widely spreading, the bark thin; branchlets angulate, becoming subterete and shallowly fissured, the nodes enlarged; leaves sessile or nearly so, coriaceous, oblong-elliptic to obovate or oblanceolate, 7–25 cm. long, 2–9 cm. broad, abruptly acute, cuneate to rounded at the base; flowers long-pedunculate, the calyx 2–4 cm. long, bilabiate, cleft almost to the base, with a

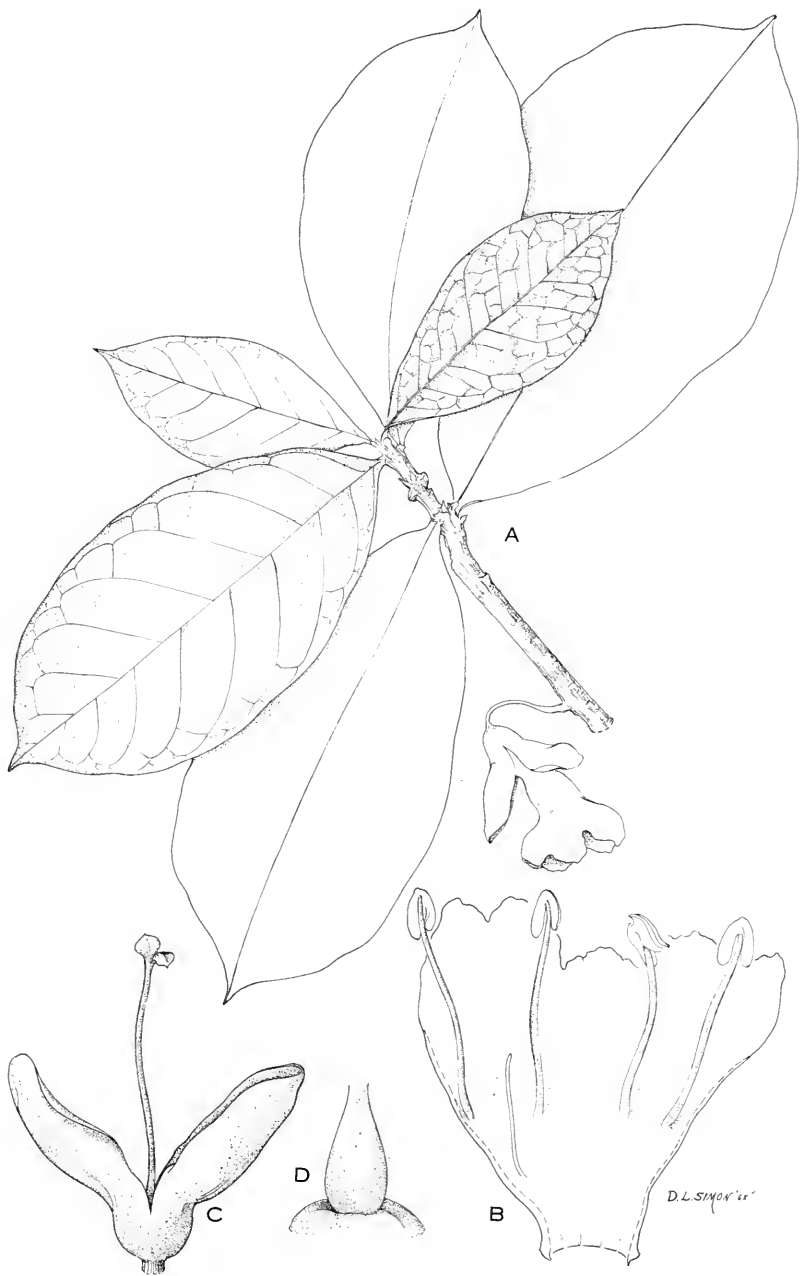


FIG. 24. *Amphitecna obovata*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected to show stamens and staminode,  $\times 1$ ; C, calyx,  $\times 1$ ; D, base of pistil and gland,  $\times 3$ .



few scattered impressed plate-shaped glands on the upper half; corolla green or tinged with purple, 4–6 cm. long, glandular-lepidote; ovary glandular-lepidote; fruit subglobose, 6–8 cm. in diameter.

Known in British Honduras as “calabash,” “morrito del río,” “river calabash,” or “wild calabash”; “huירו de montaña” (Tabasco); “jicarillo” (Veracruz).

This plant has gone under the name of *Enallagma latifolia* (Miller) Small in most of the recent floras. However, Miller’s description of *Crescentia latifolia* does not fit the plant to which the name commonly has been applied. Since no authentic material exists, the name may be considered to be an ambiguous one.

### **Amphitecna silvicola** L. Wms. Fieldiana, Bot. 36: 25. 1973.

Moist dense forest, at about 1,400 m., probably in Petén. Mexico (type from Lago Tsiskaw, Chiapas, on the Guatemalan border, *Breedlove* 10064). Known only from the type.

Shrubs about 2 m. tall, the branches angulate, becoming terete, glabrous; leaves alternate on the new growths, elliptic or oblanceolate, acuminate, short petiolate with 7–12 lateral nerves, these lighter-marginate on the lower surfaces, the blades 6–12 cm. long and 2.2–4 cm. broad, petiole to 1 cm. long; inflorescence fascicles of 1–3 flowers on older wood from an enlarged multibracteolate base, pedicels about 2 cm. long, slender; flowers white; calyx closed in bud, bilaterally split in anthesis nearly to the base, each lobe obovate, somewhat cochleate, obtuse, glabrous, 15–20 mm. long and 10–12 mm. broad; corolla campanulate-funnelform; crenulate-lobate, muriculate toward the apex outside, smooth and glabrous within, 4–5 cm. long when mature; stamens 4, two unequal pairs, reaching to the throat of the corolla; staminode cylindrical, 3–4 mm. long, arcuate; anthers 2-celled, the cells explanate and joined through apex of anther, each cell about 5 mm. long; disc entire, obscurely lobate; young ovary elongate, smooth; style about 30 mm. long, narrowly truncate; fruits unknown.

The venation on the underside of the leaves has a lighter margin and the veins look, at first, like the work of leaf-miners. This is characteristic of only two species in the genus.

### **ANEMOPAEGMA** Martius

Woody vines with simple or tripartite tendrils; branchlets terete, or subquadrate, striate, the older ones with inconspicuous lenticels, the nodes with interpetiolar ridges; pseudostipules foliaceous and conspicuous or reduced or none; inflorescence a short axillary raceme or reduced to a single flower; calyx campanulate, truncate or somewhat lobate, often glandular-lepidote; corolla funnelform, the tube narrow, yellow; stamens included, anthers glabrous; capsule subterete and compressed with subligneous valves, or ellipsoidal and somewhat terete with relatively thin valves; seeds with corky or hyaline wings.

A genus, if such it is, with perhaps some 40 species distributed from Mexico to Paraguay. It seems unlikely that the two species in Guatemala belong in the same genus, as genera in the family are divided. The generic description is written to include our species but the key that follows will show their main differences.

Pseudostipules large and foliaceous; tendrils simple; capsule ellipsoidal with the valves relatively thin; the seeds with broad corky opaque wings; lowland species. . . . . *A. chrysoleucum*.

Pseudostipules small (2-3 mm. long) or none; tendrils tripartite at the tip; capsule compressed with valves subligneous; the seeds with broad hyaline wings; highland species. . . . . *A. puberulum*.

**Anemopaegma chrysoleucum** (HBK.) Sandwith, Lilloa 3: 459. 1938. *Bignonia chrysoleuca* HBK. Gen. & Sp. Nov. Pl. 3: 134. 1819. *Anemopaegma belizeanum* Blake, Contr. Gray Herb. 52: 91. 1917 (type from British Honduras, *Peck 957*).

In ciliar forests or in swampy thickets at or near sea level; Izabal. British Honduras; Honduras; Nicaragua. Northern South America.

Small or large, woody vines, the branchlets subterete, striate, puberulent or almost glabrous, the nodes ampliate and complanate, with faint interpetiolar ridges; leaves bifoliolate, the leaflets oval or ovate-oblong, acute to short-acuminate, mucronate, rounded to cuneate at the base, entire, subcoriaceous, densely impressed-glandular-punctate above and beneath, otherwise almost glabrous; pseudostipules orbicular or elliptic, 8-20 mm. long; flowers axillary, solitary or in 3-flowered racemes; calyx 8-10 mm. long, truncate or obscurely lobate, coriaceous, sparsely ciliate, obscurely glandular-lepidote with numerous pale plate-shaped glands on the upper half; corolla 5-7 cm. long, yellow, minutely glandular-lepidote; ovary glandular-lepidote; capsule 8-15 cm. long and 3-4 cm. broad, glabrous; seeds transversely oblong, with broad corky opaque wings.

This species, like many others of the family, is known from widely separated localities. It is expected that this erratic distribution, in this species, may be due to insufficient collections along lowland rivers and swamps. The seeds of this species, in contrast to most of those of the tribe *Bignonieae*, would seem to be adapted for distribution by water rather than by wind.

**Anemopaegma puberulum** (Seibert) Miranda, Ann. Inst. Biol. Mex. 24: 93. 1953. *Chodanthus puberulus* Seibert, Carnegie Inst. Wash. Publ. 522: 425, fig. 7. 1940. *Chorcha; flor canaria*.

In forests or in thickets, 1,200-1,600 m. perhaps both cultivated and native in Guatemala; El Quiché; Guatemala. Mexico (Veracruz, type from Chiapas); Honduras.

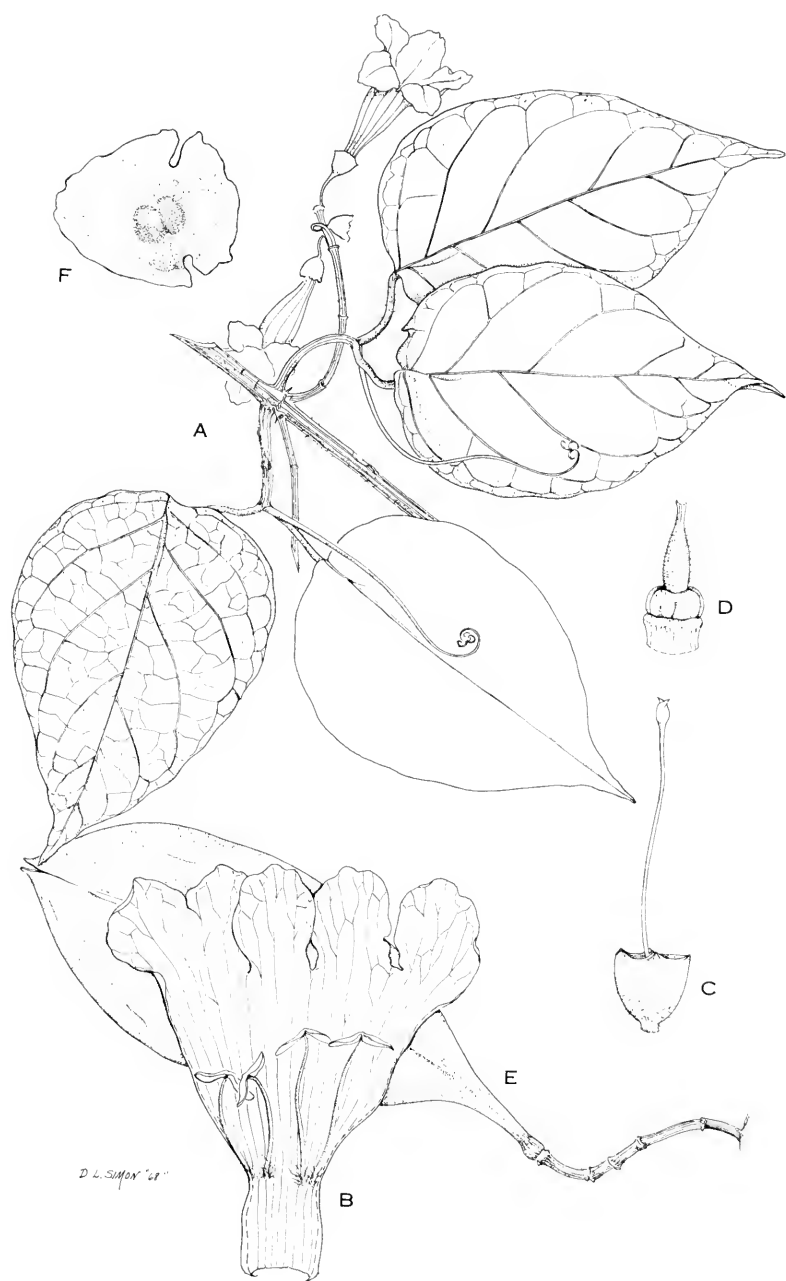


FIG. 25. *Anemopaegma puberulum*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 1$ ; C, calyx and style,  $\times 1$ ; D, pistil with subtending callus,  $\times 2$ ; E, capsule,  $\times \frac{1}{2}$ ; F, seed,  $\times \frac{1}{2}$ .

Branchlets pilose and sparsely glandular-lepidote; leaves opposite or subopposite, bifoliolate; leaflets subcoriaceous, ovate or oblong-ovate, 6.5–11 cm. long, 4–7 cm. broad, obtuse-acuminate, obtuse or rounded at the base, puberulent above, densely punctate on both surfaces, impressed-glandular beneath in the nerve axils, densely velutinous-pilose beneath with short hairs; inflorescence axillary, the bracts linear-spathulate or subulate, 8–9 mm. long; calyx campanulate, truncate, denticulate, 7–8 mm. long, tomentulose and glandular-lepidote; corolla 5.5–6.5 cm. long, sparsely fulvous-furfuraceous, the lobes 10–13 mm. long; capsule about 12.5 cm. long and 6.5 cm. broad, strongly compressed, very obtuse at the apex, abruptly contracted at the acute base into a stout stipe almost 3 cm. long; seeds transversely oblong with very broad hyaline wing.

This species was originally described as a *Chodanthus*, a monotypic genus known only from southern Brazil and Paraguay. Whether or not it is an *Anemopaegma* is open to some question.

### ARRABIDAEA DC.

Woody vines with tendrils, branchlets terete or subterete, not prominently angled, with conspicuous interpetiolar gland fields at the nodes usually present or with interpetiolar ridges; leaves usually ternately divided, the terminal leaflet often replaced by a simple tendril, pseudostipules small and inconspicuous; inflorescence often a terminal pyramidal thyrses but may be short and axillary and rarely on old wood; flowers comparatively small, pale pink to purple; calyx campanulate, truncate or denticulate, margin rarely thin and patelliform (in one species), pubescent; corolla hypocrateriform or usually campanulate-funnelform, densely pubescent outside, the lobes subequal; stamens included, glabrous; disc annular, pulvinate; capsule linear, compressed, septicidally dehiscent, the valves coriaceous and with longitudinal median nerves, smooth, rarely tuberculate; seeds with membranaceous (rarely corky) wings.

The genus is perhaps the largest of the Bignoniaceae in America and there may be as many as 100 species; they are often attractive lianas, usually of lowland regions. Ranges of some of the species are very great and the distribution often with great geographical breaks. The genus needs to be revised.

Nodes with interpetiolar ridges; corolla lobes in bud prominently white-pubescent on the limb only . . . . . *A. patellifera*.

Nodes with interpetiolar glandular fields; corolla lobes in bud not prominently white-pubescent on the limb only.

Leaflets glabrous or glabrate on both surfaces.

Leaves simply ternate, with 3 or 2 leaflets.

Leaflets white-barbate beneath in the nerve axils; corolla 1.5–2 cm. long.  
*A. floribunda*.

Leaflets not barbate beneath in the nerve axils; corolla 2.5–3 cm. long.  
*A. chica*.

Leaves 2–3 times ternate, with more numerous leaflets . . . . . *A. inaequalis*.

Leaflets with a persistent pubescence beneath.

Flowers in a long narrow thyrses; branchlets with 2 types of pubescence, short-tomentulose and with longer capitate-tipped hairs . . . *A. mollissima*.

Flowers in a large dichasium; branchlets with only one type of pubescence. Leaflets ochraceous-tomentulose beneath; calyx glandular-lepidote.

*A. litoralis.*

Leaflets with a fine dense whitish tomentum beneath; calyx tomentulose.

Costa and nerves of the lower leaf surface densely tomentulose like the rest of the surface; petioles about as long as the petiolules.

*A. sieberi.*

Costa and lateral nerves of the lower leaf surface appearing glabrous, conspicuous in contrast with the pale surface; petioles twice as long as the petiolules. . . . . *A. candicans.*

**Arrabidaea candicans** (L. Rich.) DC. Prodr. 9: 185. 1845.

*Bignonia candicans* L. Rich. Act. Soc. Hist. Nat. Paris 110. 1792. *A. pachycalyx* Sprague, Bull. Herb. Boiss. II. 6: 373. 1906.

British Honduras (El Cayo District, Mountain pine ridge, San Agustín, in high alluvial forest, *Lundell 6771*). Mexico; Costa Rica; Panama; Colombia to Amazonian Brazil.

Large vines as much as 25 m. long, the branchlets subterete or sub-tetragonous, striate, minutely pubescent at first, becoming glabrate; leaves 2-3-foliolate, turning somewhat reddish when dried; leaflets oblong-ovate to broadly ovate, 4-14 cm. long, 2.5-8 cm. broad, shortly obtuse-acuminate, cuneate to cordate at the base, sparsely pubescent above and minutely glandular-lepidote, lustrous, densely and minutely white-tomentulose beneath, except on the nerves, with some depressed plate-shaped glands toward the base on each side of the costa, subcoriaceous; inflorescence a long terminal pyramidal thyrse; calyx campanulate, truncate and minutely denticulate, 3.5-5 mm. long, finely tomentulose; corolla 2-3 cm. long, purplish, densely furfuraceous-pubescent outside; ovary densely glandular-lepidote; capsule linear, 30 cm. long and 1 cm. broad or sometimes much shorter, glabrous.

This species, rare in our area, is similar to *A. sieberi* and is distinguished by the minor characters given in the key.

**Arrabidaea chica** (Humb. & Bonpl.) Verlot, Rev. Hort. 154.

1868. *Bignonia chica* Humb. & Bonpl. Pl. Aequin. 1: 107, t. 31. 1808. *Mashaste*.

Wet thickets or forest, at or near sea level; Izabal. British Honduras; El Salvador; Nicaragua; Brazil.

Large vines, the branches terete, glabrate, the nodes somewhat compressed and dilated, conspicuously enlarged at the attachment of the petiole; leaves 2-3-foliolate, drying reddish, the leaflets ovate to oval, 7-9 cm. long, 3-5 cm. broad, acutely acuminate, rounded or obtuse at the base, subcoriaceous, glabrous or nearly so but sometimes sparsely glandular-lepidote, the costa and lateral nerves sometimes with a sparse white pubescence, the tertiary veins prominulous below; inflorescence a large, axillary or terminal, lax, pyramidal thyrse; calyx campanulate, truncate and denticulate, 3-4.5 mm. long, densely tomentulose; corolla rose or mauve, 2.5-3 cm. long, densely pubescent outside; capsule drying reddish purple, about 25 cm. long and 1 cm. broad, glabrous except for scattered depressed glands, lustrous.

It is probably this species that is reported by Wisdom as in use by the Indians of the Jocotán region, Chiquimula, for dyeing, to give a reddish brown color. Use of this plant for dyeing is widely spread and said to be well known in some parts of South America.

**Arrabidaea floribunda** (HBK.) Loes. Repert. Sp. Nov. 16: 209. 1919. *Bignonia floribunda* HBK. Nov. Gen. & Sp. Pl. 3: 104. 1819.

Petén. British Honduras (Honey Camp, Orange Walk District, *Lundell 674*); southern Mexico.

Branchlets subterete, striate, with short white pubescence when young, soon glabrate; leaves 2-3-foliolate, the leaflets ovate to ovate-oblong, 3.5-9 cm. long, 1.5-4.5 cm. broad, obtuse-acuminate, rounded or obtuse at the base, papyraceous, glandular-lepidote above, glabrate and somewhat punctate in age, the axils of the lateral nerves white-barbate beneath, the veins sparsely white-pubescent; inflorescence terminal or sometimes axillary, consisting of a large dichasium; calyx campanulate, truncate and denticulate, 2-3 mm. long, purplish-tomentulose; corolla 1.5-2 cm. long, lavender to purple, densely reddish-pubescent, the tube very slender, curved, the lobes deeply cut; capsule linear, usually somewhat curved, 9-18 cm. long, 7-9 mm. broad, lustrous, glandular-lepidote, with some impressed glands.

Maya names reported from Yucatan are "zacac," "anicab," and "sebaque-ac;" also "café-ac," a combination of Spanish and Maya.

**Arrabidaea inaequalis** (DC.) Schum. in Engler & Prantl, Pflanzenf. 4, 3b: 214. 1894. *Bignonia inaequalis* DC. ex Splitg. Tijdschr. Nat. Geschied. en Phys. 9: 9. 1842.

British Honduras (Machaca, Toledo District, in forest, *Schipp S580*). South America.

Woody vines, 18 m. long, the branchlets terete, finely striate, drying blackish, minutely glandular-lepidote; leaves biternate or triternate, rarely simply ternate, the leaflets ovate-oblong to obovate-oblong, 5-10 cm. long, 2-5 cm. broad, abruptly acuminate, cuneate to rounded at the base, papyraceous, drying fuscous, glabrous, the veins sparsely glandular-lepidote, the axils of the lateral nerves slightly barbate beneath; inflorescence a long, more or less pyramidal thyrs; calyx campanulate, truncate and denticulate, 4-6 mm. long, finely brownish-tomentulose; corolla 3-3.5 cm. long, pinkish purple, densely short-pubescent; ovary densely glandular-lepidote.

Only the collection cited is known from North America.

**Arrabidaea litoralis** (HBK.) Standl. Contr. U. S. Nat. Herb. 23: 1318. 1926. Seibert, Carnegie Inst. Wash. Publ. 522: 406. 1940. *Bignonia litoralis* HBK. Nov. Gen. & Sp. Pl. 3: 139. 1819. *A. chica* var. *viscida* Donn.-Sm. Bot. Gaz. 20: 7. 1895 (type from Casillas, Santa Rosa, *Heyde & Lux 4550*).

At 1,200 m. or less; Santa Rosa. Mexico.

Branchlets terete, striate, densely tomentulose, later glabrate, the nodes with small interpetiolar glandular fields; leaves 2-3-foliolate, the leaflets ovate to almost rounded, 8-10 cm. long, 3-7 cm. broad, acuminate, obtuse to cordate at the base, drying brownish, sparsely pubescent above and glandular-lepidote, tomentulose or glabrate beneath; inflorescence a large, axillary or terminal, somewhat ovoid dichasium; calyx campanulate, truncate, 4-6 mm. long, densely glandular-lepidote and with a few short capitate hairs; corolla pink, 3.5-4 cm. long, in bud densely tomentulose, later sparsely tomentulose and glandular-lepidote; ovary densely glandular-lepidote; capsule 21 cm. long or more, about 1 cm. broad, glabrous.

We have seen no authentic material of *A. litoralis* nor do we know that *A. chica* var. *viscida* is the same as that. We follow Seibert but suggest that monographic study may show the Guatemalan plant to be another species.

**Arrabidaea mollissima** (HBK.) Bur. & Schum. in Mart. Fl. Bras. 8, pt. 2: 46. 1896. *Bignonia mollissima* HBK. Nov. Gen. & Sp. Pl. 3: 103. 1819. *A. mollicoma* Blake, Contr. Gray Herb. 52: 92. 1917 (type from Nicaragua). *A. seleriana* Loes. Verh. Bot. Ver. Brandenb. 65: 99. 1923 (type from Chiquimula, *Seler 3348*).

Dry or moist thickets, 400 m. or less; Chiquimula; Zacapa; El Progreso; Jutiapa; Santa Rosa. Southern Mexico; El Salvador; Nicaragua; Panama; Venezuela and Colombia.

Branchlets terete, striate, with 2 kinds of pubescence, densely and closely tomentulose, also glandular-pilose, the nodes with large glandular fields; petiole scars large and conspicuous; leaves 2-3-foliolate, the leaflets ovate to rounded, 4-7 cm. long, 2.5-5 cm. broad, short-acuminate, truncate or shallowly cordate at the base, densely pubescent on both surfaces, the hairs equal, rarely glandular-capitate, sparsely glandular-lepidote; pseudostipules acicular-subulate, 6 mm. long; inflorescence a terminal or axillary, long, narrow thyrse or dichasium; calyx campanulate, truncate, obscurely denticulate, 4-6 mm. long, puberulent, the hairs unequal; corolla pink or lavender, 4-5 cm. long, densely short-pubescent; ovary densely and minutely glandular-lepidote; capsule 22-25 cm. long, 1.3-1.5 cm. broad, densely brownish-tomentulose.

Called "chupachupa" in El Salvador.

**Arrabidaea patellifera** (Schlecht.) Sandwith, Kew Bull. 22: 413. 1968. *Bignonia patellifera* Schlecht. Linnaea 8: 516. 1833. *Petastoma patelliferum* Miers, Proc. Roy. Hort. Soc. Lond. 3: 195. 1863. *Vainilla*.

Moist or dry thickets, in rather open forests or sometimes in pine forests, 1,200 m. or less, chiefly at low elevations; Jalapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Retalhuleu; Quezaltenango;

Huehuetenango. Southern Mexico; British Honduras to El Salvador and Panama; southward to Amazonian Brazil.

Small or large vines, the branchlets pale-lenticellate, densely tomentulose pilose, or glabrate, somewhat glandular-lepidote; leaflets ovate-elliptic to elliptic-oblong or obovate-oblong, 13 cm. long and 9 cm. broad or smaller, obtuse to acuminate or cuspidate, obtuse or narrowly rounded at the base, glabrate or often densely pilose or almost tomentose, glandular-lepidote, especially beneath, the nerve axils barbate beneath; pseudostipules 8 mm. long or less; inflorescence a large, terminal or axillary, pyramidal thyrse; calyx 3-5 mm. long, saucer-shaped, truncate, the margin undulate, somewhat glandular-lepidote; corolla deep pink or purple, 2.5-4 cm. long; ovary sparsely glandular-lepidote; capsule 15-25 cm. long, 1.2-1.5 cm. broad, the margins of the valves somewhat thickened, minutely glandular-lepidote and with numerous pale lenticels; seeds about 1 cm. long and 3 cm. broad.

Called "coral" or "bejuco de coral" in El Salvador. When in flower, in herbarium specimens, this plant may be recognized at once by the contrast between the densely tomentulose corolla lobes and the glabrous tube, a form of corolla pubescence not found in any other local member of the family. The plant is extremely variable in leaf pubescence, more so than is usual in other Central American members of this family.

**Arrabidaea sieberi** P. DC. in DC. Prodr. 9: 186. 1845; Sandwith, Kew Bull. 22: 404. 1968. *A. blanchetti* P. DC., l. c. *A. lundellii* Standl. Field Mus. Bot. 8: 48. 1930 (type from British Honduras, *Lundell 831*).

In forest edges or thickets, 1,200 m. or usually much less; Petén; Huehuetenango. Mexico; British Honduras; northern South America to Brazil.

Large woody vines, climbing to the tops of tall trees, the branchlets terete or subangulate, striate, rather densely tomentulose; nodes with a slightly elevated ridge extending from each side of the glandular field to the petiole; leaves bifoliate, drying pale green; leaflets elliptic-ovate, 6-10 cm. long, 3.5-5 cm. broad, obtuse to shortly obtuse-acuminate, obtuse or rounded at the base, densely and minutely tomentulose on both surfaces, greener above and glandular-lepidote; inflorescence a very large, broad thyrse; calyx campanulate, truncate and denticulate, 3.5-4.5 mm. long, densely tomentulose and sparsely glandular-lepidote; corolla 2.5-3.5 cm. long, pink, densely short-pubescent; ovary glandular-lepidote; capsule linear, 18-30 cm. long, 1 cm. broad, minutely glandular-lepidote.

Called "tietie" in British Honduras, an allusion to the fact that the tough stem, like those of other scandant Bignoniaceae, are used as a substitute for rope and twine, especially in constructing the framework of huts.





FIG. 26. *Arrabidaea sieberi*. A, habit with capsules,  $\times \frac{1}{2}$ ; B, corolla dissected showing stamens (one reduced) and staminode,  $\times 1\frac{1}{2}$ ; C, calyx and style,  $\times 1\frac{1}{2}$ ; D, seed,  $\times 1$ .

## ASTIANTHUS D. Don

Small or medium-sized trees, the branches terete; leaves simple, linear ternate; pseudostipules small, subulate; inflorescence terminal, composed of loose paniculate cymes and thyrses, the flowers bright yellow; calyx campanulate, dentate, almost glabrous but with plate-shaped glands on the upper half; corolla funnellform, pubescent on the upper third; anthers glabrous, sagittate; disc cupular; ovary constricted at the base, oblong; capsule linear, scarcely compressed, septically dehiscent, the valves coriaceous, not nerved; seeds small, transverse-oblong, with broad whitish hyaline wings.

The genus consists of a single species.

**Astianthus viminalis** (HBK.) Baillon, Hist. Pl. 10: 44. 1888. *Bignonia viminalis* HBK. Nov. Gen. & Sp. Pl. 3: 103. 1819. *Tecoma viminalis* Hemsl. Biol. Cent.-Am. Bot. 2: 497. 1882. *Chilca*.

On river banks and gravel bars along streams, at 500 m. or less; Zacapa; Jutiapa; Chiquimula; El Progreso; Santa Rosa. Southern Mexico; El Salvador; Honduras.

Trees, sometimes 15 m. high but usually lower, almost glabrous, with a thick ridged trunk and stout subterete branches, the bark grayish white; branchlets terete, glabrous; leaves linear, long-attenuate to each end, 13–28 cm. long, glandular-lepidote; pseudostipules 3 mm. long or less; panicles large and many-flowered; calyx 8 mm. long, minutely and very sparsely pubescent, with pale plate-shaped glands on the upper half; corolla 4–5 cm. long; capsules pendent, 6–9 cm. long, 8–9 mm. thick, glabrous; seeds 2 mm. long, 6 mm. broad, with white hyaline wings.

In Guatemala this handsome tree is almost confined to the lower Motagua Valley, where it is abundant on stream banks, the trees often standing deep in water at the flood season. It seems to be confined to sandy or gravelly stream beds, in this respect recalling the closely related genus *Chilopsis* of northern Mexico and southwestern United States. The foliage is decidedly willow-like and of a vivid green. The trees are a beautiful sight when covered with their abundant, brilliant yellow blossoms.

## CALLICHLAMYS Miquel

Woody vines with tendrils, the branchlets subterete, the nodes with indistinct interpetiolar ridges; leaves mostly trifoliolate, often terminated by a simple tendril; inflorescence an axillary raceme; calyx very large, inflated, campanulate, its tissue thick and spongy, irregularly and deeply lobate; corolla funnellform, thin, minutely glandular-lepidote, the tube constricted above the disc and ovary; stamens included, the anthers glabrous; ovary ellipsoid, constricted above the broad depressed-pulvinate disc; capsule thick, ligneous, somewhat rugose, compressed-ellipsoid, septically dehiscent; valves without an elevated longitudinal



FIG. 27. *Astianthus viminalis*. A, habit,  $\times \frac{1}{2}$ ; B, flower partially dissected,  $\times 1$ ; C, capsule,  $\times 1$ ; D, seed,  $\times 4$ .

median nerve, densely glandular-lepidote; seeds transverse-oblong, with very broad, membranaceous wings.

The genus consists of a single rather variable species.

**allichlamys latifolia** (L. Rich.) Schum. in Engler & Prantl, *flan enf.* 4, 3b: 223, 1894. *Bignonia latifolia* L. Rich. *Act. Soc. Hist. Nat. Par.* 110. 1792. *Tabebuia speciosa* Standl. *Field Mus. Bot.* 8: 49. 1930 (type from Middlesex, British Honduras, *Schipp S51*. *Boxac* (Maya); *bejuco negro* (Petén, fide Lundell).

In thickets, 400 m. or less; Petén. British Honduras; Costa Rica; Panama; southward to Bolivia and Brazil.

Large vines, sometimes 15 m. long, the branchlets somewhat striate, drying purplish black, minutely glandular-lepidote when young, the nodes greatly ampliate; leaflets ovate to ovate-oblong, cuspidate-acuminate, rounded to abruptly cuneate at the base, minutely glandular-lepidote and punctate above and beneath, with some impressed glands on each side of the costa; inflorescence a furfureous-puberulent raceme, becoming glabrate; calyx yellow, 2.8-3.5 cm. long, minutely furfureous at the apex, with scattered immersed blackish plate-shaped glands; corolla deep golden-yellow, 6-8 cm. long or larger, the limb very broad, minutely glandular-lepidote; capsule as much as 32 cm. long and 6-8 cm. broad, glandular-lepidote, appearing granular; seeds about 4 cm. long and 10 cm. broad.

The species is known from only two collections in our area and then skips Honduras and Nicaragua, where it certainly must occur, and is found in Costa Rica and Panama.

### CERATOPHYTUM Pittier

Woody vines, the branchlets terete, striate, the nodes with distinct interpetiolar gland fields; leaves 3-2-foliolate, the tendrils trifid; pseudostipules indistinct; inflorescence a terminal corymbiform thyrse; calyx coriaceous, campanulate, truncate, sometimes minutely denticulate, densely glandular-lepidote, with impressed glands on the upper half; corolla funnelform, tomentulose outside, white or yellowish; stamens included, the anthers glabrous; disc pulvinate; ovary oblong-linear, densely lepidote; capsule oblong-linear, smooth, terete, somewhat ligneous, septically dehiscent, gibbously thickened at the base, tapering to the apex; seeds transverse-oblong, with broad membranaceous wings having hyaline margins.

Three or four species, in tropical America. One other is known from Central America.

**Ceratophytum tobagense** (Urban) Sprague & Sandw. *Kew Bull.* 322. 1933. *Anemopaegma tobagense* Urban, in Fedde, *Repert. Sp. Nov.* 14: 311. 1916. *C. brachycarpum* Pittier, *Journ. Wash. Acad. Sci.* 18: 65. 1928. *Adenocalymna heterophyllum* Standl. *Field Mus.*

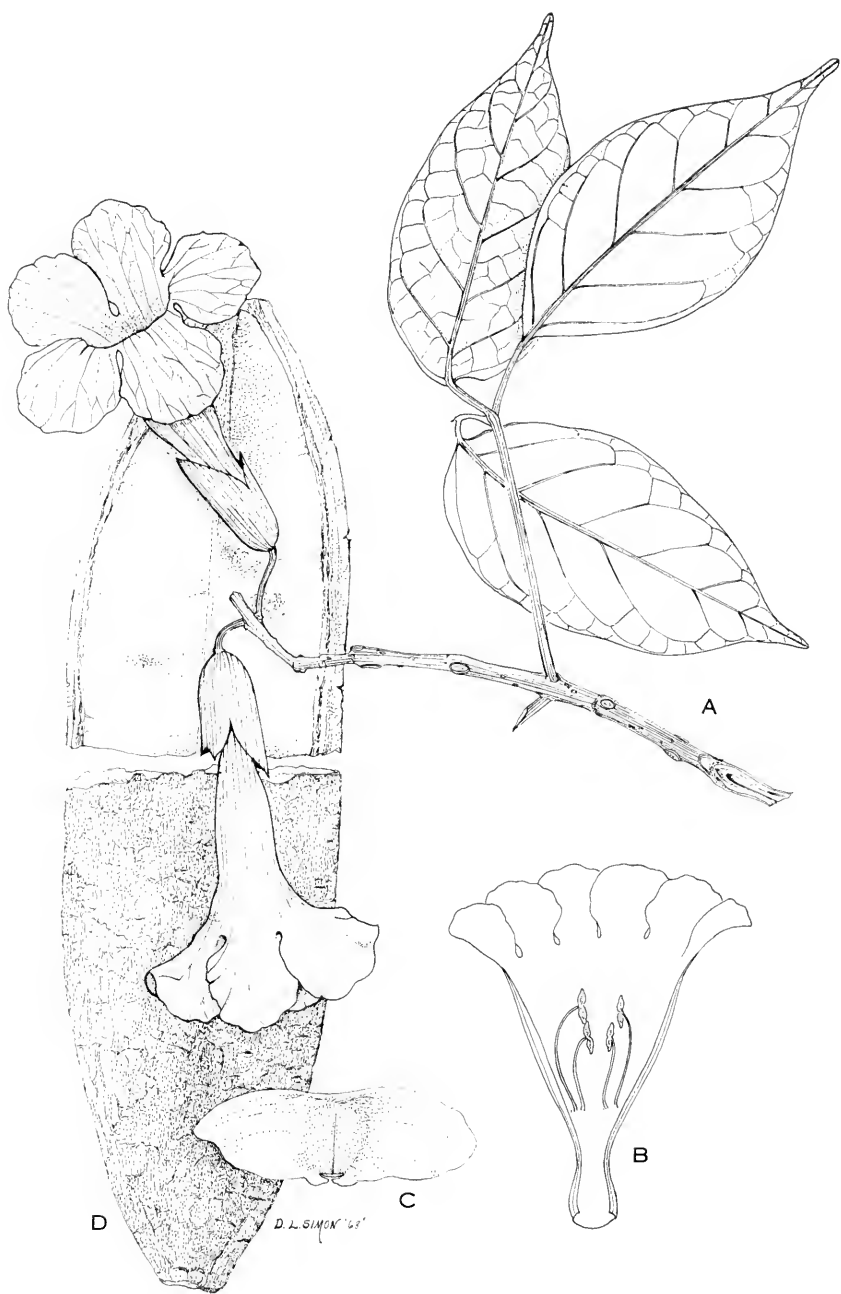


FIG. 28. *Callichlamys latifolia*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times \frac{1}{2}$ ; C, capsule,  $\times \frac{1}{2}$ ; D, seed,  $\times 1$ .

Bot. 8: 49. 1930 (type from Yucatan). *A. standleyanum* Lundell, Carnegie Inst. Wash. Publ. 478: 221. 1937.

Moist thickets, at or near sea level; Petén; San Marcos. Yucatan Peninsula of Mexico; British Honduras; northern South America.

Branchlets glandular-lepidote, the leaf scars greatly enlarged; leaves mostly trifoliolate, the tendrils recurved-trifid; leaflets ovate or ovate-elliptic, sometimes obovate, short-acuminate, cuneate to subcordate at the base, 6–15 cm. long, 4–8 cm. broad, subcoriaceous, somewhat glandular-lepidote, otherwise glabrous but the axils of the lateral nerves beneath somewhat barbellate; calyx 9–12 mm. long, coriaceous, densely glandular-lepidote, with areas of somewhat impressed glands on the upper half; corolla white with yellow throat, 6.5–8 cm. long, densely tomentulose outside; ovary linear-oblong, glandular-lepidote; capsule as much as 28 cm. long and 3.5 cm. broad, tan or pale cinnamon-colored, dotted with immersed plate-shaped glands; seeds 1.5 cm. long, 4 cm. broad.

Called “aguijón” in Yucatan, and “duppy beans” in British Honduras.

The name *Ceratophytum tetragalobum* (Jacq.) Sprague & Sandw. (Kew. Bull. 1934: 223. 1934) is thought to be the same plant, and Alwyn Gentry (*in lit.*) apparently concurs. Jacquin’s name *Bignonia tetragaloba* is based on a detached fruit and will always be open to a bit of doubt.

### CLYTOSTOMA Miers

Woody vines, the branchlets tetragonous to subterete, striate, the young lateral branches with numerous conspicuous cataphylls near the base, the nodes with interpetiolar ridges; leaves simple or 2–3-foliolate, the terminal leaflets often replaced by a simple tendril; pseudostipules small, subulate-lanceolate; inflorescence axillary, usually a few-flowered pedunculate thyrse or cyme, or a fascicle of 1–4 flowers; calyx broadly campanulate, truncate, usually denticulate, thin, glandular-lepidote; corolla delicate, lepidote and short-pubescent, funnellform; stamens included, the anthers glabrous; disc annular or plate-shaped; ovary oblong to ovoid, densely and minutely tuberculate; capsule short, oblong or ellipsoid, thick, densely echinate, loculicidally dehiscent; seeds transverse-oblong, somewhat corky, the wings narrow, rather firm.

Perhaps 10 species, in tropical America. No other species is known from Central America.

**Clytostoma binatum** (Thunb.) Sandwith, Rec. Trav. Bot. Néerl. 34: 235. 1937. *Bignonia binata* Thunb. Pl. Bras. 13: 35. 1821. *Adenocalymna ocositense* Donn.-Sm. Bot. Gaz. 18: 209. 1893 (type from Quezaltenango, *Donnell-Smith 2688*). *Petastoma ocositense* Kränzlin, in Fedde, Rep. Sp. Nov. 17: 61. 1921. *C. elegans* Standl. Carnegie Inst. Wash. Publ. 461: 86. 1935 (type from British Hon-

duras, *Schipp 1127*). *C. ocositense* Seibert, Carnegie Inst. Wash. Publ. 522: 413. 1940.

Moist to wet thickets at little above sea level, sometimes in mangrove swamps; Petén; Alta Verapaz; Izabal; Retalhuleu; Quezaltenango; San Marcos. Mexico (Veracruz, Tabasco, Chiapas); British Honduras; Honduras south to Panama; Venezuela; Colombia; northern Brazil.

Small or large vines, often with tendrils, the branchlets conspicuously lenticellate, becoming verrucose in age, glabrous, the lateral branchlets with numerous small cataphylls toward the base; leaves bifoliate, the leaflets elliptic-oblong to lance-oblong, 14 cm. long and 6 cm. broad or smaller, acuminate, obtuse at the base, coriaceous, obscurely glandular-lepidote on both surfaces, in age conspicuously punctate, petioles and petiolules both short, mostly 0.5–2 cm. long; pseudostipules small, early deciduous, covered with large glands; inflorescences consisting of 1–4-flowered fascicles, lateral, usually on obvious peduncles; calyx with subulate teeth, somewhat glandular-lepidote, the margin ciliate, 4–7 mm. long; corolla lavender-purple, 5–7.5 cm. long, lepidote above, rather densely puberulent or sublepidote on the tube and toward the base; disc small, annular; ovary minutely tuberculate; capsule ellipsoid, somewhat compressed, 5 cm. long, 4 cm. broad, densely covered with long, stiff, spinelike bristles or tubercles.

Called “bejuco de tres lomos” in Tabasco and “trastraz” in Honduras.

There seems to be no doubt that the Mexican and Central American *Clytostoma* is the same as that found in northern South America. The Panamanian *C. isthmicum* Pittier is the same, and there are several synonyms from South America not cited here.

### CRESCENTIA L.

Small or medium-sized trees, the branchlets angulate at first, becoming subterete, the nodes prominent and much enlarged in age; leaves simple or trifoliate, spirally disposed, usually produced in fascicles on short shoots in the axils of fallen leaves; inflorescence of 1–3 pedicellate flowers from the nodes on old wood, often produced on the trunk below the branches; calyx large, coriaceous, deeply cleft or variously lobate; corolla broadly campanulate, with very broad tube, transversely plicate on one side below the middle, lepidote or glandular lepidote outside, the lobes broadly deltoid; stamens somewhat exserted, the anthers glabrous; disk very large, hemispheric-pulvinate; ovary 1-celled, ovoid-ellipsoid, densely glandular-lepidote; fruit large, often very large, gourdlike, globose to oval, with a hard corky pericarp, pulpy within; seeds somewhat compressed, not winged, embedded in the pulp.

The genus probably consists of only the two following species both of which may have been widely distributed in pre-Columbian times for their useful fruits.

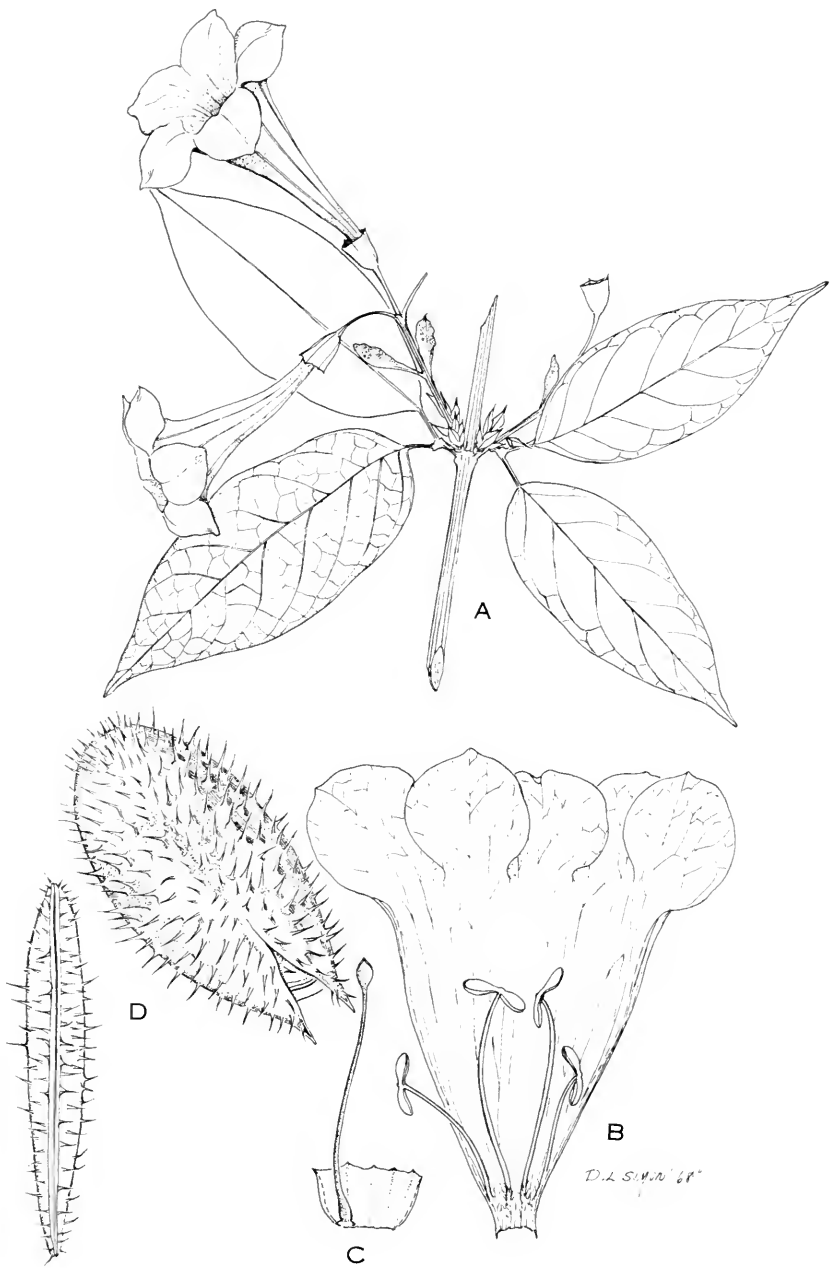


FIG. 29. *Clytostoma binatum*. A, habit,  $\times \frac{1}{2}$  B, corolla dissected,  $\times 1$ ; C, calyx dissected, with style,  $\times 1$ ; D, capsule, side and edge views,  $\times 1$ .



Leaves simple . . . . .	<i>C. cujete</i> .
Leaves trifoliolate . . . . .	<i>C. alata</i> .

**Crescentia alata** HBK. Nov. Gen. & Sp. Pl. 3: 158. 1819. *Morro*; *jícara* (sometimes so called, but this same is usually applied to *C. cujete*); *simax*, *rutc* (Chorti, fide Wisdom).

Common or abundant on essentially dry but at seasons often very wet plains and hillsides, 1,200 m. or less; Izabal (cultivated); Alta Verapaz; Zacapa; Chiquimula; El Progreso; Baja Verapaz; Jalapa; Jutiapa; Santa Rosa; Guatemala (Fiscal). Mexico; El Salvador; Honduras; Nicaragua; Costa Rica. Introduced into the Philippines and other Pacific islands.

Low trees, rarely 12 m. high, with a rounded or spreading crown, the trunk to 50 cm. in diameter, short, the branches thick, and sometimes interlaced; bark light brown, scaly or deeply fissured, fibrous; leaves trifoliolate, or in juvenile stages sometimes simple or bifoliolate, the petiole broadly winged and resembling a leaflet; leaflets sessile, linear to narrowly obovate, entire, obtuse to rounded at the apex, cuneate at the base, coriaceous, somewhat lepidote beneath; calyx bilabiate, deeply cleft, 1.5-2 cm. long, glabrous; corolla 6-7 cm. long, greenish and purple-brown, sometimes with streaks of rose-purple; fruit oval or subglobose, usually 10-15 cm. long.

Sometimes called "morrito," "cuchara," and "cutuco" in El Salvador. This tree of distinctive aspect is common throughout most of the lower Motagua Valley, except in the lowest wettest part. It is even more plentiful in some parts of western Guatemala, especially near the border of El Salvador, where it forms extensive and almost pure stands of distinctive appearance, called *morrales*. In such places there occurs little other vegetation except grasses and low herbs, and such areas supply good grazing land. Through the parts of Guatemala where this species is native, *C. cujete* seldom is seen. The fruits of *C. alata* are never very large, although some of those produced by *C. cujete* also are small. These fruits, of distinctive appearance, often are offered for sale entire in Guatemalan markets remote from places where the trees grow naturally, to be used in household medicine. The pulp is used particularly in the treatment of colds, and for other purposes. The fallen fruits, which contain a rather sweet pulp, are eaten commonly by stock of all kinds. There is said to be in Guatemala a form of this tree that bears exceptionally small fruits, little larger than a hen's egg. The small fruits often are used to fashion spinning tops for children. They have a very important use in Guatemala for making drinking cups and various other kinds of containers. A fruit cut in half makes two small cups, one of which is carried by almost every Indian pedestrian, often attached to his waist, as a drinking cup.



FIG. 30. *Crescentia alata*. Famous Sessé and Mociño plate 336 in the Desert Herbarium in Geneva, made in Mexico before 1800. Field Museum neg. 30803.

The leaves of *Crescentia alata* have the form of a cross, and such a feature could not fail to draw the attention of the early Spaniards, who quite naturally attached a supernatural significance to it. Oviedo writing 400 years ago says: "Each leaf is in the form of a cross, as I have drawn it; and this seems to me a very noteworthy thing, in which appears a testimony of the cross, a thing of which these people can not have been ignorant. These *higuero* trees, which have the leaves formed like crosses, I have seen in the Province of Nicaragua, especially in Negrando, where lies the city of León, and in other parts of that country; and marveling upon the leaves, I gathered some to show in Spain, as I did show them, and I still have some in my possession."

***Crescentia cujete*** L. Sp. Pl. 626. 1753. *Xígal* (Pipil of Salamá); *jícaro*; *hom* (Quecchi).

Planted in many parts of Guatemala, and apparently native along the Pacific plains, perhaps also in Alta Verapaz, usually brushy plains or in open fields, and at 350 m. or less; Petén; Alta Verapaz; Baja Verapaz; Izabal (planted); Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; San Marcos; El Quiché (probably only in cultivation). Mexico, the West Indies, south through Central America, and south to Peru and Brazil. Cultivated in the Old World tropics.

Small or medium-sized trees, usually 10 m. high or less, with thick trunks and dense rounded crowns; leaves short-petiolate, cuneate-oblongate or spatulate, rounded to short-acuminate at the apex, attenuate to the base, minutely glandular-lepidote, sometimes pilose beneath on the nerves, subcoriaceous; calyx 1.5-2.5 cm. long, deeply cleft, glandular-lepidote and with small scattered impressed glands; corolla yellowish white or greenish with dark purple veins, 4.5-7.5 cm. long, glandular-lepidote; fruit very variable in size and shape, often globose and 25 cm. in diameter, frequently much smaller, and often oval.

Called "calabash" and "wild calabash" in British Honduras, also "güiro," and Maya names are reported as "luch" and "huaz." The wood is light brown or yellowish brown, with fine veining of darker color, without distinctive taste or odor; moderately hard and heavy, tough and strong, the specific gravity 0.60; coarse-textured, with the consistence of elm (*Ulmus*), fairly easy to work, takes a smooth finish; probably not durable. The wood is used for ox yokes, tool handles, and vehicle parts. Thick crooked limbs often are used in Guatemala for making saddle trees. The trees seem to afford a good habitat for epiphytes, and they often are covered with orchids, bromeliads, and other plants. A syrup made from the pulp of the fruit is a popular remedy for colds, and an infusion of the leaves is

sometimes administered for dysentery. The largest fruits, globose in form, upon the tree remind one somewhat of green pumpkins, and a small tree loaded with these huge fruits is an almost unbelievable sight. The dry fruits are a very important article in Guatemala and throughout Central America and Mexico, where they have been used since ancient times as containers for various purposes. Their most general use is for drinking vessels, but the larger ones serve to store all sorts of articles. Sections of the oblong forms are much used in place of spoons. Many of the *jícaras*, as the cups made from the shells are called, are handsomely decorated in colors or by incised designs. Particularly handsome ones are made in the neighboring republic of El Salvador. Oviedo states that the Indians of Costa Rica and Panama had *jícaras* adorned with gold, "with handles of gold, and so handsome that the most powerful king might drink from them without reproach. These come from the great river of San Juan, which empties into the Gulf of Urabá." Mexico and Guatemala likewise were noted for the handsomely designed *jícaras*, from which chocolate was drunk. These cups, of course, are rounded on the bottom, so that some support must be given them when set down, either a stand especially made for the purpose or a mere twist of cloth or cotton. The fruits of this species also are eaten by cattle during the dry season, but there is a belief that the fruit often produces abortion. It is difficult to tell just where in Guatemala *C. kujete* is truly native, but it probably is in the Pacific plains, and it and *C. alata* seem to occupy distinct areas of the country. The tree is planted abundantly at low elevations or even somewhat higher because of its local commercial value. The word *jícara* appears in such place names as El Jicaro, a village of Guatemala, and El Jícaral (a grove of *jícara* trees) in Chiquimula. The place name Jicaltepeque is believed to signify "Jícara mountain."

The wood of *Crescentia kujete* and probably also of *C. alata* has been used from Colonial times to the present to make stirrups—some of those of the colonial period are beautifully carved and are real objects of art. The wood is easy to carve when still green but when thoroughly seasoned is "like iron" and some now in the collection of Mrs. Louis O. Williams had perhaps been in use for "hundreds" of years, going back into the colonial period (before 1821). While the wood is occasionally used today in Central America for stirrups no beautifully carved modern ones have been seen. Most stirrups probably originated in Honduras where there has been a long history of making beautifully carved objects of wood.

We suspect that *Crescentia cujete* was widely distributed in tropical America in the pre-Columbian era, because of the useful "shell" and may have subsequently evolved into several forms known today. The original area of dispersal is not easily discernible but erratic distribution in Central America may indicate an introduced tree here.

### CYDISTA Miers

Woody vines with tendrils, the branches tetragonal, at least when young, with 4 distinct costae, the nodes with interpetiolar ridges; leaves simple or bifoliolate, the tendrils simple; pseudostipules inconspicuous or large and foliaceous; inflorescence an axillary or terminal thyrse or raceme, usually few-flowered, the flowers white to lavender or purple; calyx campanulate, truncate or bilabiate, variously dentate or lobate, glandular-lepidote, with or without depressed glands on the upper half; corolla funnelliform, thin, glandular-lepidote outside; disc none; stamens included, the anthers glabrous; ovary densely glandular-lepidote; capsule linear, compressed, septicidally dehiscent, the valves smooth, with elevated and thickened margins, the median nerve inconspicuous or slightly impressed; seeds transversely semi-ellipsoid, brown, compressed, with broad firm opaque wings, these often with hyaline margins.

Species perhaps 15, all in tropical America. Apparently all the Central American ones are represented in Guatemala.—The genus *Cydista* (1863) differs in no substantial way from *Lundia* P. DC. (1838).

Pseudostipules foliaceous; leaflets cordate at the base. . . . . *C. diversifolia*.

Pseudostipules inconspicuous; leaflets not cordate.

Lower leaf surface without impressed glands in the nerve axils. . . . . *C. potosina*.

Lower leaf surface with impressed glands in the axils of the lateral nerves.

Calyx bilabiate; flowers produced on leafless branches. . . . . *C. heterophylla*.

Calyx truncate; flowers produced with the leaves.

Branchlets tetragonous; leaves glandular-lepidote only. . . . *C. aequinoctialis*.

Branchlets almost terete; leaves pilose and glandular-lepidote beneath.

*C. sarmentosa*.

*Cydista aequinoctialis* (L.) Miers, Proc. Roy. Hort. Soc. Lond. 3: 191. 1863. *Bignonia aequinoctialis* L. Sp. Pl. 623. 1753. *Bejuco de ajo*.

Moist or wet thickets, 1,400 m. or less; Petén; Izabal. Mexico; British Honduras to Panama; West Indies; South America.

Branches tetragonous and usually with 4 distinct costae, glandular-lepidote, the nodes with distinct interpetiolar ridges; leaves bifoliolate, drying reddish brown or purplish; leaflets ovate to oblong or narrowly elliptic, acuminate and somewhat cuspidate, obtuse to subcordate at the base, 15 cm. long and 7 cm. broad or smaller, subcoriaceous, lustrous, glandular-lepidote on both surfaces,

otherwise glabrous, with impressed glands in the axils of the lateral nerves, especially toward the base of the blade; pseudostipules inconspicuous; inflorescence of terminal few-flowered racemes or thyrses in which the main axis is suppressed; calyx truncate-campanulate, 5-8 mm. long, glandular-lepidote, with impressed glands on the upper part; corolla 4.5-8 cm. long, lavender to rose with darker veins, sometimes almost white with lavender streaks; capsule 40 cm. long or less, 2-2.5 cm. broad, densely glandular-lepidote.

*Cydista aequinoctialis* we have accepted much in the sense of Seibert. The species is assumed to occur widely in Central America but the complex is much in need of study. However it may include *C. sarmentosa* given below.

***Cydista diversifolia*** (HBK.) Miers, Proc. Roy. Hort. Soc. Lond. 3: 192. 1863. *Bignonia diversifolia* HBK. Nov. Gen. & Sp. Pl. 3: 104. 1819. *Pleonotoma diversifolium* Bur. & Schum. in Mart. Fl. Bras. 8, pt. 2: 274. 1897. *Bejuco de ajo*.

Moist or dry thickets, 700 m. or less; Petén; Zacapa; Chiquimula; Retalhuleu; El Quiché. Mexico; British Honduras; El Salvador; Honduras; Nicaragua; Costa Rica; West Indies; northern South America.

Branchlets tetragonous, with 4 distinct, easily separable costae, striate, glandular-lepidote, the nodes with a narrow pubescent interpetiolar ridge; leaves bifoliolate or sometimes simple, the leaflets broadly ovate to oblong-ovate, 4-10 cm. long, acuminate, cordate at the base or sometimes rounded, sparsely glandular-lepidote above, densely so beneath, sometimes pubescent beneath, usually 3-nerved, with large submerged glands in the axils of the lateral nerves; pseudostipules large, foliaceous, broadly ovate or rounded, 6-20 mm. long; inflorescence a terminal or axillary thyrse; calyx bilabiate or irregularly dentate, 4-5 mm. long, somewhat glandular-lepidote; corolla pinkish lavender or purple, 3-4 cm. long, glandular-lepidote; ovary glandular-lepidote, pubescent at the base; capsule 30 cm. long and 1.5 cm. broad, densely glandular-lepidote, the longitudinal median nerve somewhat impressed.

Maya names reported from Yucatan are "chacnetoloc," "anicab," "zolac," "tsolac," and "xcolac."

***Cydista heterophylla*** Seibert, Carnegie Inst. Wash. Publ. 522: 417. 1940.

Petén; Izabal. Southern Mexico; British Honduras; Honduras; Nicaragua; Costa Rica; Panama.

Large vines, the branchlets tetragonous, subterete at maturity, striate, glandular-lepidote, ampliate at the nodes, usually leafless at flowering time; leaves simple or rarely bifoliolate, the tendrils simple; leaflets papyraceous, ovate, 8-15 cm. long, 4-9.5 cm. broad, acutely acuminate, truncate to subcordate at the base, glandular-lepidote, 3-nerved, glandular beneath in the axils of the lateral nerves; pseudostipules small; inflorescences axillary, laxly racemose, borne on



FIG. 31. *Cydista diversifolia*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 1$ ; C, calyx and stipe,  $\times 2$ ; D, capsule, about  $\times \frac{1}{2}$ .

leafless branches; calyx subcoriaceous, 5-7 mm. long, campanulate, bilabiate, densely glandular-lepidote; corolla purplish pink, 5-7 cm. long, glandular-lepidote; stamens included, the anthers glabrous; ovary linear, densely glandular-lepidote; capsules unknown.

This is one of the more common of the bignoniaceous vines in dry lowland regions of Central America and is conspicuous because it usually is without leaves at flowering time. Although good collections are at hand we have not a single collection of the plant in fruit. The junior author suspects that this plant does not belong in the genus *Cydista* but until fruits are known its proper generic designations will not be known.

***Cydista potosina*** (Schum. & Loes.) Loes. in Fedde, Repert. Sp. Nov. 16: 209. 1919. *Arrabidaea potosina* Schum. & Loes. Bull. Herb. Boiss. 3: 618. 1895. *Clytostoma mayanum* Standl. Carnegie Inst. Wash. Publ. 461: 86. 1935 (type from Petén, Yaxha-Remate road, Lundell 4008). *Bejuco de coral*.

Thickets and second-growth forest, 300 m. or less; Petén; Alta Verapaz; Escuintla; Retalhuleu. Southern Mexico; British Honduras; El Salvador.

Small or large vines, the branchlets tetragonous, with 4 easily detachable costae, striate, glandular-lepidote especially when young, with some very short pubescence near the nodes, surrounded at the base by more or less persistent, small bracts or cataphylls; nodes with a narrow, conspicuous elevated interpetiolar ridge; leaves bifoliate, the leaflets elliptic to oblong-elliptic or obovate-elliptic, acuminate, rounded or obtuse at the base, sparsely glandular-lepidote, hirtellous beneath along the costa and nerves, without glands in the axils of the lateral nerves; pseudostipules small, broadly sickle-shaped; inflorescence a few-flowered terminal raceme; calyx campanulate, subtruncate, dentate, 4.5-5.5 mm. long, glandular-lepidote; corolla white or cream with lavender throat, or lavender throughout, 4.5-5.5 cm. long, densely glandular-lepidote; capsule somewhat glandular-lepidote, 20-25 cm. long, 3-4.5 cm. broad; seeds brown, with firm broad wings having a hyaline margin.

The Maya names "ekixil" and "xekkixi" are reported from Yucatan. The capsules are relatively shorter and broader than in most other members of the genus.

***Cydista sarmentosa*** (Bertol.) Miers, Proc. Roy. Hort. Soc. Lond. 3: 191. 1863. *Bignonia sarmentosa* Bertol. Fl. Guat. 425. 1840 (type from "Salto de Forola" [Torola], Escuintla, Velásquez). *Arrabidaea guatemalensis* Schum. & Loes. in Engler, Bot. Jahrb. 23: 129. 1896 (type from Retalhuleu, Bernoulli & Cario 2056). *Cydista*



*pubescens* Blake, Contr. U. S. Nat. Herb. 24: 23. 1922 (type from La Florida, Dept. Copán, Honduras). *Ito; campana*.

Moist or dry thickets, 1,000 m. or less; El Progreso; Jutiapa; Retalhuleu. Southern Mexico; Honduras; Nicaragua; Costa Rica; Panama.

Branches tetragonous when young, in age subterete, striate, sparsely pubescent and glandular-lepidote, the nodes dilated, with an indistinct interpetiolar ridge; leaves bifoliolate, drying brownish or fuscous, lustrous; leaflets rounded-ovate to ovate, 7–13 cm. long, 4–11 cm. broad, abruptly short-acuminate, obtuse to broadly rounded at the base, subcoriaceous, sparsely pubescent above, densely pilose beneath with spreading hairs, with large fields of impressed glands in the axils of the lateral nerves; pseudostipules small, caducous, densely pubescent; inflorescences terminating the branchlets, usually composed of 3 few-flowered thyrses; calyx campanulate, truncate, denticulate, glandular-lepidote, with impressed glands on the upper half; corolla pink, 4.5–6 cm. long, densely papillose-glandular; capsule about 40 cm. long, with thickened and raised margins, lustrous, glandular-lepidote; seeds with almost opaque wings having hyaline margins.

### GODMANIA Hemsley

Medium-sized or rather large trees; leaves deciduous, opposite, long-petiolate; digitately 5–9-foliolate; leaflets usually 7 or 9, petiolulate, entire, or in juvenile leaves often coarsely dentate; flowers small, numerous, in dense terminal corymbs; calyx small, broadly campanulate, with 5 short obtuse teeth; corolla ventricose-campanulate, barbate within, the limb somewhat bilabiate, the lobes broad, rounded, unequal, spreading or recurved; stamens included, the anthers pilose, their cells oblong, divergent, the filaments short-pilose; staminode capitate; disc annular; capsule long and slender, cylindric, costate, loculicidally dehiscent, the valves coriaceous; seeds with a long hyaline wing on each side.

The genus consists of a single species.

**Godmania aesculifolia** (HBK.) Standl. in Standl. & Calderón, Lista Prel. El Salvador 200. 1925; Contr. U. S. Nat. Herb. 23: 1319. 1926. *Bignonia aesculifolia* HBK. Nov. Gen. & Sp. Pl. 3: 109. 1819. *Tecoma fuscata* DC. Prodr. 9: 218. 1845. *G. macrocarpa* Hemsl. Diag. Pl. Mex. 35. 1879. *Palo blanco; palo de agua; cortés* (perhaps an erroneous name); *chorequillo* (Huehuetenango).

Mostly in rather dry thickets or forest, chiefly on the Pacific plains, sometimes on open hillsides or in pastures, 1,300 m. or less; Petén; Izabal; Jutiapa; Santa Rosa; Escuintla; Guatemala; Sololá; Suchitupéquez; Retalhuleu; Huehuetenango. Southern Mexico; El Salvador to Panama; British Guiana; Venezuela.

Small to large trees, sometimes 15 m. high, the bark gray, corky, the branchlets puberulent, thick; leaflets mostly oblong-obovate, sometimes cuneate-obovate



FIG. 32. *Godmania aesculifolia*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 3$ ; C, calyx and style,  $\times 3$ ; D, capsule,  $\times \frac{1}{2}$ ; E, seed,  $\times \frac{1}{2}$ .

or oblanceolate, 5-17 cm. long, acute or acuminate, attenuate to the base, short-pilose on both surfaces but often glabrate, especially above, glandular-lepidote beneath; corymbs small and very dense, shorter than the leaves; calyx minute, short-pilose; corolla 10-13 mm. long, yellow or yellowish, or buff-brown and tinged with red, puberulent; capsules 70 cm. long or often shorter, 1-1.5 cm. in diameter, often curved or contorted, about 16-costate.

Called "cortéz blanco" in El Salvador; "cacho de toro" (Chiapas); "joco" (Campeche); "cuerno de chivo" (Guerrero). The name "señorita" has been reported from Guatemala for this tree, but doubtless in error, the informant having confused it with *Bombax ellipticum*, to which that name is applied currently in Guatemala. The tree is fairly common on the Pacific plains, and is rather conspicuous when almost leafless and bearing quantities of the very long slender capsules, which remind one somewhat of those of *Catalpa*.

### JACARANDA Jussieu. Jacaranda.

Large trees, the branchlets subterete; leaves bipinnate, with numerous large or small, entire, lobate, or dentate leaflets; pseudostipules none or obscure; inflorescence a terminal or axillary thyrse, often many-flowered; calyx tubular-campanulate, subtruncate, or shallowly cupular and with acute deltoid teeth; corolla funnelform or campanulate-funnelform, the tube contracted toward the base, densely pubescent to almost glabrous outside; stamens short, the staminode elongate and much exceeding the stamens; anther cells very unequal, one of them greatly reduced, glabrous; disc pulvinate or stipitiform; ovary ovoid or ovoid-ellipsoid, usually glabrous; capsule short and broad, compressed, smooth, loculicidally dehiscent, the septum very narrow, the valves hard and ligneous; seeds broadly transverse-elliptic or suborbicular, with broad hyaline wings.

Species about 40, in Central and South America. One or two others in southern Central America.

Leaflets large, mostly 2.5-7 cm. long, often dentate. . . . . *J. copaia*.  
 Leaflets small, mostly less than 1 cm. long, entire. . . . . *J. mimosifolia*.

*Jacaranda copaia* (Aubl.) D. Don, Edinb. Phil. Journ. 9: 267. 1823. *Bignonia copaia* Aubl. Pl. Guian. 650, t. 265, t. 261, f. 1. 1775.

Wet forest, at or little above sea level; Izabal. British Honduras; Honduras; Nicaragua; Costa Rica; Panama; northern South America.

Large trees, often 25-30 m. high, with thick trunks, the branches smooth, drying somewhat purplish, the nodes slightly compressed, somewhat dilated; leaflets numerous, elliptic to oblong or rhombic, obtuse to short-acuminate, cuneate at the base, often or usually coarsely dentate, 2.5-7 cm. long, conspicuously punctate, usually sparsely pubescent beneath on the costa; calyx 4-6 mm. long, truncate, the lobes very short, pubescent and glandular-lepidote; corolla light blue, 3-4.5 cm. long, the limb stellate-pubescent, the tube glabrous; capsule

8-14 cm. long, 5-8 cm. broad, rounded at the apex, very hard and woody; seeds suborbicular, 2.5 cm. long and 4 cm. wide, the wings hyaline.

We have not seen this tree in flower in Guatemala, but it is not uncommon in the forests of Izabal. It is one of the most beautiful and showy of Central American trees, and bears a high reputation for beauty in Costa Rica and Panama, where it is plentiful. The wood is oatmeal-colored or dingy white, with a somewhat satiny luster, without distinctive odor or taste; light and soft but firm, the specific gravity 0.40-0.47; grain straight; texture medium, uniform; very easy to cut, saws woolly when green, finishes smoothly, holds nails well, is not resistant to insects or decay. The wood has some of the properties of white pine (*Pinus strobus*), and is suitable for light interior construction, boxes, crates, etc.

**Jacaranda mimosifolia** D. Don, Edinb. Phil. Journ. 9: 264. 1823. *Jacaranda*; *gigante*.

Native of South America, from Colombia to Argentina. Planted in vast numbers for ornament in Guatemala, chiefly at middle elevations but also in the lowlands, most plentiful in the central departments, and especially about Guatemala; abundantly naturalized in many regions, and spreading rapidly by its winged seeds; noted in Alta Verapaz, Baja Verapaz, El Progreso, Jalapa, Jutiapa, Escuintla, Guatemala, Sacatepéquez, Sololá, Totonicapán, Huehuetenango, Quezaltenango, Suchitepéquez, and Retalhuleu, and probably planted in most of the other departments.

Small to large trees with pale bark, the branchlets glabrous or nearly so; leaflets very numerous, oblong or oblong-lanceolate, mostly 6-8 mm. long, acute and mucronulate, sessile, glabrous or nearly so; panicles large and many-flowered, 15-25 cm. long; calyx 2 mm. long, broadly campanulate, denticulate, almost glabrous; corolla blue, 3.5-4.5 cm. long, subtomentose; capsule suborbicular, glabrous, about 6 cm. long and 5 cm. broad, truncate or apiculate at the apex; seeds 1.5-2.5 cm. broad.

Whoever loves jacaranda trees will be delighted with Guatemala, for in few regions is one very far from at least a small number of them. One jacaranda tree is a lovely sight, never to be forgotten, but hundreds of thousands rather pall upon one. For most of the year the trees are flowerless, and then not at all impressive. The blooming season is a short one, usually beginning in late February or early March, and continuing for two or three weeks. The date of flowering is partly dependent upon temperature, and on the very hot lake shores at Panajachel, trees were observed in full bloom January 15. Near Pastores a tree partially in flower was noted December 26, but

other trees nearby showed no signs of flowers. The peculiar hard flattened pods remain upon the tree through the flowering season. The jacaranda trees are most attractive because of the vast abundance of their blossoms and their rare coloring, blue being even less common in the tropics, perhaps, than in the north temperate zone. If the ground beneath the trees is fairly clean, it often is covered with a carpet of blue formed by fallen corollas, that gives a rather dazzling effect of a reflection of the crown above.

### LUNDIA DC.

Woody vines with tendrils, the branchlets subterete, with somewhat ampliate and compressed nodes having large interpetiolar glandular fields; leaves bifoliolate or sometimes trifoliolate, the tendrils simple; pseudostipules small, not foliaceous; inflorescence an axillary or terminal thyrse; calyx closed in bud, variously ruptured in anthesis, campanulate, thin, truncate or bilabiate, the upper conic portion sometimes pushed off by the expansion of the bud; corolla campanulate-funnel-form, densely pubescent outside; stamens included, the anthers densely villous; disc none; ovary oblong, densely pubescent, villous at the base; capsule linear, compressed, smooth, septicidally dehiscent, each valve with an elevated longitudinal median nerve; seeds narrowly transverse-oblong, with hyaline wings.

About 12 species, in tropical America. Two other species have been reported from southern Central America.

**Lundia dicehilocalyx** Blake, Contr. Gray Herb. 52: 94. 1917.

Moist or wet forest or thickets, 225 m. or less; British Honduras (type from Toledo, *Peck 495*); Nicaragua.

Vines 9–12 m. long, the stems as much as 5 cm. in diameter, the branchlets tomentulose, drying blackish, with numerous pale elevated lenticels; leaves drying brownish black, the leaflets ovate, abruptly acuminate, obtuse to cordate at the base, sparsely puberulent above and with a few minute impressed glands, minutely glandular-lepidote beneath and sparsely pubescent, barbellate beneath in the nerve axils; pseudostipules very small, triangular-dentiform, 1 mm. long; calyx bilabiate, 4–6.5 mm. long, closed in bud; corolla rose, 4–4.5 cm. long, tomentulose.

### MACFADYENA A. DC.

Woody vines, the branchlets slender, subterete, with conspicuous interpetiolar gland fields at the nodes; leaves bifoliolate, terminated by a trifid tendril, its branches uncinat and claw-like; pseudostipules small, subulate-lanceolate; inflorescence an axillary contracted few-flowered thyrse, cyme, or raceme, or the flowers solitary; calyx spathaceous and cleft to about the middle, or bilabiate, the costa of the posterior lobe produced into a short incurved hook; corolla funnelform, yellow, glabrous, the tube expanded at the base; stamens included, the anthers glabrous; disc flattened, pulvinate or cupuliform; ovary oblong or linear, glandular-



FIG. 33. *Lundia diceilocalyx*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 1\frac{1}{2}$ ; C, calyx and style,  $\times 3$ ; D, anther,  $\times 5$ .

lepidote; capsule oblong-linear or linear, compressed, smooth, septically dehiscent, the valves with an elevated longitudinal median nerve, thin-coriaceous; seeds with a truncate base and curved upper margin, the wings firm, dark and opaque or hyaline.

About five species, in tropical America. Only the following are known from Central America.

Wings of the seeds hyaline; branchlets verrucose-lenticellate. . . . . *M. unguis-cati*.

Wings of the seeds firm, dark and opaque.

Leaflets punctate beneath; inflorescence a contracted thyrse or cyme, or a single flower in the axils of the leaves on the main branches. . . . . *M. uncata*.

Leaflets pubescent beneath; inflorescence of short axillary racemes terminating short lateral branches. . . . . *M. mollis*.

**Macfadyena mollis** (Sond.) Seem. Journ. Bot. 1: 227. 1863.

*Spathodea mollis* Sond. Linnaea 22: 561. 1849. *M. guatemalensis* Blake, Contr. U. S. Nat. Herb. 24: 24. 1912 (type from banks of Rio Izabal, Izabal, Blake 7845).

Moist or wet forest, 300 m. or less; Alta Verapaz; Izabal. Colombia to Brazil.

Branchlets subterete, striate, puberulent, sometimes with gland-tipped hairs; petioles and petiolules densely puberulent; leaflets oval to broadly ovate, 9-14 cm. long, 3.5-6.5 cm. broad, acutely acuminate, cuneate to rounded at the base, glandular-lepidote above, densely puberulent beneath and somewhat glandular-lepidote; inflorescence of 1-2 short racemes or contracted thyrses terminating short lateral branches; calyx membranaceous, 1.5-2.5 cm. long, subspathaceous, usually somewhat lobate, each lobe terminated by a short hook, sparsely and minutely pubescent and with scattered plate-shaped glands near the base; corolla drying blackish, 5.5-9 cm. long; disc thick, pulvinate or somewhat cupuliform; ovary densely glandular-lepidote.

**Macfadyena uncata** (Andr.) Sprague & Sandw. Recueil Trav.

Bot. Néerl. 34: 215. 1937. *Bignonia uncata* Andr. Bot. Rep. 8: t. 530. 1908. *B. uncinata* G. F. W. Mey. Prim. Fl. Esseq. 210. 1818. *M. uncinata* DC. Prodr. 9: 180. 1845.

Moist or wet thickets or forest, sometimes in mangrove swamps, 1,000 meters or less; Petén; Izabal; Escuintla; Retalhuleu; San Marcos. Southern Mexico; British Honduras to Panama; southward to Brazil.

Large or small vines, the branchlets minutely pubescent or lepidote; leaves bifoliolate, terminated by a trifid tendril having hooked branches; petioles and petiolules minutely puberulent when young; leaflets elliptic to oblong-lanceolate, long-acuminate, cuneate-obtuse at the base, glandular-lepidote on both sides, with a few impressed plate-shaped glands beneath near the base on each side of the

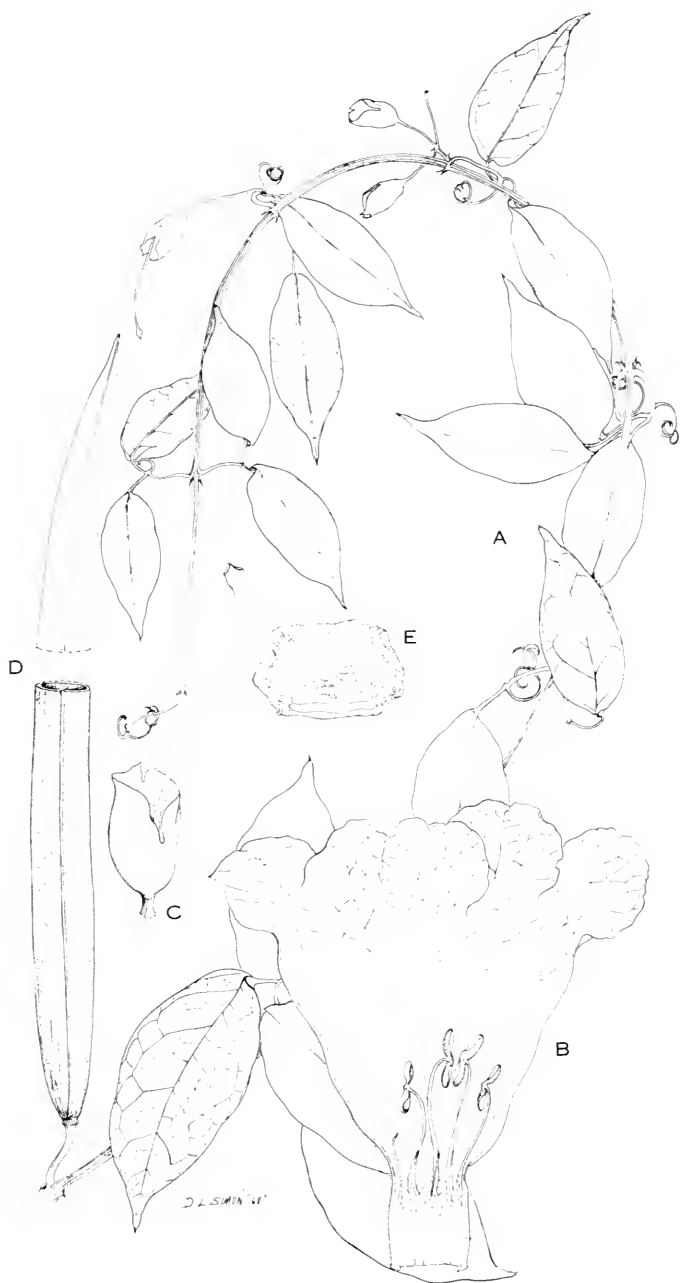


FIG. 34. *Macfadyena uncata*. A, habit,  $\times \frac{1}{2}$ ; B, corolla dissected,  $\times 1$ ; C, calyx and style,  $\times 1$ ; D, capsule,  $\times \frac{1}{2}$ ; E, seed,  $\times 1$ .



costa; inflorescence few-flowered in the axils of the leaves on the main branches; calyx 1-2 cm. long, subspathaceous, cleft to about the middle, terminated by a short hook, glabrous, with a few plate-shaped glands; corolla bright yellow, 5-7 cm. long, glabrous; ovary minutely glandular-lepidote; capsule gradually narrowed at each end, 25 cm. long and 2 cm. broad or smaller, drying blackish, glabrous; seeds about 1.5 cm. long and 2.5 cm. broad, with firm blackish wings.

Known in Honduras by the names "uña de gato," "chinacla," and "coral"; "bejuco verde," "bejuco blanco," and "uña de iguana" (Tabasco).

**Macfadyena unguis-cati** (L.) A. Gentry, *Brittonia* 25: 236. 1973. *Bignonia unguis-cati* L. Sp. Pl. 623. 1753. *B. unguis* L. ex DC. Prodr. 9: 146. 1845. *B. unguis* var. *guatemalensis* Schum. & Loes. Bot. Jahrb. 23: 130. 1896 (type from Retalhuleu, *Bernoulli & Cario 2057*). *Doxantha unguis-cati* Rehder, Mitt. Deutsch. Dendr. Ges. 262. 1913. *Uña de gato*; *bejuco azucena*; *pega-palo* (fide Aguilar).

Common in moist or wet thickets or forest, sometimes in mangrove swamps, 1,500 m. or less; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Guatemala; Sololá; Suchitupéquez; Retalhuleu; Quezaltenango; San Marcos; Huehuetenango. Mexico; El Salvador; Honduras; Nicaragua; Costa Rica; Panama; West Indies; South America.

Small or large vines, the branchlets verrucose-lenticellate, glabrate; tendrils with short branches, these uncinatate and thickened at the apex; leaflets 2, lance-oblong to oblong-ovate, acute or short-acuminate, acute to truncate at the base, often drying blackish, sparsely pubescent or almost glabrous, minutely glandular-lepidote above; flowers solitary or in fascicles of 2-3, long-pedicellate; calyx membranaceous, crenate-lobate, glabrous, 1-2 cm. long; corolla yellow, 5-8 cm. long, usually blackish when dried; ovary minutely glandular-lepidote; capsule 60 cm. long or less, 1-1.5 cm. broad, with numerous small pale lenticels.

Maya names of Yucatan are recorded as "xcanloac," "xanicab," and "ec-ki-xilac." The variety published by Schuman and Loesener is said to differ in having more numerous flowers, evidently not a character of importance. Plants called *Doxantha unguis-cati* var. *dasyonyx* (Blake) Siebert, Carnegie Inst. Wash. Publ. 522: 422. 1940 (*Bignonia dasyonyx* Blake, Contr. Gray Herb. 52: 93. 1917; *D. dasyonyx* Blake, Journ. Bot. 61: 192. 1923) differs in having somewhat more puberulent leaves than the usual form, and a puberulent rather than glandular-lepidote ovary. It is known only from the type, from Toledo, British Honduras (*M.E. Peck 919*). This vine is sometimes cultivated in Guatemala because of its exceptionally showy, bright yellow flowers, produced in great abundance on the larger vines. The species is most often represented by abundant ju-

venile plants, which can be associated with adult ones only because of the presence of the characteristic claw-like tendrils. These young plants creep closely along rough tree trunks by the innumerable aerial rootlets, and often form dense mats covering the trunks. These mats frequently are inhabited by large ants that bite severely. The leaves of juvenile plants are very small and vary greatly in shape, being often orbicular, and broadly rounded at the apex. It is possible that these juvenile forms are often confused with similar juvenile forms of *Macfadyena uncata*.

### MARTINELLA Baillon

Woody vines, the branchlets subterete, with short spreading capitate-glandular hairs or almost glabrous, the nodes with interpetiolar ridges; leaves bifoliate, the tendrils trifid; pseudostipules obsolete; inflorescence an axillary or rarely terminal, flexuous raceme; flower buds ovoid, the calyx closed, apiculate; calyx in anthesis tubular-campanulate, deeply and irregularly 2-3-lobate, the lobes apiculate; corolla funnellform or campanulate-funnelform, thin, glabrous or minutely lepidote, the tube broadened at the base, gradually constricted above the disc; stamens included, attached high in the elongate tube; disc pulvinate or patelliform; ovary cylindric, minutely glandular-lepidote; capsule compressed, elongate-linear, thin, septicidally dehiscent, attenuate at each end, the valves slightly thickened on the margins, with an indistinct median nerve; seeds transversely oblong, with broad membranaceous wings.

About six species have been reported, all in tropical America, some of them perhaps referable to other genera or to synonymy. Only one occurs in North America. This genus is closely related to *Arribidaea* and perhaps should include *Scobinaria*, which see.

**Martinella obovata** (HBK.) Bur. & Schum. in Mart. Fl. Bras. 8, pt. 2: 161, t. 84. 1896. *Spathodea obovata* HBK. Nov. Gen. & Sp. Pl. 3: 115. 1819.

Wet forest, at or near sea level; Izabal. British Honduras; Costa Rica; Panama; southward to Brazil.

Branchlets terete, striate, becoming costate, with spreading gland-tipped hairs or glabrate, the nodes with broad flat interpetiolar ridges; tendrils trifid, the branches recurved and somewhat uncinata; leaflets 2, ovate to ovate-elliptic or ovate-lanceolate, attenuate-acuminate, rounded or subcordate at the base, glabrous; flowers on slender, flexuous or deflexed pedicels; calyx 12-17 mm. long, minutely puberulent or glabrate, with a few impressed glands; corolla 5-7 cm. long, rose-purple, minutely lepidote; disc broad, pulvinate; ovary constricted above the disc, minutely lepidote; capsule drying brown, 80 cm. long or less, about

2 cm. broad, glandular-lepidote; seeds 10–17 mm. long and 4–6 cm. broad, the wings yellowish white or yellowish brown.

### MELLOA Bureau

Woody vines, the branchlets subterete, striate, with interpetiolar ridges at the nodes; leaves bifoliolate, terminated by a trifid tendril, its branches uncinat; pseudostipules subulate; inflorescence terminal or axillary, usually on short lateral branchlets, thyrroid or reduced to a single flower, some of the flowers often aborted; calyx ampliate, membranaceous, closed in bud, spathaceously cleft in anthesis, recurved-apiculate; corolla elongate, tubular-funnelform, almost glabrous, the lobes ciliate; stamens included, the anthers glabrous; disc large, annular-pulvinate; ovary oblong, glabrous; capsule oblong, compressed, ligneous, smooth, septicidally dehiscent, the valves very thick, with a longitudinal median nerve; seeds transverse-oblong, with broad hyaline wings.

One other species has been described, from South America.

*Melloa quadrivalvis* (Jacq.) A. Gentry, *Brittonia* 25: 237. 1973. *Bignonia quadrivalvis* Jacq. *Fragm.* 37. 1801. *B. populifolia* DC. *Prodr.* 9: 159. 1845. *Melloa populifolia* Britton, *Ann. N. Y. Acad.* 7: 188. 1893. *Sinaca*.

Moist or dry thickets, 500–1,000 m.; El Progreso; Jutiapa. Southern Mexico; South America, southward to Argentina.

Branchlets becoming verrucose-lenticellate, glabrous; tendrils usually caducous; leaflets 2, ovate to elliptic or oblong, acute or obtuse, mucronulate, rounded at the base, glabrous but with a few impressed plate-shaped glands; pseudostipules subulate, 3 mm. long or less; inflorescence usually a thyrse in which the 2 lateral flowers of each cyme are aborted; calyx thin, ampliate, cleft one-third its length on one side, recurved-apiculate, 1.5–2 cm. long, 1–1.5 cm. broad, glabrous or nearly so; corolla 5–7 cm. long, bright yellow, minutely lepidote or glabrous; ovary glabrous; capsule 8–12 cm. long, 4–4.5 cm. broad, the valves thick, woody, with numerous pale lenticels; seeds 1.5–4.5 cm. broad.

Both the *Index Kewensis* and Seibert in his account of the Mayan Bignoniaceae give the author of the combination *Melloa populifolia* as Bureau, but both are in error, since no such name is published at the place they cite.

### MUSSATIA Bureau

Woody vines, the branchlets tetragonous, with distinct ribs on the angles, the nodes with interpetiolar ridges; leaves opposite or nearly so, 2–3-foliolate, often terminated by a simple tendril; pseudostipules usually foliaceous; inflorescence a terminal thyrse or dichasium; calyx very short, spreading-cupular or campanulate, truncate, somewhat lobate or cleft; corolla funnelform, bilabiate, thin, densely stipitate-glandular-lepidote; stamens included, the anthers glabrous; disc short,

carnose, shallowly cupular or pulvinate; ovary oblong, sulcate, densely glandular-lepidote; capsule elongate-linear, compressed, the valves without an elevated median nerve.

About four species, in tropical America. Only the following are found in Central America.

Pseudostipules small, not foliaceous; corolla white or cream-colored; fertile stamens 2, with 2 short sterile ones and 1 staminode. . . . . *M. caudiculata*.

Pseudostipules foliaceous; corolla purple or yellowish with purple stripes; fertile stamens 4, a staminode also present. . . . . *M. hyacinthina*.

***Mussatia caudiculata*** (Standl.) Seibert, Carnegie Inst. Wash. Publ. 522: 418. 1940. *Petastoma caudiculatum* Standl. Field Mus. Bot. 11: 141. 1932 (type from British Honduras, *Schipp S297*).

Wooded swamps or wet forest, 700 m. or less; Alta Verapaz; Izabal; Retalhuleu. British Honduras.

Large vines, the young branches tetragonous, striate, some of the striations becoming rib-like in age, the stems then multiangular, glabrous, ochraceous, the nodes somewhat dilated, the interpetiolar ridges often interrupted in the middle; leaves 2-3-foliolate, the leaflets narrowly elliptic-oblong to obovate-oblong, 4-12 cm. long, 2-6 cm. broad, acute or acuminate, obtuse to truncate at the base, lustrous and glabrous above, minutely and sparsely glandular-lepidote beneath and becoming sparsely punctate; pseudostipules subulate, 3 mm. long; inflorescence a small terminal thyrse; calyx campanulate, spreading in anthesis, 4 mm. long, truncate or short-dentate, minutely lepidote; corolla white or cream-colored, bilabiate, broadly campanulate, 2.5 cm. long, densely stipitate-glandular-lepidote; ovary oblong to obovate, costate; capsule 1.5 cm. broad, lustrous, glabrous.

***Mussatia hyacinthina*** (Standl.) Sandwith, Recueil Trav. Bot. Néerl. 34: 218. 1937. *Tynanthus hyacinthinus* Standl. Carnegie Inst. Wash. Publ. 461: 87. 1935.

Moist or wet forest, 300 m. or less; Petén; Alta Verapaz. British Honduras (type from Jacinto Creek, *Schipp S661*); Mexico (Chiapas); Panama; northern South America.

Large vines as much as 18 m. long, the branches tetragonous, striate, distinctly 4-costate, the nodes with interpetiolar ridges, these usually interrupted in the middle; leaves often subopposite, especially on younger branches, bifoliolate; leaflets ovate to elliptic or oblong-ovate, 8-16 cm. long, 5-8 cm. broad, acute or short-acuminate, rounded or truncate at the base, papyraceous, with numerous plate-shaped glands on the lower surface, the nerve axils barbellate; pseudostipules foliaceous, ovate, 18 mm. long or less; inflorescence a terminal many-flowered thyrse or dichasium; calyx broadly campanulate, spreading, 1.5-2.2 mm. long, truncate or somewhat lobate, glandular-lepidote or sparsely short-pubescent; corolla 1.5-2 cm. long, purple or yellow streaked with brown, brownish-glandular-lepidote, the glands short-stipitate; ovary oblong, acute, glandular-lepidote.

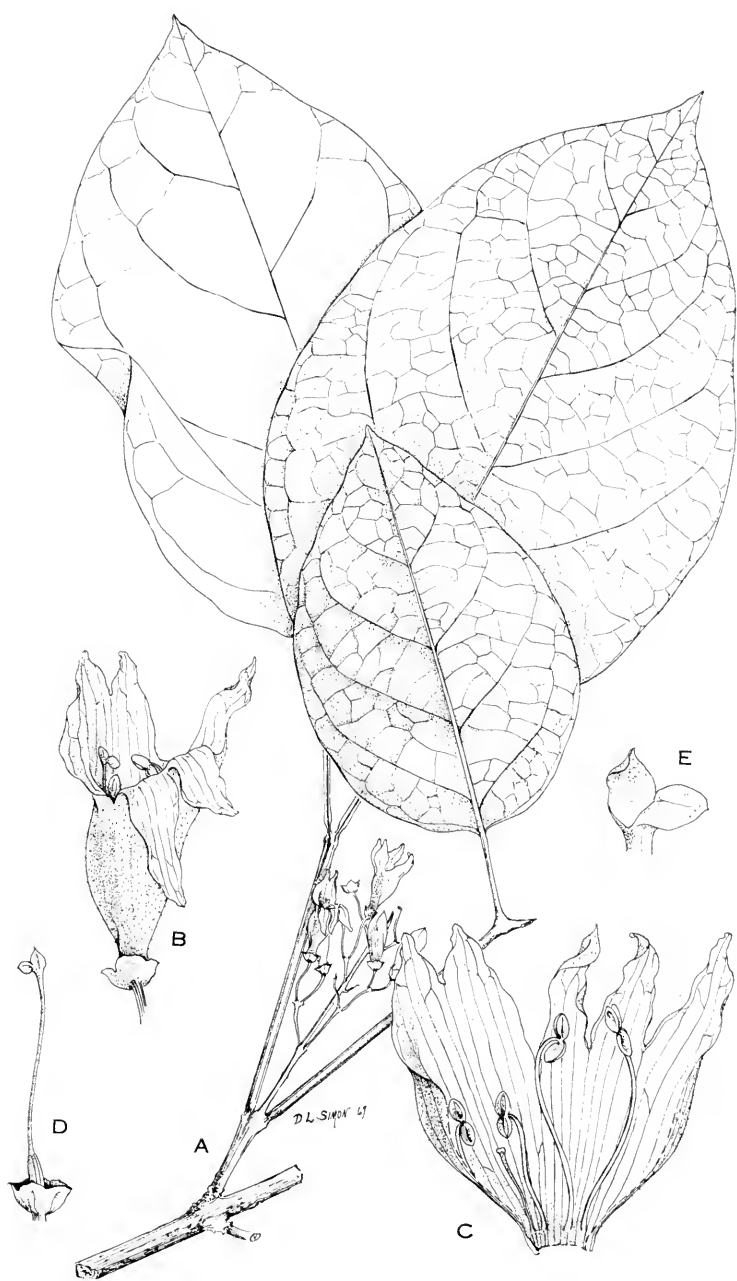


FIG. 35. *Mussatia hyacinthina*. A, habit,  $\times \frac{1}{2}$ ; B, flower,  $\times 2$ ; C, corolla dissected showing stamens and staminode,  $\times 2$ ; D, calyx and style,  $\times 2$ ; E, stigma,  $\times 8$ .

This species was collected some 170 years ago by Sessé and Mociño.

### NEOMACFADYA Baillon

Woody vines, the branchlets subterete, striate, with very small interpetiolar gland fields at some of the nodes; leaves opposite or subopposite, 1-2-foliolate, sometimes with simple tendrils; pseudostipules inconspicuous; inflorescence of terminal few-flowered racemes on short lateral branchlets; calyx membranaceous, cleft on one side, spathaceous; corolla campanulate, somewhat bilabiate, the tube expanding from a very narrow base, minutely and sparsely pubescent and glandular-lepidote; stamens included, the anthers glabrous; disc annular; ovary densely glandular-lepidote; capsule linear, compressed, smooth, septicidally dehiscent, the valves with a slightly elevated longitudinal median nerve; seeds transversely oblong, with translucent membranaceous wings.

The genus consists of a single species, and that exceedingly rare.

**Neomacfadya podopogon** (DC.) Baill. Hist. Pl. 10: 26. 1888.  
*Spathodea podopogon* DC. Prodr. 9: 205. 1845. *Phryganocydia brevicalyx* Standl. Field Mus. Bot. 4: 261. 1929.

Dry or moist forest, little above sea level; Petén. British Honduras (type of *P. brevicalyx* from Tower Hill, Orange Walk District, *Karling 39*); Mexico (Yucatan); Cuba.

Branchlets pubescent or glabrate, with pale elevated lenticels; leaflets ovate-oblong or elliptic-oblong, obtuse to short-acuminate, cuneate to cordate at the base, subcoriaceous, glandular-lepidote, especially beneath, becoming punctate, the nerve axils barbellate beneath; calyx closed in bud, cleft on one side halfway to the base in anthesis, 16-18 mm. long; corolla pinkish lavender, 4-5 cm. long; capsule about 11 cm. long and 1.3 cm broad, sparsely glandular-lepidote.

The plant is unusual in not having glandular fields at every node, but often has indistinct interpetiolar ridges where these fields are lacking.

### PACHYPTERA DC.

Woody vines, the branches more or less tetragonous, costate and striate, the nodes with conspicuous interpetiolar gland fields, similar fields also present at the nodes of the inflorescence and at the apex of the petiole; leaves 2-3-foliolate, the tendrils trifid; axillary buds usually 3, arranged serially and forming a conspicuous row of superposed subulate pseudostipules; inflorescence an axillary or terminal raceme; calyx narrowly campanulate, truncate, lobate or denticulate, densely puberulent, with large plate-shaped glands on the upper half; corolla narrowly funnelform, thin, puberulent, the lobes with rows of glands outside; stamens included, the anthers densely villous; disc pulvinate; ovary elliptic-oblong or oblong-linear, 4-angulate, pubescent; capsule oblong or oblong-linear, attenuate or apiculate, thick and subcylindric, loculicidally dehiscent; capsule valves smooth, with or without a distinct longitudinal nerve, puberulent and dotted with immersed

plate-shaped glands; seeds transversely oblong, the wings somewhat corky, of the same color as the body, with a narrow hyaline margin.

Perhaps five species, in tropical America. Only the following occurs in Central America.

**Pachyptera kerere** (Aubl.) Sandwith, *Recueil Trav. Bot. Néerl.* 34: 219. 1937. *Bignonia kerere* Aubl. *Pl. Guian.* 644, t. 260. 1775. *P. foveolata* DC. *Prodr.* 9: 175. 1845. *Tanaecium zetekii* Standl. *Contr. Arnold Arb.* 5: 140, t. 19. 1933.

Wet thickets, at or little above sea level; Izabal. British Honduras; Costa Rica; Panama; southward to Amazonian Brazil.

Branchlets puberulent when young, glabrate in age, the nodes with gland fields and with a straight interpetiolar ridge above the glands; leaves 2-3-foliolate, the leaflets ovate to ovate-lanceolate, 9-18 cm. long, 3-11 cm. broad, usually acuminate, rounded and slightly cordate at the base, sparsely and minutely glandular-lepidote beneath, minutely puberulent on the veins; pseudostipules subulate, sharp-pointed, serially arranged in 3 pairs, 7 mm. long or less; inflorescence short, nodose, about 5 cm. long; calyx 7-11-mm. long, densely puberulent, with large plate-shaped glands in vertical rows on the upper half; corolla pale pink, white, or creamy white, 5.5-8 cm. long, minutely and rather densely puberulent, the lobes with 2 irregular rows of conspicuous glands near the base; anthers densely white-villous; ovary elliptic, 4-angulate, densely and minutely pubescent; capsule 10-25 cm. long, 2-4 cm. broad, densely and minutely pubescent and with scattered immersed glands.

The flowers have a strong odor resembling that of roach powder.

### PANDOREA Spach

Slender woody vines, the stems striate, somewhat dilated at the nodes, with interpetiolar lines; leaves opposite, pinnate, the leaflets mostly 5 or more, entire or dentate; tendrils none; inflorescence a terminal thyrse, often leafy at the base; calyx small, campanulate or cupular, truncate or with 5 short teeth; corolla tubular-funneliform, pubescent or almost glabrous, the limb somewhat bilabiate; stamens 4 and didynamous, the fifth rudimentary; ovary oblong or oval; capsule elliptic-oblong, acuminate, cuneate at the base, the valves coriaceous; seeds with a broad membranaceous wing.

About seven species, in Australia and the Netherlands East Indies. Cultivated widely in tropical regions.

**Pandorea jasminoides** (Lindl.) Schum. in Engler & Prantl, *Pflanzenf.* 4, 3b: 230. 1894. *Tecoma jasminoides* Lindl. *Bot. Reg.* 23: t. 2002. 1837.

Native of Australia; cultivated frequently for ornament in Central America, and seen occasionally in Guatemala, especially about Cobán and Guatemala City.

Large vines, glabrous or nearly so; leaflets 5-9, short-petiollate, subcoriaceous, ovate to lance-oblong, mostly 4-5.5 cm. long, acute or obtuse, entire; panicles few-flowered, the flowers long-pedicellate; calyx campanulate, 6-7 mm. long, very shallowly lobate and with broad subapiculate lobes; corolla 4.5-5.5 cm. long, white or pale pink, rather densely puberulent outside with rather thick, spreading, short hairs.

Called "jasmín de Italia" in El Salvador, because the foliage and flowers do suggest those of some species of *Jasminum*, although the flowers are much larger than in that genus.

### PARAGONIA Bureau

Woody vines, the branchlets subterete, lenticellate, the nodes with interpetiolar ridges; leaves bifoliolate, the tendrils 2-3-fid, often deciduous; petioles with plate-shaped glands along the upper side, especially near the upper end; pseudostipules small, subulate-lanceolate; inflorescence usually a many-flowered terminal dichasium, rarely a simple thyrse; calyx campanulate, truncate or slightly lobate; corolla funnelliform, velutinous-tomentose outside, rather thick; stamens included, the anthers glabrous; disc large, cupular; ovary subcylindric, glandular-lepidote; capsule elongate-linear, subcylindric, acuminate, minutely and densely tuberculate, septically dehiscent, the valves with an elevated longitudinal costa; seeds narrowly transverse-oblong, the wings broad, membranaceous, translucent, brownish.

The genus consists of probably a single species.

**Paragonia pyramidata** (L. Rich.) Bureau, Vid. Medd. Naturh. For. 104. 1894. *Bignonia pyramidata* L. Rich. Act. Soc. Hist. Nat. Paris 110. 1792.

Moist or rather dry thickets or in forest, 1,200 m. or less; Petén; Alta Verapaz; Izabal; Jutiapa; Escuintla; Sololá; Retalhuleu. British Honduras to Panama; southward to Peru and Brazil.

Often large vines, the branchlets with numerous elevated pale lenticels, glandular-lepidote; leaflets ovate to obovate, elliptic, or oblong-elliptic, 8-17 cm. long, 3-9 cm. broad, short-acuminate, obtuse or rounded at the base, subcoriaceous, minutely glandular-lepidote; pseudostipules 5-7 mm. long, usually longitudinally striate in age; calyx campanulate, 5-9 mm. long, densely and minutely tuberculate, appearing coarsely and densely tomentose, with a few impressed plate-shaped glands; corolla deep rose or pinkish purple, drying chocolate brown, 3-6 cm. long, densely velutinous-tomentose; ovary glandular-lepidote; capsule 4.5 cm. long or shorter, 1.5 cm. broad; seeds about 1.5 cm. long and 4.5 cm. broad, the wings pale brownish.

Called "tietie" in British Honduras and "bejuco de casa" in El Salvador. Guatemalan specimens have been reported as *Bignonia laurifolia* Vahl.



## PARMENTIERA DC.

*Reference:* Louis O. Williams, *Parmentiera*, Fieldiana, Bot. 36 (4): 27-29. 1973.

Small or medium-sized trees, the branches subterete, usually armed with a short spine at each node, the nodes ampliate to form the spines; leaves opposite or subopposite, often alternate on young branchlets, often fasciculate in the axils of the spines, trifoliolate or simple on young shoots, the petioles usually narrowly winged, at least near the apex; flowers large or small, greenish, solitary or fasciculate from nodes on old wood, or terminating the branchlets; calyx spathaceous, closed in bud, cleft on one side in anthesis and soon deciduous, glandular-lepidote; corolla campanulate and somewhat curved, the limb somewhat bilabiate; stamens slightly exserted, the anthers glabrous; disc large, pulvinate; ovary oblong, glandular-lepidote, 2-celled; fruit elongate, subcylindric, indehiscent, with fleshy pericarp, smooth or costate; seeds small, numerous, not winged, imbedded in pulp.

There are seven species of the genus, all in tropical North America; one of these is the "candle tree" of Panama, *P. cerifera* Seeman, which bears a large number of showy smooth yellowish fruits 30-120 cm. long, strongly suggestive of wax candles. One other species, *Parmentiera millspaughiana* L. Wms. occurs in the Yucatan Peninsula and may eventually be found in Petén.

Calyx 2.5-3.5 cm. long; corolla 5-6.5 cm. long; fruits prominently costate, 11-17 cm. long.....*P. aculeata*.

Calyx 1-1.5 cm. long; corolla about 1.5 cm. long; fruits smooth or essentially so, up to 6 cm. long.....*P. parviflora*.

***Parmentiera aculeata*** (HBK.) L. Wms., Fieldiana, Bot. 36: 27. 1973. *Crescentia aculeata* HBK. Nov. Gen. & Sp. Pl. 3: 158. 1819. *Parmentiera edulis* DC. Prodr. 9: 244. 1845. *Crescentia edulis* Moç. ex DC. l.c., *nomen nudum*. *Parmentiera aculeata* Seeman, Bot. Voy. Herald 183. 1854, *nomen nudum*, non *Crescentia aculeatum* of HBK. *Cuajilote*; *caiba*; *coxluto* (Chimaltenango, fide Tejada); *ixlut* (Huehuetenango, fide Tejada).

Moist or dry thickets or lowland forest, often along rocky water-courses, chiefly at 1,200 m. or less; planted commonly about dwellings in the drier regions; Petén; Alta Verapaz; Baja Verapaz; El Progreso; Chiquimula; Santa Rosa; Guatemala; Suchitepéquez; Retalhuleu; San Marcos; El Quiché. Southern Mexico; British Honduras; El Salvador; Honduras.

Small or sometimes rather large trees with usually broad, dense crowns, the trunk short and thick, the bark pale, the branches with short, stout, somewhat incurved spines at the nodes; leaves minutely lepidote, the petioles long, winged; leaflets 3, entire, elliptic to obovate, acute or obtuse, cuneate at the base, 4-8 cm.



FIG. 36. *Parmentiera aculeata*. A, habit with flower and immature fruit,  $\times \frac{1}{2}$ ; B, terminal growth,  $\times \frac{1}{2}$ ; C, fruit,  $\times \frac{1}{2}$ ; D, corolla dissected to show stamens and staminode,  $\times 1$ ; E, calyx, disk, and pistil,  $\times 1$ .

long, the nerve axils barbate beneath; flowers fasciculate on old wood or axillary at or near the ends of the branches; calyx 2.5-3.5 cm. long, green; corolla green with brown-purple lines, 5-6.5 cm. long; fruit pale yellow, 11-17 cm. long, 2-3 cm. or more in diameter, often curved, conspicuously costate, acute or acuminate.

Called "cow okra" in British Honduras; "pepino de árbol" (Yucatan); "cat"; "caat" (Yucatan, Maya). The usual name in Guatemala, "cuajilote," is of Nahuatl origin, and signifies maize-ear tree. Cuajilote is the name of a village in Jalapa. The tree is abundant on the dry hills between El Rancho and Salamá, and less frequent in other dry regions. It is widely spread in cultivation in Guatemala, but the trees are not very numerous, since the fruit is not highly esteemed except in the very dry regions where there is often a shortage of fruits and other food. The fruit is fried or otherwise cooked before being eaten, and it is often stuffed with meat or other articles. It is said to be eaten greedily by pigs where available. At Aguacatán it was stated that the Indians employ the ripe fruit for making sweets.

***Parmentiera parviflora* Lundell, Lloydia 3: 211. 1940.**

Wet forest and on stream banks to 300 m.; Petén (*Tún 835*). Mexico (type from Chiapas, *Matuda 3210*).

Shrubs or small trees, a meter or taller, the branches slender, terete, obscurely puberulent at first, with 1 or 2 short porrect spines at the nodes, these sometimes bearing small leaflets; leaves 1 or more from the nodes, opposite or alternate, trifoliolate or simple, with sparse peltate scales, especially below,—leaves when simple 2-4 at a node, oval, about 1 cm. long,—when trifoliolate the mid-leaflet lanceolate or ovate-lanceolate, acuminate, (2-)3-7 cm. long, the lateral leaflets smaller, suborbicular to ovate, apex rounded or acute, 1-2 cm. long or even less; petioles slender, canaliculate, 1-3 cm. long (or even less); inflorescence terminal, a single short pedicellate flower; calyx spathaceous, about 1-1.5 cm. long; corolla narrowly campanulate-tubular, about 1.5 cm. long, obscurely bilabiate; anthers reaching the throat; fruits terete, smooth or obscurely costate, somewhat arcuate, fusiform, up to 6 cm. long and 1.5 cm. in diameter; seeds bilobate, about 8 mm. long and 9 mm. broad.

This is the species with the smallest flowers and fruits of the tree species known in the Guatemalan-Yucatecan area and is closely related to *P. millspaughiana* L. Wms.

**PITHECOCTENIUM Martius**

Woody vines, the branchlets angulate, with ridges or 6-8 detachable costae, the nodes with interpetiolar ridges; leaves 2-3-foliolate, the tendrils trifid or twice trifid; pseudostipules often evident, oblong or spatulate; inflorescence a terminal raceme or thyrse; calyx coriaceous, campanulate, truncate and often denticulate;

corolla subcoriaceous, campanulate-funnelform, densely tomentose or stellate-furfuraceous except near the base of the tube; anthers glabrous; disc conspicuous, pulvinate; ovary ellipsoid, contracted above the disc, densely and softly spinulose; capsule ellipsoid, compressed, ligneous, septicidally dehiscent, densely echinate to smooth; seeds transverse-oblong, with a broad thin body, the wings very broad, hyaline.

About 20 species in tropical America.

The genus *Phadranthus* Miers is not considered distinct and the species known only from cultivation in Guatemala is placed here.

Corolla 4–6 cm. long; capsule echinate; common native plant. . . . .*P. echinatum*.

Corolla 9–11 cm. long; capsule not echinate; cultivated plant. . . . .*P. buccinatorium*.

**Pithecoctenium buccinatorium** P. DC. in DC. Prodr. 9: 195. 1845. *Phadranthus buccinatorius* Miers, Proc. Hort. Soc. Lond. 3: 182. 1863.

Cultivated, probably, Guatemala (*Aguilar 206*). Mexico.

Large and attractive vines, the branchlets at first sparsely pilose; leaflets oblong to ovate, oval, or oval-elliptic, 5–9 cm. long, acute to rounded at the apex, rounded to truncate or subcordate at the base, glabrous above, densely covered beneath with rather large, pale scales; pseudostipules broadly ovate, obtuse or acute, to 1.5 cm. long or more; calyx 1–1.5 cm. long, 5-dentate, densely tomentose; corolla 9–11 cm. long, rather densely tomentose, the tube narrow for some distance above the base, then gradually dilated to a throat almost 2 cm. broad, the lobes about 2 cm. long; capsules not seen.

The plant is sometimes cultivated for ornament in Mexico and California. It is probable that the Guatemalan specimens were taken from a vine in cultivation at Finca La Aurora in Guatemala City.

There is no record of this plant having been found as a wild plant anywhere in Guatemala. It is curious that this very attractive plant, if really native of Mexico, has not been found there in more than 100 years.

**Pithecoctenium echinatum** (Jacq.) Schum. in Engler & Prantl, Pflanzenf. 4, 3b: 218. 1894. *Bignonia echinata* Jacq. Enum. Pl. Carib. 25. 1760. *P. muricatum* Mociño ex P. DC. Prodr. 9: 194. 1845. *P. hexagonum* P. DC. l.c. 195. *Cucharó*; *cucharillo*; *lengua de vaca*; *petaquillas* (seeds); *shape* (Huehuetenango).

Dry or moist thickets, 1,500 m. or less; Baja Verapaz; Izabal; Santa Rosa; Escuintla; Guatemala; Huehuetenango. Southern Mexico; ranging southward to Panama; southward to Brazil.



FIG. 37. *Pithecolobium echinatum*. Famous Sessé & Mociño plate 217 in the Delessert Herbarium, Geneva, made in Mexico before 1800. Field Museum neg. 30767.

Large or small vines, the branchlets hexagonal, somewhat pubescent and glandular-lepidote; leaves mostly trifoliolate, the tendrils trifid or twice trifid; leaflets ovate to suborbicular, acuminate, often abruptly so, rounded or usually cordate at the base, 5-14 cm. long, 4-10 cm. broad, papyraceous, glandular-lepidote, pubescent or glabrate above, usually more densely pubescent beneath; pseudostipules oblong-linear or spatulate, 7-9 mm. long; inflorescence a long narrow raceme; calyx 7-10 mm. long, densely tomentulose, with gland fields on the upper half; corolla white or yellowish, 4-6 cm. long, densely tomentose except near the base, there glabrous; capsule about 16 cm. long and 6 cm. broad, covered with hard prickles 3-4 mm. long; seeds about 3 cm. long and 8 cm. broad.

Often called "peine de mico" in El Salvador and other parts of Central America, also "pico de pato" and "bateíta"; "xachextabay," "netoloc," "xtabay" (Yucatan, Maya). The vine is common in many parts of the Central American lowlands, especially in rather dry areas, and is easy of recognition because of the distinctive capsules, whose valves are hard and woody, and covered with hard prickles. These valves are often used as rasps for scouring and cleaning various objects, or as graters. The tough stems are used for tying, like those of many other Bignoniaceae. The Maya name "xachextabay" is derived from *xach* or *xachah*, to comb, and *xtabay*, an apparition in the form of a woman, dressed as a *mestiza*, who appears, combing her beautiful hair with a pod of this vine, in isolated spots of the Yucatan villages. The generic name *Pithecoctenium* signifies "monkey comb." In Huehuetenango a decoction of the leaves is said to be used as a lotion for treating cutaneous diseases.

### PODRANEA Sprague

Shrubs or vines (ours) with opposite, simple imparipinnate leaves. Inflorescence paniculate, of pink or white flowers; calyx regular, campanulate, 5-dentate, inflated; corolla campanulate, narrowed to a cylindric tube below, limb slightly bilabiate, lobes spreading, subequal; stamens 4, included, anthers divaricate when mature, the cells free except at the apex; disc cupular; capsule linear, slightly compressed, bilocular.

An African genus of two species of which the following is found in cultivation in America.

***Podranea ricasoliana*** (Tanf.) Sprague in Dyer, Fl. Cap. 4, 2: 450. 1904. *Tecoma ricasoliana* Tanf. Bull. Soc. Tosc. Ort. 17, tt. 1-2. 1887. *Pandorea ricasoliana* Baillon, Hist. Pl. 10: 40. 1888. *Linda*; *agradecido*; *mírame-linda*.

An African plant commonly cultivated for ornament in Guatemala at middle and low elevations.

Large or small, slender vines, glabrous throughout or nearly so; leaflets usually 7-11, long-petiolulate, lanceolate, 3.5-5.5 cm. long, with a very narrow, long acumination, usually serrate or serrulate, at least some of them; panicles terminal, lax, mostly few-flowered; calyx lax and somewhat inflated, about 2 cm. long, with a few large depressed glands above, lobate for about a third its length, the lobes broadly ovate, ending in a long subulate tip; corolla pink, glabrous, 4.5 cm. long; capsule linear, terete, 25-30 cm. long.

This is a handsome vine with pretty pink flowers, a favorite in many parts of Central America. In Guatemala it is much planted in parks and gardens, as about Guatemala City, Cobán, Huehuetenango, Puerto Barrios, and elsewhere. It is especially plentiful about Cobán, where it has a tendency to become naturalized in the hedges.

### PSEUDOCALYMMMA Sampaio & Kuhlmann

Woody vines, often with the odor of garlic, the branchlets subterete, often becoming angulate in age, with conspicuous interpetiolar gland fields at the nodes; leaves bifoliolate, the tendrils trifid, often caducous; petioles usually with gland fields at the apex; leaflets mostly somewhat 3-nerved, the pseudostipules small, subulate; inflorescence a terminal or axillary raceme or thyrse; calyx campanulate, truncate, usually minutely denticulate, without plate-shaped glands; corolla funnelliform, the tube glabrous or minutely glandular-lepidote, the lobes densely pubescent outside; stamens included, the anthers glabrous; disc annular or pulvinate; ovary oblong, lepidote or glandular-lepidote; capsule elongate-linear, compressed, smooth, septicidally dehiscent, the valves thin, with an elevated longitudinal median nerve; seeds transverse-oblong, the wings broad, membranaceous, hyaline.

About eight species, in tropical America. Only the following are known from North America.

Calyx 15-18 mm. long, about 15 mm. broad . . . . . *P. sagotii* var. *macrocalyx*.

Calyx 5-9 mm. long, about 5 mm. broad . . . . . *P. sagotii*.

**Pseudocalymma sagotii** (Bur. & Schum.) Sandwith, Rec. Trav. Bot. Néerl. 34: 210. 1937; L. Wms. Phytologia 25: 458. 1973. *Adenocalymma sagotii* Bur. & Schum. in Mart. Fl. Bras. 8<sup>2</sup>: 110. 1896. *A. macrocarpa* Donn.-Sm. Bot. Gaz. 40: 9. 1905. *Pseudocalymma macrocarpum* Sandwith, l. c. *P. alliacea* var. *microcalyx* Sandwith, Kew Bull. 1953: 467. 1954. *Bejuco de ajo*.

Moist or dry thickets, 1,400 m. or less; Zacapa; Santa Rosa; Escuintla; Quezaltenango; Huehuetenango; doubtless also in San Marcos, since collected at Tapachula, Chiapas. Western and southern Mexico; El Salvador to Panama; South America.

Branchlets becoming shallowly sulcate but not distinctly angulate; petioles with inconspicuous gland fields at the apex or with a few submersed glands; leaflets ovate to broadly ovate or rounded, 6-9 cm. long, 4-8 cm. broad, abruptly short-acuminate or sometimes obtuse, rounded to shallowly cordate at the base, with a few impressed plate-shaped glands beneath in the axils of the 2 basal nerves; pseudostipules small and inconspicuous; calyx 5-8 mm. long, minutely puberulent or almost glabrous, the margin ciliolate; corolla lavender or rose, 5-6.5 cm. long; ovary lepidote; capsule 25-35 cm. long, 1.5-2 cm. broad, conspicuously punctate; seeds 12-18 mm. long, 6-7 cm. broad.

Mexican and Guatemalan material has been determined as *P. laevigatum* (Bur. & Schum.) Sampaio & Kuhlmann.

***Pseudocalymma sagotii* var. *macrocalyx*** (Sandwith) L. Wms. *Phytologia* 25: 458. 1973. *P. alliacea* var. *macrocalyx* Sandwith. *Kew Bull.* 1953: 468. 1954. *P. standleyi* Steyerem. *Field Mus. Bot.* 23: 235. 1947 (type from Quezaltenango, *Steyermark 33533*).

Known in Guatemala only from lower slopes of Volcán Santa María, 1,300-1,400 m.; Quezaltenango. British Guiana; Brazil.

Large glabrous woody vines with coarse stout tendrils, the branches terete, ochraceous, the young ones green, somewhat obtusely tetragonous; leaves large, the petioles stout, 2.5-4 cm. long; leaflets 2, thick-chartaceous or subcoriaceous, on petiolules 1.5-2 cm. long, broadly elliptic or ovate-elliptic, 15-18 cm. long, 9-11 cm. broad, abruptly short-acuminate, obtuse or somewhat rounded at the base, slightly paler beneath, densely and conspicuously impressed-glandular in the axils of the lowest nerves, 3-nerved from the base, the lateral nerves about 6 on each side, the veins prominulous, laxly reticulate; inflorescences axillary and lateral, thyrsoid, 18-27 cm. long, 6-8 cm. broad, many-flowered, the branches compressed, the flowers long-pedicellate; calyx broadly campanulate and somewhat inflated, 15-23 mm. long, 15-21 mm. broad, rounded at the base, the margin very shallowly 5-lobate, the lobes somewhat unequal, about 2.5 mm. long, 4-7 mm. broad; corolla pale lilac (on the tube) and rose-lavender, about 7 cm. long, the tube glabrous outside, 4.7 cm. long, 2 cm. broad, the lobes ovate-rounded, rounded at the apex, 2.3 cm. long and broad, glandular-lepidote outside; stamens included, the filaments glabrous; anthers glabrous, the cells divaricate, 4.5-4.8 mm. long; disc annular; ovary oblong, minutely glandular-lepidote.

## PYROSTEGIA Presl

Woody vines, the branchlets angulate, with 6-8 small costae, with interpetiolar ridges at the nodes; leaves 2-3-foliolate, the tendrils trifid, the leaflets somewhat pellucid-punctate; pseudostipules conic, small, caducous; inflorescence a terminal or axillary thyrse, dense and many-flowered; calyx campanulate, truncate and denticulate, glandular-lepidote; corolla orange, narrowly long-tubular, gradually dilated from the base, the lobes narrow, subvalvate, tomentulose outside, the greater part of the corolla glabrous; stamens exerted, the anthers glabrous; disc annular; ovary 4-angulate, linear, glandular-lepidote; capsule linear, compressed, smooth, loculicidally dehiscent, acute or attenuate, the valves subcoriaceous, with



an indistinct median longitudinal nerve; seeds transverse-oblong, the wings thin, opaque, with hyaline margins.

About four species, in South America, one of them often cultivated in other tropical lands.

**Pyrostegia venusta** (Ker) Miers, Proc. Roy. Hort. Soc. 3: 188. 1863. *Bignonia venusta* Ker, Bot. Reg. 3: t. 249. 1818. *B. ignea* Vell. Fl. Flum. 244. 1825; 6: t. 15. 1827. *P. ignea* Presl, Bot. Bemerk. 93. 1843. *Chiltote*; *chorro de oro*; *chorro*.

Native of Brazil and Paraguay; planted commonly for ornament in Guatemala, at low and middle elevations; frequent in gardens of the central region, also in the Oriente, about Cobán, and in the lowlands of San Marcos, as well as in other areas.

Branchlets somewhat glandular-lepidote and punctate, slightly pubescent at the nodes; leaves mostly trifoliolate, the leaflets ovate, acuminate, truncate or shallowly cordate at the base, 4-8 cm. long, 2-5 cm. broad, densely punctate beneath and with scattered plate-shaped glands; pseudostipules 3 mm. long or less, caducous; calyx denticulate, pubescent and glandular-lepidote; corolla orange, 5.5-7.5 cm. long, sparsely glandular-lepidote, tomentulose on the upper part of the lobes; capsule 25 cm. long, 1-1.5 cm. broad, attenuate at the apex, sparsely glandular-lepidote; seeds 1 cm. long and 3.5 cm. broad, the wings dark brown except for the hyaline margins.

Called "San Carlos" in El Salvador and "triquitrac" in Costa Rica. This is one of the most showy vines of the Bignoniaceae, and is grown for ornament in many tropical regions of the earth. It is common through much of Central America, at least in the lowlands, and has become common also in Florida.

## ROSEODENDRON Miranda

Large trees with the young branches somewhat quadrangular, often pubescent with branched farinaceous hairs; leaves opposite, digitate, 5-7-foliolate, the leaflets entire or dentate, long petiolulate, often with branched hairs and subpeltate circular scales; inflorescence paniculate, cymose, the flowers large and yellow; calyx membranaceous, yellowish, obconic-cylindric, tightly enclosing the base of the corolla, without ribs, bilobulate or irregularly divided; corolla tubular-infundibuliform, the limb obscurely bilabiate, 5-lobate with lobules semiorbicular; stamens 4, didynamous, included, the anthers divaricate at maturity; staminode small; disc suburceolate, entire; capsule linear, with 8-12 longitudinal costae, loculicidally bivalvate, the valves subcoriaceous; seeds with a wide hyaline wing.

There are three species of the genus, two from Mexico and northern Central America, the other from Venezuela. The genus was named by Dr. Faustino Miranda and dedicated to the memory of Joseph Nelson Rose, botanist at the Smithsonian Institution who

described a species of this genus, as *Tabebuia*, but called attention to its differences with *Tabebuia*.

**Roseodendron donnell-smithii** (Rose) Miranda, Bol. Soc. Bot. Mex. 29: 43, fig. 1965. *Tabebuia donnell-smithii* Rose in Donn.-Sm. Bot. Gaz. 17: 418, t. 26. 1892 (type from Cuyuta, Escuintla, *Donnell-Smith 2070*). *Cybastax donnell-smithii* Seibert, Carnegie Inst. Wash. Publ. 522: 392. 1940. *Palo blanco*; *copal* (fide Donnell-Smith); *cortéz*; *cortéz blanco*; *primavera* (in U.S. lumber trade).

Forested plains little above sea level; Chiquimula; Santa Rosa; Escuintla; Suchitépéquez; Retalhuleu; San Marcos. Possibly southern Mexico; El Salvador; Honduras; possibly nearly exterminated as a wild plant for its valuable wood, cultivated in plantations according to F. B. Lamb (Caribbean Forester 21: 47. 1960).

Tall trees, sometimes 35 m. high, the trunk often 60–100 cm. in diameter, usually buttressed, the crown rounded or spreading, the bark light brown to gray, fairly smooth or sometimes with large scales, the inner bark white or pale brown; young branchlets minutely and sparsely pubescent with stellate hairs; leaves deciduous, mostly 7-foliolate, sometimes 5-foliolate; leaflets long-petiolulate, membranaceous, oblong to ovate, acuminate, rounded or subcordate at the base, 5–25 cm. long, often irregularly serrate, pubescent above and beneath along the nerves, glabrate in age; inflorescence a large open panicle, rather densely pubescent with glandular-capitate hairs; calyx membranaceous, bilabiate, deeply lobate, 12–15 mm. long, covered with very short gland-tipped hairs; corolla bright yellow, 4.5–6 cm. long, pubescent with gland-tipped hairs; ovary densely glandular-lepidote; capsule 30–45 cm. long, 2–3 cm. broad, oblong in cross-section, each valve with 5–6 costae, sparsely pubescent with short white hairs.

Called “cortez” in Honduras and El Salvador; “primavera” (Oaxaca, Veracruz, fide Standley). The wood is pale yellow or almost white to light yellowish brown, without distinctive odor or taste; rather light in weight but firm, the specific gravity 0.45; grain fairly straight to roey; texture medium to rather coarse; fairly strong, easy to work, finishes smoothly, does not warp or check badly, does not appear durable. The wood is exported from Guatemala and Mexico to the United States under the names “primavera” and “white mahogany,” as much as 300,000 board feet having been imported in a single year. It is used principally for making furniture, largely in the form of veneer. During the first world war it was utilized for making airplane propellers. In Mexico and Guatemala it is employed for making furniture, for house construction, and for general purposes. This was one of the important lumber trees of the Pacific plains of Guatemala. The trees bloom when leafless and are exceptionally showy when covered with the large panicles of



FIG. 38. *Roseodendron donnell-smithii*. Plate XXVI from the Botanical Gazette for the year 1892, used by permission of the University of Chicago. Magnifications may be calculated from the description.

flowers. The usual Guatemalan name of *palo blanco* refers to the whitish bark, which makes the tree easily recognizable from a distance.

### SCOBINARIA Seibert

Woody vines, the branchlets subterete, striate, conspicuously lenticellate, dilated at the nodes and compressed, furnished there with gland fields composed of numerous, very small glands; leaves bifoliate, the tendrils caducous; pseudostipules small, subulate; inflorescences terminal and axillary, thyrsoïd; calyx narrowly tubular-campanulate, glabrate, membranaceous, shallowly bilabiate or lobulate-serrate; corolla rose-purple, funnellform, pilose; stamens included, the anthers glabrous; disc annular; ovary oblong, tetragonous; capsule elongate-linear, compressed, densely covered with rather long tubercles; seed oblong, the wings broad, thin, with hyaline margins.

**Scobinaria japurensis** (DC.) Sandw. Kew Bull. 1958: 440. 1958. *Tabebuia japurensis* DC. Prodr. 9: 214. 1945. *Adenocalymma verrucosum* Standl. Field Mus. Bot. 4: 323. 1929 (type collected near Tela, Honduras). *Arrabidaea belizensis* Standl. Field Mus. Bot. 8: 48. 1930 (type from Middlesex, British Honduras, *Schipp* 284). *Martinella verrucosa* Standl. Contr. Arnold Arb. 5: 138. 1933. *Scobinaria verrucosa* Seibert, Carnegie Inst. Wash. Publ. 522: 408. 1940.

Moist or wet forest, 200 m. or less; Huehuetenango (between Ixcán and Rio Ixcán, *Steyermark* 49314). British Honduras; Atlantic coast of Honduras; Costa Rica; Panama.

Small or large vines; leaflets elliptic or broadly elliptic, 5–12 cm. long, 2.5–7 cm. broad, acute or short-acuminate, obtuse to rounded at the base, subcoriaceous, darkening when dried, minutely glandular-lepidote, barbate beneath in the nerve axils; inflorescence an axillary or terminal, rather few-flowered thyrse; calyx 1.5–3 cm. long, gradually expanding upward and about 14 mm. broad at the throat, colored like the corolla; corolla rose-purple, 5–7 cm. long, sparsely short-pilose; ovary slightly pubescent near the apex; capsule 30–40 cm. long, 1.5–2 cm. broad, densely covered with short spine-like tubercles; seeds 1.5 cm. long, 4.5 cm. broad.

The genus is easy to recognize in fruit, since the long linear capsule, densely covered with tubercles, is quite unlike that of any other member of the family. The similarity of this genus to *Martinella*, other than the verrucose capsules, is rather great and it may be doubted that they are really very different.

### SPATHODEA Beauvois

Large trees; leaves large, pinnate, the leaflets petiolulate, entire; flowers large and showy, red or orange, arranged in short dense racemes; calyx tomentose, closed in bud and long-acuminate, spathaceously cleft in anthesis; corolla glabrous, broadly ventricose-campanulate, oblique, the limb somewhat bilabiate, the lobes broad and rounded, with undulate margins; stamens 4, didynamous, short-exserted,



FIG. 39. *Scobinaria japurensis*. A, habit,  $\times \frac{1}{2}$ ; B, fruit,  $\times \frac{1}{2}$ ; C, flower dissected,  $\times 1\frac{1}{2}$ ; D, corolla from a bud,  $\times 1$ .

the anthers glabrous; disc pulvinate; capsule oblong-lanceolate, compressed, loculicidally dehiscent, the valves thick-coriaceous, cymbiform or finally explanate; seeds compressed, with a broad hyaline wing.

Three species, in tropical Africa.

**Spathodea campanulata** Beauv. Fl. Owar. 1: 47, t. 27, 28. 1805.

Native of tropical Africa, now grown for ornament in many tropical regions; a few trees are planted in Guatemala, especially in the Atlantic lowlands and about Guatemala City.

Tall trees when fully grown, with dense rounded crowns; leaves large, the leaflets 9-19, short-petiolulate, oval to elliptic or lance-oblong, 5-10 cm. long, rounded and cuspidate at the apex or obtuse, obtuse or rounded at the base, entire, glabrous above or nearly so, somewhat paler beneath, puberulent or glabrate, with 2-3 large glands at the base; racemes short, dense, with few-many flowers on thick pedicels; calyx strongly curved, long-acuminate, 4-5 cm. long, densely fulvous-tomentose; corolla scarlet, 10 cm. long, very broad in the throat; capsule glabrous, about 20 cm. long.

Called "tulipán" in El Salvador, and "tulip tree" in Panama. The tree is of recent introduction into Central America and probably was planted first in the Canal Zone 40 or 50 years ago.

The tree is one of the finest ornamental trees introduced in Central America. It is suitable and does well at elevations up to 1,000 m. Thousands of small trees have been distributed through Central America since 1950 by Escuela Agrícola Panamericana.

### STIZOPHYLLUM Miers

Woody vines, the branchlets terete, striate, with obscure interpetiolar ridges at the nodes; leaves 2-3-foliolate, the tendrils simple or trifid; leaflets coarsely and conspicuously glandular-lepidote beneath, entire or dentate; pseudostipules inconspicuous; inflorescence a short, axillary or terminal raceme; calyx campanulate, membranaceous and somewhat inflated, pubescent, irregularly 5-lobate and bilabiate, costate; corolla campanulate-funnelform, pubescent and glandular-lepidote; stamens included, the anthers glabrous; disc thick, depressed-pulvinate; capsule elongate-linear, compressed, smooth, septicidally dehiscent, gradually attenuate to the apex, the valves with an elevated longitudinal median nerve; seeds transverse-oblong, with broad membranaceous wings.

Two or three species in tropical America, only the following in North America.

**Stizophyllum perforatum** (Cham.) Miers, Proc. Roy. Hort. Soc. 3: 198. 1863. *Bignonia perforata* Cham. Linnaea 7: 667. 1832. *Adenocalymma flos-ardeae* Pittier, Contr. U. S. Nat. Herb. 18: 256. 1917 (type from Panama). *A. punctifolium* Blake, Contr. U. S. Nat. Herb. 24: 22. 1922 (type from Quebradas, Izabal, *H. Pittier 8570*). *S. punctifolium* Sandw. Recueil Trav. Bot. Néerl. 34: 212. 1937.

Wet forest or thickets, 350 m. or less; Petén; Alta Verapaz; Izabal. Mexico (Oaxaca; Yucatan); British Honduras; Panama; southward to Brazil.

Large or small vines, the branchlets densely tomentulose at first; leaflets entire or often dentate, ovate to oval-ovate, acute to abruptly short-acuminate, more or less cordate at the base, densely dotted, especially beneath, with depressed saucer-shaped pellucid glands, pubescent beneath, especially along the nerves; panicles tomentulose; calyx 10–16 mm. long, densely fulvous-puberulent, with sparse yellowish glands near the apex; corolla cream-colored or lavender, 4.5–6 cm. long, papillose-puberulent and sparsely glandular-lepidote; ovary densely glandular-lepidote, becoming tomentulose; capsule 30–60 cm. long, 7–8 mm. broad, densely puberulent and somewhat glandular-lepidote.

This plant is easy to recognize because of the many large yellowish glands on the lower leaf surface.

### TABEBUIA Gomes

*Reference:* Alwyn H. Gentry, A revision of *Tabebuia* in Central America, *Brittonia* 22: 246–264. 1970.

Large or medium-sized trees, deciduous; leaves palmately 3–7-foliolate in Central American species, in others sometimes simple or unifoliolate, the leaflets petiolulate, entire or dentate, the lateral ones smaller; inflorescence terminal, loosely paniculate to capitate; calyx campanulate or tubular, unequally bilabiate, usually 5-lobate; corolla straight or slightly curved, the limb spreading; stamens included, the anthers glabrous, their cells divergent; staminode small; disc annular-pulvinate or cupuliform; ovary linear or linear-oblong, glabrous or glandular-lepidote, sometimes pubescent; capsule elongate-linear or oblong-linear, subterete, pendent, loculicidally dehiscent; seeds broadly winged, with hyaline or almost opaque wings or wing sometimes reduced.

Perhaps 100 species, in tropical America. Two other species are known in Central America and one of these, *T. neochrysantha* A. Gentry, may be expected in Guatemala.

Calyx and leaflets glandular-lepidote, never with spreading or stellate hairs; corolla purple to rose or almost white. . . . . *T. rosea*.

Calyx and leaflets with pubescence of spreading or stellate hairs.

Corolla lavender or purple; densely puberulent or tomentulose. . . . . *T. palmeri*.

Corolla bright yellow, glabrous or nearly so.

Young branchlets glandular-lepidote; inflorescence rather open; flowers all open at the same time; calyx sparsely stellate-puberulent. . . . . *T. guayacan*.

Young branchlets densely stellate-pubescent, often stellate-pilose; inflorescence dense and congested; flowers not all open at the same time; calyx densely covered with barbate hairs and with short stellate hairs.

*T. chrysantha*.

***Tabebuia chrysantha*** (Jacq.) Nicholson, *Dict. Gard.* 4: 1. 1889.  
*Bignonia chrysantha* Jacq. *Hort. Schoenbr.* 2: 45, t. 211. 1797.  
*Tecoma chrysantha* DC. *Prodr.* 9: 221. 1845. *Tecoma evenia* Donn.-Sm. *Bot. Gaz.* 20: 8. 1895, in part (type from Santa Rosa, Heyde &

*Lux 3110*). *Tecoma palmeri* Kraenzl, in Fedde, Repert. Sp. Nov. 17: 220. 1921. *Matilisquate* (Alta Verapaz).

Moist or rather dry forest, often on open hillside, sometimes on limestone, 750 m. or less; Izabal; Alta Verapaz; Baja Verapaz; El Progreso; Chiquimula; Jutiapa; Santa Rosa. Mexico; British Honduras to El Salvador and Panama; Colombia and Venezuela.

A medium-sized or often small tree with pale bark; young branchlets densely stellate-tomentose; leaflets usually 5, broadly lanceolate to obovate or elliptic-oblong, 10–18 cm. long, abruptly acuminate, obtuse at the base, usually entire sometimes coarsely dentate, densely stellate-tomentose to glabrate beneath, less abundantly pubescent above, sparsely glandular-lepidote; inflorescence congested and headlike, the flowers numerous, opening at different times; calyx 8–14 mm. long, 5-dentate, costate, densely covered with long or short, more or less branched, fulvous hairs; corolla bright yellow, 5.5–7 cm. long, almost glabrous; ovary sparsely stellate-pubescent; capsules 20–30 cm. long, 1.3 cm. thick, the valves thick, somewhat rugose when dry, stellate-tomentose.

Known in El Salvador as “cortez,” “cortez amarillo,” “cortez coyote,” “cortez negro,” and “cortez prieto;” “ahau-che,” “ha-hauche” (Yucatan, Maya). The wood is brown, hard, heavy, strong, durable, and finishes smoothly. It is employed for tool handles and for general construction. The tree is a showy and rather handsome one, blooming when devoid of leaves, in the spring months. It is particularly plentiful on the low dry hills along the road between El Rancho and Salamá. The type material of *Tecoma evenia* consists of a mixture, the flowers being those of *Tabebuia chrysantha*, while the leaves are referable to *T. rosea*.

**Tabebuia guayacan** (Seem.) Hemsl. Biol. Cent.-Am. Bot. 2: 495. 1882. *Tecoma guayacan* Seem. Bot. Voy. Herald 180. 1854. *Cortez; corteza; guayacán.*

Wet to rather dry forest, often in open places, 1,200 m. or less; Petén; Alta Verapaz; El Progreso; Izabal; Chiquimula; Santa Rosa. Mexico (Oaxaca, Vera Cruz, Tabasco, Chiapas); British Honduras to Panama.

Large trees, sometimes 40 m. high, the trunks to 60 cm. or more in diameter, often buttressed, the crowns narrow or rounded, the bark light tan to buff or gray-brown, scaly, the inner bark light brown; young branchlets minutely glandular-lepidote; leaflets usually 5, the lateral ones sometimes parted, ovate to oblong-elliptic, acuminate, rounded to subtruncate at the base, minutely glandular-lepidote, especially beneath, glabrate or somewhat persistently pubescent beneath, the axils of the lateral nerves barbate; inflorescence rather open, few-flowered, stellate-tomentulose, the flowers all open at the same time, bright yellow, appearing



when the tree is leafless; calyx 1-1.5 cm. long, costate, sparsely and minutely stellate-puberulent; corolla 7-9.5 cm. long, glabrous or nearly so; ovary glabrous.

The wood of this species is highly esteemed where available, and is considered excellent for construction purposes, especially where durability is important. The Cathedral of Panamá Vieja contained beams of this *guayacán* which were reported to be perfectly sound after having been exposed to the weather since the destruction of the city, some 250 years ago. Called "yellow mayflower" in British Honduras. Seibert states that the calyx is usually found punctured at the base, possibly because hummingbirds thus obtain nectar from them. Very closely allied to the preceding species.

**Tabebuia palmeri** Rose, Contr. U. S. Nat. Herb. 1: 109, *t. 11*. 1891. *T. nicaraguensis* Blake, Contr. Gray Herb. 52: 95. 1917. *Cortez colorado*.

Moist forest, 600 m. or less; Chiquimula; El Progreso; Zacapa. Western and southern Mexico; El Salvador; Nicaragua; Panama.

Trees of 10-15 m. or more, the branchlets glabrous except at the tips, there minutely stellate-puberulent; leaflets usually 5, oval-oblong to oval-lanceolate or oblong-obovate, abruptly short-acuminate, cuneate to rounded at the base, entire, glandular-lepidote, somewhat puberulent beneath, especially along the veins and in the nerve axils; inflorescence densely farinose-tomentulose, appearing when the tree is leafless; calyx 5-8 mm. long, stellate-tomentulose; corolla pinkish lilac or purple, 5-7 cm. long, densely puberulent or tomentulose; ovary glabrous; capsules 35 cm. long or shorter, about 2 cm. thick, glabrous; seeds 1.5 cm. long and 5 cm. broad.

The wood is dark reddish brown, very hard, and heavy; durable in contact with the soil. It is used in Mexico for railroad ties and general construction.

**Tabebuia rosea** (Bertol.) DC. Prodr. 9: 215. 1845. *Tecoma rosea* Bertol. Fl. Guatemalensis 25. 1840 (type, from near Escuintla, Velasquez). *Couralia rosea* Donn.-Sm. Bot. Gaz. 20: 9. 1895. *Tecoma evania* Donn.-Sm. *l.c.* 8, in part. *Matilisquate* (the most usual name); *maqueliz* (Petén); *matilishuate*; *mano de león* (perhaps an erroneous name); *macuelizo*; *macueliz*; *fresno* (Huehuetenango).

Common in moist or rather dry forest, often in open fields or along roadsides, most abundant on the Pacific plains, but often on steep hillsides, 1,200 m. or less; Petén; Alta Verapaz; Baja Verapaz; El Progreso; Izabal; Zacapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Sololá; Suchitepéquez; Retalhuleu; San Marcos; Hue-

huetenango. Mexico; British Honduras to El Salvador and Panama; southward to Venezuela.

Large trees, sometimes 30 m. tall, with thick straight trunks as much as a meter in diameter, often buttressed, the crown spreading or rounded, the bark light brown, with rather coarse, long, vertical fissures, the inner bark medium brown; branchlets glandular-lepidote; leaflets usually 5, mostly on very long petiolules, subcoriaceous, 10-25 cm. long, elliptic-oblong to elliptic-ovate or sometimes obovate, acute or acuminate, acute to rounded at the base, entire, densely glandular-lepidote, the axils of the lateral nerves beneath with plate-shaped glands, never barbate; inflorescence large and open, glandular-lepidote; calyx bilabiate, 1.5-2 cm. long, closed in bud, splitting in anthesis, densely glandular-lepidote; corolla 6-8 cm. long, varying in color from deep rose-purple to rarely white, glabrous; ovary glandular-lepidote; capsules about 30 cm. long and 12 mm. thick, attenuate to each end, densely glandular-lepidote.

Called "may flower" and "May bush" in British Honduras; "hocab" (Yucatan, Maya); "roble" (British Honduras); "roble blanco" (Honduras); "maquiligua," "maculigua," "matilisguat" (El Salvador); "puntilla" (Honduras). The name "matilisguate," most usual for the species in Guatemala, is evidently of Nahuatl origin, and probably signified "hand tree," in allusion to the fine leaflets composing each leaf. In Guatemala the name of the tree appears as a place name, Matilishuate, a village in Jutiapa. The wood is one of the most important ones of Central America, being used for a great variety of purposes—heavy construction, furniture and cabinet-work, interior finish, boat building, carts, and many other kinds of work. It is rather dull grayish brown with fine striping of deep brown, often in conspicuous pattern on the tangential surface, without distinctive odor or taste; moderately light and soft to rather hard and heavy; specific gravity 0.62; grain usually straight, sometimes roey or wavy; texture medium; easy to work, finishes smoothly, seasons without difficulty, is fairly durable. It is said that if the wood is cut green and stacked to dry, it acquires a dark color, without losing its striping, and is then of different appearance from lumber treated in the more usual manner. A large part of the cheaper chairs of Central America are made from this wood. When in flower, the tree has few equals among Central American trees for beauty. The trees blossom when leafless, mostly in the spring months, toward the end of the dry season. They are then huge bouquets of flowers, which vary in shade from deep rose-purple to pure white (rarely), in their range of tints strongly suggesting the multicolored and lovely Japanese cherry trees. They are abundant on the Pacific plains, where from a slight elevation one may sometimes overlook a widely spread display of beautiful color provided by *matilisguate*

trees. There is a fine lot of planted trees in the Parque Central of Guatemala, in full blossom about the end of April. The blooming season is somewhat extended and variable, and some trees may be in flower as early as January. Some handsome trees stand near the river at the entrance into Cobán.

This species, more often than not, has been confused with the West Indian *Tabebuia pentaphylla* (L.) Hemsl.

### TECOMA Jussieu

Shrubs or small trees, the nodes of the branches with indistinct interpetiolar ridges; leaves odd-pinnate, rarely simple, the leaflets serrate; pseudostipules small and inconspicuous; inflorescence a terminal raceme or panicle; calyx campanulate, the lobes triangular, often apiculate; corolla campanulate-funnelform or tubular-funnelform, yellow in North American species, usually glabrous except on the margins of the lobes; stamens included, the anthers pilose; disc shallowly cupuliform; ovary oblong, glandular-lepidote; capsule linear, slightly compressed, smooth, loculicidally dehiscent, the valves subcoriaceous; seeds oblong, with broad membranaceous whitish wings.

Perhaps four to five species, all except the following in South America.

Leaflets glabrous or nearly so . . . . . *T. stans*.  
 Leaflets whitish-tomentose beneath . . . . . *T. stans* var. *velutina*.

**Tecoma stans** (L.) HBK. Nov. Gen. & Sp. Pl. 3: 112. 1819. *Bignonia stans* L. Sp. Pl. ed. 2. 871. 1763. *Stenolobium stans* Seem. Journ. Bot. 1: 88. 1863. *Timboco*; *timboque*; *chacté* (Zacapa; also the Quecché name); *San Andrés*; *barreto* (Jutiapa).

Wet or dry thickets or open forest, frequent on dry open rocky hillsides, often planted for ornament, 1,500 m. or less, chiefly below 1,000 m.; Baja Verapaz; El Progreso; Zacapa; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Suchitpéquez; Retalhuleu; Quezaltenango; San Marcos. Southwestern United States through Mexico; El Salvador to Panama; West Indies; South America.

Shrubs or small trees, rarely 12 m. high with trunks 25 cm. in diameter, the branchlets terete, with numerous pale elevated lenticels, glandular-lepidote when young; leaflets usually 7, sessile or short-petiolate, lanceolate to ovate-lanceolate, 4-10 cm. long, attenuate-acuminate, cuneate at the base, serrate, glabrous or nearly so, punctate beneath and sparsely pilose along the veins, the axils of the lateral nerves barbellate; panicles often large and many-flowered; calyx 4-7 mm. long, sparsely glandular-lepidote; corolla bright yellow, funnelform, 3.5-5 cm. long,

sparsely glandular-lepidote in bud, the lobes white-ciliate; anthers pilose; capsule linear, attenuate to each end, brownish, 10–20 cm. long, lustrous, lenticellate.

The Maya names of Yucatan are reported as “canlol” and “canlol-che”; “flor amarilla” (Yucatan); “borla de San Pedro,” “candox” (Chiapas); “San Andrés,” “marchucha,” “tagualaishte,” “tache,” “tacho” (El Salvador); “sardinillo” (Honduras); “sauco amarillo” (Yucatan). This is one of the common shrubs or small trees through most of the lower regions of Central America, perhaps more plentiful along the dry Pacific slope. It is planted generally about the houses for ornament, especially in regions where it does not grow naturally, and many of the plants found apparently wild probably are really escapes from cultivation. The flowers are showy and handsome, and may be found at almost any season of the year. Neither the species nor its variety were observed in the Cobán region, although the plant must be in cultivation in some of the fincas. It is common in fincas of Retalhuleu and Mazatenango, but apparently is not native in that region. It, or the variety, is cultivated as high as Quezaltenango and San Marcos. The generic name *Tecoma* is derived from the Nahuatl word signifying “trumpet.”

***Tecoma stans* var. *velutina* DC.** Prodr. 9: 224. 1845. *T. mollis* HBK. Nov. Gen. & Sp. Pl. 3: 112. 1819. *Stenolobium molle* Seem. Journ. Bot. 1: 90. 1863. *Timboco*.

Dry or moist, brushy, often rocky slopes, often in hedgerows, 1,500–2,500 m., frequently planted for ornament; El Progreso; Guatemala; Sacatepéquez; El Quiché, Huehuetenango; Sololá; Quezaltenango. Southern Mexico; western South America.

Differing from the typical form of the species only in having more abundant pubescence; young branchlets densely pubescent; leaflets whitish-tomentose beneath, sometimes glabrate in age.

We have seen no Central American specimens of the variety except from Guatemala, and there the variety is limited in range, being found chiefly in the western highlands. It grows wild at a much higher elevation than the typical form, and is apparently the only form occurring wild in the higher mountains and in the center and west of Guatemala. The abundant pubescence gives both growing plants and herbarium specimens an appearance substantially different from that of the species. The variety often has been treated as a distinct species, but there is too much variation in pubescence, apparently, to warrant the recognition of *T. mollis* as a distinct species.

## TECOMARIA Spach

Woody vines, the branchlets subterete; leaves odd-pinnate, the leaflets small, serrate; inflorescence terminal, racemose or thyrsoid, the lateral flowers of each cymule reduced or abortive; calyx campanulate, 5-dentate; corolla somewhat curved, with a long narrow tube; stamens exserted, the anthers glabrous; disc annular-cupuliform; ovary glabrous; capsule oblong-linear, loculicidally dehiscent, the valves thin-coriaceous, with a conspicuous longitudinal median costa; seeds transverse-oblong, with broad hyaline wings.

Probably two species, native in South Africa, one of them often planted for ornament in tropical regions.

**Tecomaria capensis** (Thunb.) Spach, Hist. Veg. Phan. 9: 137. 1840; Seibert, Carnegie Inst. Wash. Publ. 522: 395. 1940. *Bignonia capensis* Thunb. Prodr. Pl. Cap. 105. 1800. *Tecoma capensis* Lindl. Bot. Reg. 13: t. 1117. 1828. *Julia*; *flor de fuego*.

Native of South Africa, cultivated occasionally in Guatemala, as in Guatemala City, Panajachel, and Cobán.

Large or small vines; leaflets 7-9, ovate to broadly elliptic, 1.5-3 cm. long, acute or short-acuminate, coarsely serrate, somewhat pubescent, pilose beneath on the veins, stellate-tomentose along the costa; calyx 4-5 mm. long, puberulent, costate; corolla orange-red, 4-5 cm. long, glabrous, the lobes small and short; capsule linear, about 11 cm. long and 8 mm. broad, attenuate to each end.

Seibert states that this species is "cultivated in the higher altitudes of tropical America, where it occasionally has become naturalized." We have seen no evidence from field work or herbarium material that the vine has become naturalized anywhere in tropical America. In Central America it is infrequent, and in Guatemala it is rarely seen.

## TOURETIA Fougereux

Herbaceous vines with tendrils, the branchlets tetragonous, the nodes with interpetiolar ridges; leaves opposite, 2-3-ternate, the tendrils trifid, each arm of the tendril usually dichotomous; leaflets thin, small, coarsely serrate; inflorescence a terminal raceme, the flowers small, short-pedicellate, dimorphous, the upper ones sterile and deciduous; calyx 2-parted, deciduous, the segments entire; corolla slender-tubular, unequally bilabiate, the tube shorter than the calyx; fertile stamens 4, no staminode present, the anthers glabrous; disc annular; ovary ovoid, densely covered with short spines; capsule ovoid, densely covered with long stiff uncinate spines, septically dehiscent; seeds somewhat oblong, small, with a narrow membranaceous wing.

The genus consists of a single species.

**Touretia lappacea** (L'Hér.) Willd. Sp. Pl. 3: 263. 1800. *Dombeya lappacea* L'Hér. Stirp. Nov. 33, t. 17. 1784. *T. volubilis*

J. F. Gmel. Syst. 2: 940. 1791. *Güisquilito*; *güisquilillo*; *güisquelete*; *amarillo*.

Wet thickets or forest, 650–2,000 m.; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos; Huehuetenango. Honduras; Nicaragua; Costa Rica; western South America.

Slender and often very large, herbaceous vines, covering large shrubs and often good-sized trees, somewhat succulent; leaflets ovate or rhombic, acute or acuminate, acute or obtuse at the base, 3–9 cm. long, conspicuously serrate, glabrous, generally with scattered impressed plate-shaped glands on the upper surface; calyx usually bright red, sometimes pale red, 10–14 mm. long, somewhat villosulous; corolla 12–20 mm. long, sparsely villosulous; capsules 3–4 cm. long, 1.5–2 cm. thick, densely covered with long hard uncinat spines.

Called “pegapega” in El Salvador. The plant is a most abnormal member of the Bignoniaceae, having no close resemblance to any other American genus of the family. A botanist seeing it for the first time would almost certainly refer it to the Cucurbitaceae. Its fruits densely covered with long, hard, hooked spines that can penetrate the flesh and that closely resemble those of some cucurbits or a large cocklebur (*Xanthium*). In Guatemala the vine is plentiful in many regions, usually in wet forest or thickets along ravines, but is particularly abundant in the barrancos of San Marcos, where with *Hidalgoa* it often forms a dense mantle over shrubs and small trees or along cliffs growing so densely that it is impossible to penetrate the tangles. In this respect also it suggests some of the Cucurbitaceae, such as *Momordica*. The small red flowers are not at all conspicuous, and the plant is a decidedly weedy one.

The species was originally described from Peru and occurs in all the Andean countries northward. It is said to occur in Mexico but I have seen no specimens, nor have specimens been seen from Panama. The curious spiny fruit may account for this curious distribution.

### TYNANTHUS Miers

Woody vines, the branchlets subterete, striate or subangulate, the nodes with interpetiolar, often V-shaped ridges; leaves 3–2-foliate, the tendrils simple; pseudostipules often foliaceous, soon deciduous; inflorescence of axillary or terminal thyrses or dichasia; calyx very small, turbinate or campanulate, truncate, denticulate; corolla very small, conspicuously bilabiate, curved, funnellform, densely tomentulose; stamens slightly exserted, the anthers glabrous; disc very small; ovary conic, pubescent; capsule elongate-linear, compressed, septicidally dehiscent, the valves smooth, with an elevated longitudinal median nerve or the ligneous

valves each with two coriaceous wings on the margins; seeds small, with broad hyaline wings.

About 12 species, in tropical America, only three in continental North America.

***Tynanthus guatemalensis*** Donn-Sm. Bot. Gaz. 18: 6. 1893.

Moist thickets and forest, at or little above sea level; Petén; Izabal; Quezaltenango (type from Río Ocosito, 75 m. *Donnell-Smith* 1488). Mexico (Tabasco; Yucatan); British Honduras.

Large vines, the branchlets subterete or obscurely angulate, striate, minutely glandular-lepidote, pubescent at the nodes at first, the nodes with a more or less distinct V-shaped interpetiolar ridge; leaflets elliptic to ovate, 4–10 cm. long, 2–6.5 cm. broad, acuminate, obtuse or rounded at the base, thin, glabrous except on the veins, with scattered plate-shaped glands beneath on each side of the costa, the axils of the lateral nerves pitted beneath; pseudostipules foliaceous, caducous, 5–15 mm. long, ovate, acute; inflorescence of axillary thyrses, sometimes terminal, the flowers cream-colored, fragrant; calyx campanulate, truncate, almost glabrous, 2 mm. long; corolla 6–8 mm. long, conspicuously bilabiate, tomentulose, the lobes tomentulose within; stamens slightly exerted; ovary densely pubescent; capsule unknown.

The name "café-ac" is reported from Yucatan. The vine is noteworthy for its extremely small flowers, smaller than those of all other Central American Bignoniaceae.

**XYLOPHRAGMA** Sprague

Woody vines, the branchlets subterete, with interpetiolar gland fields at the nodes; leaves 3–5-foliolate, or bifoliolate and terminated by a simple tendril, petiolar scars conspicuous; inflorescence of dense thyrses borne in the axils of fallen leaves; calyx campanulate, somewhat turbinate, truncate or subulate-dentate, pubescent; corolla membranaceous, campanulate-funnelform, minutely stellate-pubescent, the tube straight; stamens included, the anthers glabrous; disc annular-pulvinate, somewhat lobate; ovary tetragonous, glandular-lepidote; capsule elongate or oblong, somewhat compressed, thick, rugose, septicidally dehiscent, the valves ligneous; seeds broadly transverse-oblong, with hyaline wings.

About six species, in tropical America, only the following in Central America.

***Xylophragma seemanniana*** (O. Kuntze) Sandw. Kew Bull. 1953: 469. 1954. *Saldanhaea seemanniana* O. Kuntze, Rev. Gen. Pl. 2: 489. 1891. *Distichtis rovirosana* Donn.-Sm. Bot. Gaz. 20: 7. 1895 (type from Mexico).

Wet or dry thickets or forest, 800 m. or less; Petén; Izabal; Escuintla; Huehuetenango (?). Mexico (Tabasco); British Honduras; Costa Rica; Panama; Colombia; Venezuela; and Trinidad.

Small or large vines, usually without tendrils, the branchlets somewhat tetragonous when young but soon becoming subterete, stellate-tomentulose, soon glabrate; leaves long-pedunculate, the leaflets usually 3, oblong-ovate to obovate or oval, abruptly acuminate, obtuse to subcordate at the base, thin, sparsely stellate-tomentulose when young, glabrate in age except along the veins, pseudostipules 3 mm. long or less, triangular; calyx 5–7.5 mm. long, truncate, 5-costate, the costae extended as small teeth, somewhat tomentulose; corolla orchid-pink, 4.5–5.5 cm. long, stellate-pubescent; ovary ovoid, slightly pubescent near the base, glandular-lepidote above; capsule oblong, 9–12 cm. long, 5 cm. broad or less, smooth or when dry somewhat rugose; seeds 2.5 cm. long, 4.5 cm. broad, the body pubescent.

The name "pie de gallo" is recorded from Tabasco. This has been reported from Petén under the name *Saldanhaea costaricensis* Kraenzl.—Sandwith has commented (Kew Bull. 22: 407. 1968) that "if the winged border of the valves is not to be regarded as of generic significance in this family then *Saldanhaea* must surely be reduced to the earlier described *Cuspidaria* DC." Dr. Alwyn Gentry has told me (*in lit.*) that he considers the species to belong to *Xylophragma*.

## PEDALIACEAE. Sesame Family.

DOROTHY NASH GIBSON

Annual or perennial herbs or rarely shrubs, often with mucilaginous sap, the stems erect; leaves opposite or the upper ones alternate; flowers axillary, usually solitary, sometimes cymose, perfect, zygomorphic; calyx segments 5; corolla gamopetalous, the tube usually broad, the limb usually short, somewhat bilabiate, the lobes 5; stamens included, usually 4 and didynamous, rarely 2, the anthers dorsifixed, the thecae parallel or sometimes discrete; a staminode often present; disc annular; ovary mostly superior, rarely inferior, bicarpellate, the locules 2 or 4, placentation axile, the ovules several or numerous, anatropous; style filiform; stigmas 2; fruit capsular or indehiscent, often beaked or barbed; seeds few or numerous, smooth, the endosperm thin, the embryo straight.

About 14 genera, natives of the Old World tropics.

## SESAME L.

Erect herbs, the lower leaves opposite, the upper ones alternate, or all the leaves sometimes alternate; flowers short-pedicellate, solitary in the leaf axils; calyx segments 5; corolla tube oblique at the base, somewhat gibbous, the limb somewhat bilabiate, the 5 lobes spreading; stamens 4, didynamous, inserted near the base of the corolla tube, the anthers sagittate; ovary bilocular, the ovules numerous; fruit capsular, oblong, somewhat 4-angulate, loculicidally dehiscent.

About 12 species, in tropical Africa and Asia.



**Sesamum indicum** L. Sp. Pl. 634. 1753. *S. orientale* L., *l.c.*  
*Ajonjolí sesame.*

Native of the East Indies; cultivated widely in tropical regions for its seeds, and often more or less naturalized; cultivated rather extensively in Guatemala and often found as a weed in rice fields or other cultivated ground.

Erect annuals to about a meter tall, the stems simple or branched, sparsely pilose or glabrate; leaves petiolate, the petioles usually more or less pilose, the blades variable, the upper ones commonly lanceolate or ovate-lanceolate, the lower ones often broadly ovate and sometimes trilobate, mostly 7–15 cm. long, acuminate, acute at the base, the margins entire, coarsely dentate or sinuate-dentate, glabrous or glabrate above, the lower surfaces rather densely punctate with minute, 4-celled, mucilaginous hairs; leaves of inflorescence mostly reduced; flowers axillary, the pedicels mostly 2–5 mm. long; calyx parted nearly to the base, the segments linear to linear-lanceolate, 5–8 mm. long, villous outside; corolla pink, lilac, white, or cream, 2–3 cm. long, more or less villous outside, the throat 1–1.5 cm. broad; capsule oblong, short-rostrate, 4-sulcate, 2–3 cm. long, rather densely pubescent; seeds obovate, somewhat compressed, about 3 mm. long.

The plants are said to be known in Yucatan by the Maya name "zicilpuuz."

In Mexico and Central America *Sesamum* is grown more commonly than in the United States, the seeds used for flavoring candy and other confections as well as for baked goods. It has been grown on a fairly large scale on the Pacific plains of Guatemala. The plants are somewhat mucilaginous and have emollient properties.

## MARTYNIACEAE. Unicorn Plant Family.

DOROTHY NASH GIBSON

*References:* G. P. Van Eseltine, A Preliminary Study of the Unicorn Plants (Martyniaceae), N. Y. Agr. Exp. Sta. Tech. Bull. 149, 1–41. 1929; George H. M. Lawrence, *Proboscidea* and Other Unicorn Plants (Martyniaceae), *Baileya* 5: 127–132. 1957; Richard H. Hevly, Nomenclatural History and Typification of *Martynia* and *Proboscidea* (Martyniaceae), *Taxon* 18: 527–534. 1969.

Coarse, usually viscid-pubescent herbs; leaves simple, opposite or alternate, petiolate, the blades entire, undulate, or dentate, sometimes lobate; inflorescences terminal and/or axillary, racemose; the flowers pedicellate; calyx with 5 free sepals or spathe-like and with 5 lobes on the dorsal side and split to the base on the ventral side; bracts at the base of the calyx 1–2, often becoming thick and fleshy in age; corolla gamopetalous, the tube cylindrical at the base, then campanulate or funnellform above, often ventricose and oblique, the limb zygomorphic,

usually somewhat bilabiate, the lobes 5, the upper 2 exterior in bud; fertile stamens 4, didynamous, or 2, the second pair reduced to staminodes, with the rudiments of a fifth stamen sometimes obvious, all inserted on the corolla tube near the base of the expanded portion; anthers bitheous, the thecae divergent, the anthers of each pair of stamens initially coherent; disc annular; ovary superior, bicarpellate, the carpels united to form the unilocular ovary with 2 parietal placentae; ovules few to many, anatropous; style slender, the stigma bilobate; fruit a horned capsule, the exocarp somewhat fleshy and deciduous, the endocarp ligneous; seeds few-many, black, sculptured, almost oblong, often irregularly compressed; endosperm thin or none; embryo straight, the cotyledons large, carnosae.

Although Van Eseltine recognized five genera, the family as treated by most authors today consists of three genera, native to the New World tropics, and cultivated in many parts of the world for their ornamental fruits. Two occur in Guatemala.

Calyx spathe-like, shallowly lobate above, cleft to the base below; fertile stamens 4; horns of capsule about equalling or surpassing the body. . . . . *Proboscidea*.

Calyx not spathe-like, the 5 sepals free; fertile stamens 2; horns of capsule much shorter than the body. . . . . *Martynia*.

## MARTYNIA L.

Erect, often branching, viscid annuals, glandular-pubescent to glandular-villous throughout; leaves opposite, petiolate, the blades more or less angular-ovate to broadly triangular, cordate and palmate-nerved at the base; inflorescences terminal, racemose, the flowers bibracteate, pedicellate; calyx segments 5, free, irregular; corolla rather abruptly campanulate from the short-cylindrical basal portion of the tube, ventricose, the limb somewhat bilabiate, oblique, the lobes 5; fertile stamens 2, staminodes 2, with the fifth stamen very rudimentary or absent; anthers bitheous; ovary superior; style slender; stigma bilobate; fruit a horned capsule, the body ovoid, somewhat compressed dorsiventrally, the exocarp glandular-tomentose, soon separating from the hard, woody endocarp, this with 4 stout ribs above and 4 below, the central fissure revealing a woody, pectinate crest, the stout, recurved horns much shorter than the body.

A monotypic genus varying in flower size and color and in leaf form.

*Martynia annua* L. Sp. Pl. 618. 1753, non L. Syst. Nat. 1113. 1759. *M. diandra* Glox. Obs. Bot.: 14. 1785. *M. angulosa* Lam. Encycl. Meth. Bot. 2: 112. 1786. *Carpoceras angulata* A. Rich. Bull. Sci. Nat. Geol. 21: 98. 1830. *Disteira angulosa* Raf. Fl. Telluriana: 68. 1836. *Vatkea diandra* O. Hoffm. Verh. Bot. Brandenb. 73: 45. 1881; Linnaea 43: 554. 1882. *Uña de gato* (Zacapa, Guatemala); *chiche de gata* (Jutiapa); *catsclaw* (British Honduras); *hoja de pulga* and *casan pulga* (Chiapas).



FIG. 40. *Martynia annua*. A, habit,  $\times \frac{1}{2}$ ; B, flower with corolla partly opened to show stamens and style (stamens and staminodes opposite);  $\times 1\frac{3}{4}$ ; C, detail of stigma,  $\times 5$ ; D, detail of anthers (dorsal view),  $\times 4$ ; E, three views of capsule,  $\times \frac{3}{4}$ .

Damp or dry thickets, fields, hedgerows, and clearings, sea level to 2,400 m.; Guatemala; Huehuetenango; Jutiapa; Petén; El Quiché; Santa Rosa; Suchitépéquez; Zacapa. Mexico; British Honduras to El Salvador and Nicaragua; West Indies.

Coarse, erect, often much-branched annuals to 1.5 m. tall, viscid throughout with short or long, spreading, glandular hairs; leaves opposite, on petioles mostly 3–15 cm. long, the blades angular-ovate, angular-cordate, or broadly triangular, subacute, cordate at the base, the margins irregularly dentate, sometimes obscurely 3–5-lobate, mostly 5–23 cm. long, 5–22 cm. broad, sparsely or densely glandular-pubescent on both surfaces; racemes lax, mostly 10–20-flowered, the pedicels 1.5–3 cm. long, the bracts 1–1.5 cm. long, oblong-ovate to ovate, often asymmetrical, obtuse, pubescent, ciliate; calyx about 1.5 cm. long, the upper 3 sepals oblanceolate to elliptic, the middle one considerably longer than the 2 lateral ones, the 2 lower sepals broader, ovate to obovate or oblanceolate; corolla 4–5.5 cm. long, white or pinkish, with rose or purple spots on the inside of each lobe, the spots usually surrounded by yellow; stamens included; capsule ovoid, somewhat compressed dorsiventrally, the body of the fruit 2–3 cm. long, the stout, recurved horns 0.5–1 cm. long.

### PROBOSCIDEA Schmidel

Erect, annual or perennial herbs, sometimes suffruticose, viscid, more or less glandular-pubescent to glandular-villous throughout, the stems stout; leaves mostly opposite but sometimes alternate above, petiolate, the blades entire or 3–7-lobate, commonly broadly triangular to broadly ovate, sometimes suborbicular, nearly entire or sinuate or more or less dentate; inflorescences terminal, racemose, the flowers bracteate, pedicellate; calyx viscid-pubescent, spathe-like, split ventrally to the base, the 5 lobes shallow, the margins glandular-ciliate; corolla tube with short, cylindrical basal portion, rather abruptly becoming campanulate and often ventricose above, the limb somewhat bilabiate, the 5 lobes rounded, spreading; stamens 4, didynamous, with a rudimentary fifth stamen usually obvious; ovary unilocular; stigma bilobate; fruit capsular, the body more or less ovoid, the exocarp viscid-pubescent, deciduous, the endocarp ligneous, deeply sculptured, crested dorsally and sometimes ventrally, the horns about equalling or longer than the body; seeds few-many, black.

Perhaps six or seven valid species, with only one in Guatemala.

**Proboscidea triloba** (Cham. & Schlecht.) Dcne. Ann. Sci. Nat. 5(3): 326. 1865. *Martynia triloba* Cham. & Schlecht. Linnaea 5: 121. 1830. *P. botteri* Dcne. Ann. Sci. Nat. 5(5): 327. 1865. *M. botteri* Hemsl. Biol. Cent. Am. Bot. 2: 499. 1882. *P. confusa* Van Eseltine, N. Y. Agric. Exp. Sta. Tech. Bull. 149: 13, f. 4. 1929. *Martynia confusa* Standl. & Steyerl. Field Mus. Bot. 23: 86. 1944.

From 1,400 to about 1,500 m.; Chimaltenango; Guatemala; Sacatepéquez. Mexico.

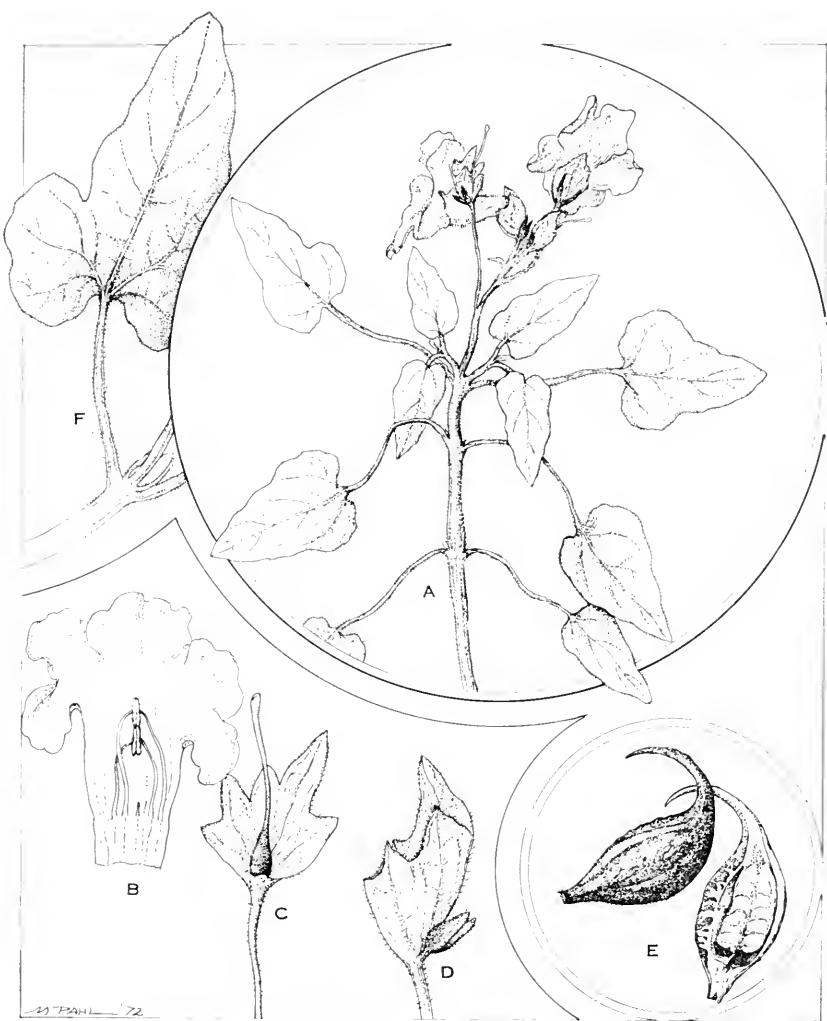


FIG. 41. *Proboscidea triloba*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and staminode,  $\times 1$ ; C, calyx opened to show pistil,  $\times 1$ ; D, side view of calyx, with bracts,  $\times 1$ ; E, capsule opened vertically to show seeds and crest within,  $\times \frac{3}{4}$ ; F, detail of leaf from lower stem,  $\times \frac{1}{2}$ .

Erect, perennial herbs, sometimes suffruticose, viscid-villous throughout, the stems stout; leaves opposite or the upper ones sometimes alternate, on petioles mostly 3–12 cm. long, the blades mostly 3–10 cm. long, simple or shallowly 3–5-lobate, cordate or truncate at the base, when lobate the terminal lobe acute or obtuse, rarely acuminate, the lateral ones rounded or subacute, viscid-pubescent on both surfaces, more densely so beneath, the margins somewhat undulate, irregularly crenate, and coarsely and obscurely denticulate; racemes 4–20 cm. long, pedicels mostly 1–3 cm. long; bracts 2, elliptic-oblong to broadly triangular, rounded or obtuse, 0.5–1 cm. long; calyx spathe-like, 1–2 cm. long, cleft to the base ventrally, shallowly 5-lobate dorsally with the uppermost lobe longer than the others, glandular-pubescent outside, glabrous inside, the margins glandular-ciliate; corolla pale yellow to brownish or purplish outside, usually white or yellowish inside with purple and yellow markings, 3–4 cm. long, the limb spreading, the 5 lobes rounded; stamens 4, didynamous; body of capsule 4–5 cm. long, the dorsal crest prominent, the horns curved, slightly longer than the body.

### OROBANCHACEAE. Broom-rape Family.

DOROTHY NASH GIBSON

*References:* Guenther Beck von Mannagetta, *Orobanchaceae*, in Engler, *Pflanzenr.* IV. 261: 1–348. 1930; John W. Thieret, *The Genera of Orobanchaceae in the Southeastern United States*, *Journ. Arn. Arb.* 52: 404–434. 1971.

Plants without chlorophyll, parasitic on the roots of other plants, annual or perennial, often succulent, pubescent or glabrous; stems slender or stout, the flowering stems arising from a thickened or swollen base; leaves reduced to scales, alternate; inflorescences simple or branched, spicate or racemose, or the flowers rarely solitary; flowers sessile or pedicellate in the axil of a bract, perfect; calyx tubular or campanulate or often appearing spathe-like and anteriorly cleft, the limb with 2–5 lobes or teeth, these usually very unequal; corolla sympetalous, the limb zygomorphic, usually bilabiate, the lobes 5, the tube curved or straight; stamens 4, included or exerted, alternate with the corolla segments, didynamous, inserted on the corolla tube, the filaments free; anthers dorsifixed, bithecous, free or coherent, the thecae parallel or divergent, both or only one fertile; connective conspicuous, sometimes apiculate; ovary superior, 2–3–4-carpellate, unilocular, the placentae parietal; ovules numerous, anatropous; style one, the stigma usually capitate or bilamellate; fruit capsular, loculicidally 2–3-valvate; seeds numerous, small.

Seventeen genera, most of the species in temperate regions of both hemispheres and most numerous in the Old World. Only the following genus is represented in Central America.

### CONOPHOLIS Wallroth

*Reference:* Robert R. Haynes, *A Monograph of the Genus Conopholis (Orobanchaceae)*, *Sida* 4: 246–264. 1971.

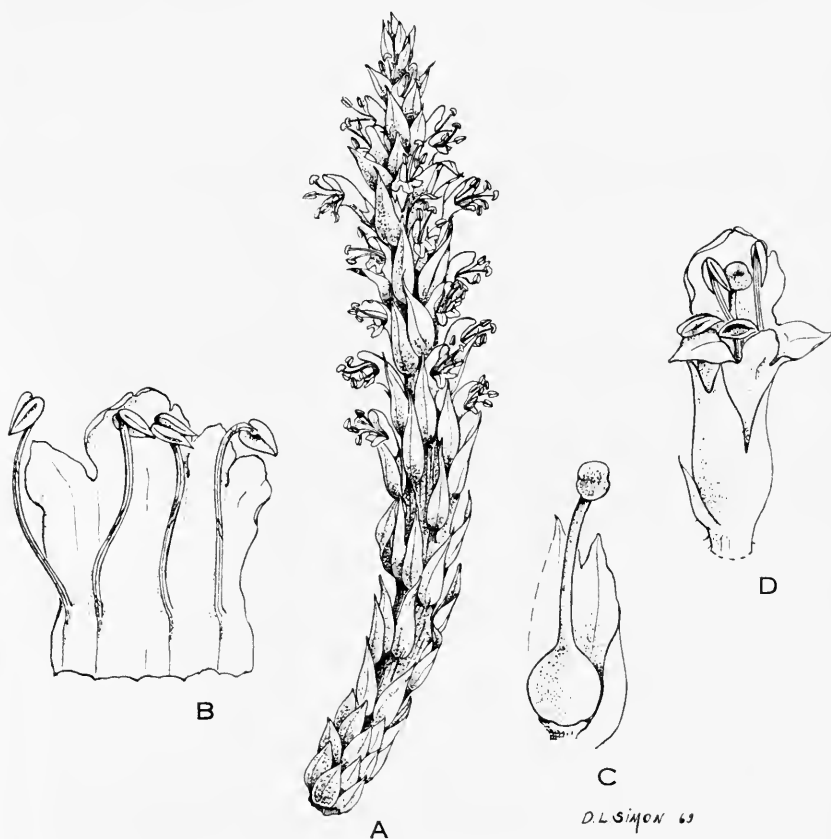


FIG. 43. *Conopholis alpina*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens,  $\times 2$ ; C, calyx opened to show pistil,  $\times 2$ ; D, flower complete with bracteole,  $\times 2$ .

Plants parasitic on oak roots, the annual flowering stalks arising from perennial swollen bases, the stems erect, commonly unbranched, grooved, glabrous to sparsely glandular-pubescent, covered with sessile scales (reduced leaves), imbricate below, alternate above; inflorescences spicate, the flowers solitary, sessile or subsessile in the axil of a bract (reduced scale-leaf), each flower subtended by one or two small bracteoles arising from the base of the calyx; calyx tubular, usually cleft anteriorly to below the middle and appearing spathe-like, the limb irregularly dentate or lobate; corolla sympetalous, the tube somewhat ventricose near the base, the limb bilabiate, the upper lip arched, nearly entire or notched or rarely shallowly 3-4-lobate, the lower lip usually trilobate, the lobes subequal, short, usually spreading; stamens 4, exserted, the filaments inserted below the middle of the corolla tube, the anthers bithecaous, the thecae slightly divergent, basally attenuate, glabrous or sparsely pilose; ovary superior, 4-carpellate, unilocular, the 4 placentae parietal; ovules numerous, anatropous; style one, the stigma

capitate; fruit capsular, bivalvate, when immature often partly enclosed by the persistent corolla; seeds numerous.

Haynes recognizes two closely related species, *C. americana* (L.) Wallroth, which he states is limited to the eastern United States and Canada, and *C. alpina* Liebmann, of Mexico and Central America.

**Conopholis alpina** Liebmann, Forh. Skand. Naturf. Möde 4: 184. 1847. *C. sylvatica* Liebmann, l.c. 185. *C. mexicana* Gray ex Watson, Proc. Am. Acad. Sci. 18: 131. 1883. *C. panamensis* Woodson, Ann. Mo. Bot. Gard. 25: 835. 1935. *C. alpina* var. *mexicana* Haynes, Sida 3: 347. 1969.

Parasitic on roots of oak, 1,300–2,200 m.; Jalapa (Volcán de Jumáy, *Steyermark* 32326). Western United States; Mexico to Panama.

Plants glabrous, the swollen basal portions sometimes 15 cm. in diameter; stems erect, 8–28 cm. tall, to 1.2 cm. in diameter; scale leaves broadly triangular to lanceolate, appressed and imbricate, fleshy at first, becoming coriaceous, mostly 10–20 mm. long, acute to acuminate, the veins invisible to obscure in young leaves, in age often becoming more or less prominent; spikes densely flowered; bracts glabrous or minutely glandular-pubescent, 10–22 mm. long, narrowly lanceolate to narrowly triangular, acute to acuminate; bracteoles 1 or 2 or none, mostly 2–6 mm. long; calyx 4–13 mm. long, the tube more or less cylindrical, usually split anteriorly from about half-way from the base, sometimes split to the base (rarely not split); the limb irregularly dentate or lobate, the teeth or lobes acute or rounded; corolla yellowish white to very pale yellow, glabrous, 8–20 mm. long; stamens exerted, the filaments pilosulous above or glabrous, the anthers glabrous or sparsely pilose; style 6–12 mm. long, the stigma capitate; capsule broadly ovoid to ellipsoidal, 8–16 mm. long.

Haynes distinguishes *C. alpina* var. *mexicana* (Gray ex Watson) Haynes, as limited to the western United States and northern Mexico, and states that it differs from the typical variety "by the veins of its leaves and bracts being invisible, by its bracts mostly not concealing the calyx, and by its pubescence being mostly glandular." The single Guatemalan collection of the genus, *Steyermark* 32326, annotated by Haynes in 1968 as *C. alpina* var. *mexicana* is a poor specimen, lacking corollas, and all the calyces and bracts are at least partially broken away. Veins can be seen on the lower scale leaves.

## GESNERIACEAE. Gesneria Family

DOROTHY NASH GIBSON

*References:* Johannes von Hanstein, Die Gesneraceen des Kön. Herbariums und der Gärten zu Berlin, *Linnaea* 26: 145–216, 1853;



27: 693-785, 1854; 29: 497-592, 1857-1858; 34: 225, 462, 1865-1866; Gesneriaceae, in Martius, Fl. Bras. 8(1): 341-448. 1864. Anders Oersted, Centralamericas Gesneraceer, et systematisk, plantegeographisk Bidrag til Centralamericas Flora, 78 pp. 1858. Karl Fritsch, Gesneriaceae, in Engler & Prantl, Pflanzenf. IV (3b): 133-144. 1893; 145-185. 1894; Nachtrage 1: 299-300. 1897; 2: 71. 1900; 3: 317-319. 1908; Beiträge zur Kenntnis der Gesnerioideae, in Engler Bot. Jahrb. 50: 392-439. 1913. Paul C. Standley, Gesneriaceae, in Trees and Shrubs of Mexico, Contr. U. S. Nat. Herb. 23: 1325-1331. 1926. Conrad V. Morton, Gesneriaceae, in Standley, Flora of Costa Rica, Field Mus. Bot. 18: 1137-1187. 1938. Hermano Alain, Gesneriaceae, in León y Alain, Flora de Cuba 4: 451-472. 1957. Harold E. Moore, Jr., African Violets, Gloxinias, and their Relatives, 323 pp. 1957. A. J. M. Leeuwenberg, The Gesneriaceae of Guiana, Acta Bot. Neerl. 7: 291-444. 1958.

Terrestrial or epiphytic herbs and shrubs from scaly rhizomes, stolons, or tubers, erect, pendent, or more or less scandent, usually pubescent, rarely glabrous, the indument commonly of multiseptate hairs; stems simple or branched; leaves usually opposite, sometimes whorled, sometimes in basal rosettes, rarely alternate, petiolate, those of a pair often unequal or subequal, the blades entire, serrate, dentate, or crenate; inflorescences axillary, the often bracteate pedicels solitary, geminate, or clustered in the upper leaf axils (when the upper leaves are reduced, the areas of inflorescence appearing racemose), or the pedicels arising from a common peduncle and the cymose inflorescence then appearing subumbelliform; flowers perfect; calyx free or more or less connate with the ovary, often colored, the 5 lobes free or connate, usually valvate, often unequal or subequal, entire or incised; corolla gamopetalous, erect, oblique, or horizontal in the calyx, the tube often saccate or calcarate at the base, cylindric, ventricose, or ampliate above, the limb bilabiate or almost regular, the lobes spreading or erect, often broad, entire or denticulate or fimbriate; stamens 4 (in ours), didynamous, a staminode sometimes present, the filaments inserted near the base of the corolla, often connate; anthers commonly quadrate to oblong, sometimes obovate, subglobose, heart-shaped, or reniform, frequently coherent, the thecae discrete or confluent, dehiscent by longitudinal slits for all or only part of their length; ovary superior or partly or wholly inferior, unilocular, the 2 parietal placentae bilobate; ovules very numerous, anatropous, on funicles that are often fleshy, borne on the inner surface of the placentae or on both the inner and outer surfaces; style simple, elongated; stigma usually bilobate or stomatomorphic, rarely capitate; disc annular or of distinct or united glands, rarely absent; fruit capsular and variously dehiscent, often bivalvate, or indehiscent and berrylike; seeds numerous, minute, usually more or less fusiform.

Nearly 100 genera, widely distributed in tropical regions of the world, with about half that number in the New World. Sixteen are known from Guatemala. *Chrysothemis friedrichsthaliana* (Hanst.) Moore (Baileya 2: 86. 1954) has been omitted from the flora. Although based upon specimens supposed to have been collected in

Guatemala by Friedrichsthal, the plant has not been found later in Guatemala, but has been collected frequently in Costa Rica and Panama where many of Friedrichsthal's "Guatemalan" plants are known to have been collected.

Ovary superior or nearly so.

Leaves alternate; flowers secund in lax, terminal racemes; corollas bright blue. . . . . *Rhynchoglossum*.

Leaves opposite, whorled, or crowded at the apex of the stem and appearing rosulate; flowers axillary, solitary, or disposed in fascicles or cymes, these sometimes pedunculate and subumbelliform, or the inflorescence rarely appearing racemose as in *Recksteineria* but then flowers opposite and the racemes very leafy; corollas variously colored but not blue.

Calyx lobes shorter than the tube (in ours); leaves often in whorls.

*Recksteineria*.

Calyx lobes longer than the tube; leaves never in whorls.

Plants acaulescent or with a very short, naked stem below a rosette-like cluster of leaves; corollas about 12 mm. long; disc absent *Napeanthus*.

Plants with elongated leafy stems, the leaves never in a rosette-like cluster; corollas 2-8 cm. long; disc present.

Anthers with thecae confluent at the apex; disc annular or rarely semi-annular; plants always terrestrial. . . . . *Besleria*.

Anthers with thecae distinct; disc reduced to 1, 3, 4, or rarely 5 glands; plants epiphytic or terrestrial.

Corollas conspicuously bilabiate, the upper lip trilobate, the middle lobe galeiform with 2 lateral lobes spreading from it. . . *Columnnea*.

Corollas nearly regular or if bilabiate, the upper lip never galeiform.

Anthers with thecae separated by a broad connective; leaves small, mostly 2-6 cm. long, always glabrous. . . . . *Codonanthe*.

Anthers with thecae not separated by a broad connective; leaves mostly 6-45 cm. long, usually more or less pubescent (rarely glabrous).

Anthers narrowly oblong, appearing sagittate at the base, united by their inner faces with the pores (at the base of the thecae) uppermost until pollen is shed; corolla tube ampliate upward, not contracted below the lobes, the limb more or less bilabiate and somewhat spreading. . . . . *Drymonia*.

Anthers suborbicular, not sagittate at the base, united by their tips, thecae fully dehiscent; corolla tube usually somewhat ventricose and more or less contracted below the lobes of the nearly regular limb (except in *A. cucullatus*, when the corolla is somewhat ampliate in the throat, with an obliquely bilabiate limb). . . . . *Alloplectus*.

Ovary wholly or partly inferior.

Corollas subrotate, the tube 1-2 mm. long, much shorter than the limb.

Anthers obovate to subglobose; thecae distinct. . . . . *Phinaea*.

Anthers oblong; thecae confluent at the apex. . . . . *Niphaea*.

Corollas tubular to campanulate, the tube equalling or longer than the limb.

Fruiting calyx tube long-cylindric; disc absent. . . . . *Monopyle*.

Fruiting calyx tube turbinate or hemispheric; disc present.

Inflorescence racemose; corollas 1-1.4 cm. long (in ours); disc glands linear. . . . . *Diastema*.

Inflorescence not racemose; corollas 1.5-6.5 cm. long; disc glands not linear.

Plants epiphytic and scandent (in ours); corolla pale green, spotted with maroon. . . . . *Campanea*.

Plants terrestrial, erect; corollas never green.

    Calyx tube prolonged far above the ovary. . . . . *Solenophora*.

    Calyx tube not prolonged above the ovary.

        Corolla limb broad, the lobes broad and spreading; disc annular, usually entire and cuplike (rarely divided and more or less bilobate in *A. erecta*). . . . . *Achimenes*.

        Corolla limb narrow, the lobes short, not spreading; disc usually of 5 glands, or 2 of the glands connate, or rarely all united to form an entire, crenate annulus, but this never cuplike. . . . *Kohleria*.

## ACHIMENES Persoon

Perennial, terrestrial, pubescent or glabrous herbs from scaly rhizomes, the stems simple; leaves opposite or ternate, petiolate, those of a pair subequal or unequal, the blades usually thin, dentate or serrate; inflorescences axillary, the pedicels solitary or geminate or one to several on a common peduncle; calyx tube turbinate, adherent to the ovary, the 5 lobes free, entire; corolla usually salverform funnellform, sometimes almost campanulate, the tube erect or oblique in the calyx, often saccate or calcarate at the base, the limb almost regular or somewhat bilobate, the 5 lobes broad; stamens 4, didynamous, the filaments inserted near the base of the corolla tube, the anthers united to form a square, the thecae distinct; a small staminode often present; disc annular, often cuplike, usually entire but rarely divided and appearing lobate, glabrous; ovary half or almost wholly inferior, the style elongated, the stigma stomatomorphic or more or less distinctly bilobate; fruit capsular, convex or short-conic at the apex, bivalvate; seeds small, numerous.

About 30 species, all in tropical America, with eight in Guatemala.

Corolla oblique in the calyx, the tube conspicuously saccate or calcarate at the base.

    Corolla purple or red-violet, not spotted, the tube slender, scarcely ampliate upward, calcarate at the base, the spur about half as long as the calyx lobes, the limb commonly 3-5 cm. in diameter. . . . . *A. grandiflora*.

    Corolla orange-red, rose, yellow, or straw-colored, more or less spotted or marked, at least in or near the throat, the tube gradually ampliate upward, saccate at the base, the limb commonly 1.5-2.5 cm. in diameter.

    Leaves mostly 5-10 cm. long; corolla finely puberulent to glabrate, the tube orange-red or rose; stigma bilobate.

    Calyx lobes oblong-ovate to broadly triangular, 3-4 mm. long; corolla bright orange-red, the limb 1.5-2 cm. in diameter, prominently spotted or marked with darker red, the lobes 3-7 mm. long, entire or nearly so. . . . . *A. pedunculata*.

    Calyx lobes lanceolate to linear-lanceolate, 5-7 mm. long; corolla rose, the limb 2-2.5 cm. in diameter, only minutely red-spotted near the throat, the lobes 6-10 mm. long, somewhat crenate or minutely denticulate. . . . . *A. skinneri*.

    Leaves mostly 1.5-6 cm. long; corolla pilose with multi-septate hairs, the tube pale yellow or straw-colored with broken maroon or reddish lines outside; stigma stomatomorphic. . . . . *A. antirrhina*.

Corolla erect in the calyx, the tube only a little dilated at the base, neither saccate nor calcarate.

Corolla commonly 4.5–6.5 cm. long.....*A. longiflora*.

Corolla commonly 0.7–2.5 cm. long.

Leaves with 3–5 pairs of lateral veins; corolla commonly bright red, rose, or pink, the tube nearly cylindric, scarcely ampliate in the throat, the limb flat or nearly so; stigma bilobate.....*A. erecta*.

Leaves with 6–10 pairs of lateral veins; corolla white, usually with lavender, purple, maroon, or brownish markings, the tube gradually ampliate upward, the limb not flat; stigma stomatomorphic.

Stems densely glandular-pilosulous or glandular-villous; calyx lobes about 2 mm. wide at base; corolla tube with 2–3 pouches on underside.

*A. misera*.

Stems glabrate or only sparsely villous; calyx lobes about 1 mm. wide at base; corolla tube lacking pouches on underside.....*A. candida*.

**Achimenes antirrhina** (DC.) Morton, Kew Bull. 1936: 11. 1936. *Gloxinia antirrhina* A. DC. in DC. Prodr. 7: 534. 1839. *Trevirana maculata* Mart. & Gal. Bull. Acad. Brux. 9(2): 36. 1842. *A. foliosa* Morren, Ann. Soc. Gand. 2: 403. t. 91. 1846.

Damp or wet mountain forest, often on rocks in ravines, 1,300–3,000 m.; Huehuetenango. Mexico (Chiapas).

Slender, erect herbs 5–45 cm. tall, the stems simple, more or less pilose; leaves opposite, those of a pair unequal or subequal, on petioles mostly 0.5–3 cm. long, the blades ovate to lance-ovate, mostly 1.5–6 cm. long, acute to acuminate, rounded to subcordate and usually oblique at the base, the margins serrate, sparsely or rather densely pilose or pilosulous on both surfaces, often reddish beneath and more densely pilose on veins and costae beneath, the lateral veins 5–8 pairs; peduncles axillary, 0.5–2.5 cm. long (rarely obsolete), the flowers solitary on bracteate pedicels 1–2 cm. long; calyx lobes oblong-ovate to oblong-lanceolate, 5–7 mm. long, 2–3 mm. broad, pilose; corolla oblique in the calyx, 3–3.5 cm. long, the tube pale yellow or straw-colored with broken maroon or reddish lines outside, saccate at the base, pilose with multiseptate hairs, the limb more or less bilabiate, the lobes yellow outside, bright red inside, the 2 upper lobes shorter, reflexed, 5–6 mm. long, the lower ones commonly 7–10 mm. long and spreading; stigma stomatomorphic.

**Achimenes candida** Lindl. Journ. Hort. Soc. London 3: 317. 1848. *Diastema gracilis* Regel, Flora 32: 180. 1849 (type said to have been collected in Guatemala between Guatemala and Zacapa, by *Warscewicz*). *A. gracilis* Warsc. ex Regel, l.c. *Dicyrta candida* Hanst. Linnaea 27: 714, 754. 1854. *Kohleria saxicola* Brandege, Univ. Calif. Publ. Bot. 6: 66. 1914. *A. saxicola* Morton, Kew Bull. 1936: 14. 1936.

Usually in dense wet, mountain forest, sometimes in second-growth thickets, often on rocks, 1,200–2,500 m. (type said to have been collected in Guatemala by *Skinner*) Chimaltenango; Huehue-

tenango; Quezaltenango; El Quiché; Sacatepéquez; Santa Rosa; Suchitepéquez. Mexico; Costa Rica; Panama.

Slender herbs, erect or ascending, 6-45 cm. tall, the stems simple, glabrate or only sparsely villous, often red or purplish; leaves opposite, those of a pair usually very unequal, on petioles mostly 0.5-4 cm. long, the blades thin, ovate to elliptic or lance-oblong, mostly 3-8 cm. long, 1.5-5 cm. wide, acuminate or long-acuminate, obliquely rounded or cuneate at the base, the margins serrate, sparsely villous above, more or less villous beneath, especially on costae and veins, rarely almost glabrous, lateral veins 6-10 pairs; inflorescence axillary, the pedicels solitary or several on a very short, bracteate peduncle or the peduncle obsolete; calyx pilosulous or almost glabrous, the lobes linear or linear-lanceolate, 4-6 mm. long, about 1 mm. wide at base; corolla 15-25 mm. long, the tube white outside, sometimes marked with maroon, yellow within throat and often flecked with red or maroon, the lobes white, the tube erect in the calyx, somewhat dilated at the base but not saccate nor calcarate, glabrous or nearly so, the limb 12-18 mm. broad, the lobes undulate and almost entire to erose-denticulate; filaments of stamens glabrous; style glabrous or nearly so, the stigma stomatomorphic.

**Achimenes erecta** (Lam.) H. P. Fuchs, Act. Bot. Neerl. 12: 15. 1963. *Columnnea erecta* Lamareck, Encycl. Method. Bot. 2(1): 66. Oct. 1786. *Buchnera coccinea* Scopoli, Del. Fl. et Faun. 2: 10. t. 5. Nov. 1786. *C. humilis* Meerburg, Pl. Rar., ed. 2: 54. f. 2. 1789. *Cyrilla pulchella* L'Her. Stirp. Nov., Fasc. 6: 147. t. 71. 1791. *A. coccinea* Pers. Syn. Pl. 2: 169. 1807. *A. tenella* A.DC. in DC. Prodr. 7: 536. 1839. *A. rosea* Lindl. in Edwards' Bot. Reg. 27: t. 65. 1841 (based on plants grown in England, sent from Guatemala by Hartweg). ?*A. autumnalis* Hanst. Linnaea 27: 724, 744. 1854 (believed to have been of Guatemalan origin). *A. pulchella* Hitchcock, Ann. Rept. Mo. Bot. Gard. 4: 114. 1893. *Clarincillo* (Huehuetenango); *flor de piedras*, British Honduras.

Damp or wet, shaded, shrubby slopes, river bluffs, along road-banks, and in forest, frequently in rocky places, 900-1,970 m.; Chiquimula; Guatemala; Huehuetenango; Jalapa; El Quiché; Sololá; Zacapa. Mexico; British Honduras; Honduras; Costa Rica; Panama; West Indies.

Slender herbs, commonly 5-20 cm. tall, rarely to 40 cm., erect or ascending, the stems villous or pilosulous; leaves opposite or ternate, short-petiolate, those of a pair subequal, the blades ovate to elliptic, mostly 1-5 cm. long, acute or sub-obtuse, acute or rounded at the base, thinly or densely villous or pilose on both surfaces, often reddish or purplish beneath, especially on the costae and veins, the margins serrate-dentate with only 5-10 teeth on each side, the lateral veins 3-5 pairs; pedicels axillary, solitary or geminate, 1-3 cm. long, the common peduncle usually obsolete and the pedicels ebracteate, or rarely the bracts minute and inconspicuous; calyx densely pilosulous, the tube 1-2 mm. long, the lobes

2-5 mm. long, linear to linear-lanceolate; corolla commonly red or rose (rarely pink or white with red, orange, or purplish markings), puberulent or almost glabrous, commonly 15-25 mm. long, erect in the calyx, the tube nearly cylindrical, slightly dilated at the base but neither saccate nor calcarate, little ampliate above, the lobes spreading, the limb usually flat or nearly so, 8-18 mm. in diameter; disc entire or sometimes divided and bilobate; stigma shallowly bilobate.

The flowers of the form with small white corollas (7-15 mm. long), the tube variously marked with color, superficially resemble the flowers of *A. misera* Lindl. or *A. candida* Lindl., especially since the bilobate stigma is not easily seen (the stigmas of *A. misera* and *A. candida* are stomatomorphic). However, the leaves of these two species are larger, usually with 6-8 pairs of lateral veins and the margins with 15-30 or more teeth on each side.

***Achimenes grandiflora*** (Schiede) A. DC. in DC. Prodr. 7: 536. 1838; Hooker in Curtis' Bot. Mag. 69: t. 4012. 1843. *Trevirana grandiflora* Schiede, Linnaea 8: 247. 1833. *A. grandiflora* var. *incisa* Hanst. Linnaea 27: 710. 1854. *A. incisa* Klotzsch ex Oersted, Vidensk. Selsk. Skr. V. 5: 19. 1858. *Flor de Jesus; ji-tit* (Huehuetenango); *maravilla* (Guatemala).

Damp or wet, mixed forest or pine forest, often on bluffs or rocky cliffs, 700-2,400 m.; Alta Verapaz; Chimaltenango; Chiquimula; Guatemala; Huehuetenango; Jalapa; Santa Rosa. Southern Mexico; Honduras; Costa Rica.

Erect herbs to 60 cm. tall, the stems simple, often red or purplish, thinly villous; leaves opposite, those of a pair subequal, on petioles 0.5-6 cm. long, the blades ovate to broadly lanceolate, mostly 3-12 cm. long, acuminate, usually oblique at the base, cuneate, rounded, or subcordate, the margins coarsely serrate, more or less short-villous on both surfaces, usually sparsely so above, paler beneath or sometimes reddish, lateral veins 6-10 pairs; inflorescences axillary, the common peduncle obsolete, or if present not more than 1 cm. long, the pedicels solitary, bracteate, usually shorter than the leaves; calyx tube villous or pilose, often densely so, the lobes linear, acute, mostly 5-12 mm. long, more or less villous or sometimes scabrous; corolla purple or red-violet, not spotted, oblique in the calyx, 3.5-6 cm. long, conspicuously calcarate at the base, the spur about half as long as the calyx lobes, the tube pilose, slender, scarcely ampliate upward, abruptly expanded into the broad limb, this commonly 3-5 cm. in diameter, the lobes spreading, entire or crenulate; style pilosulous or puberulent; stigma bilobate.

Plants with considerably smaller corollas, the limb only 2-2.5 cm. in diameter, are infrequently seen, but appear to conform in other respects.

***Achimenes longiflora*** A. DC. in DC. Prodr. 7: 536. 1839; Lindley in Edwards' Bot. Reg. 28: t. 19. 1842; Moore, African

Violets, Gloxinias, and their Relatives: 107. 1957. *A. kleei* Paxton, Mag. Bot. 16: 289. 1849 (described from plants cultivated in England from material sent from Guatemala by Skinner). *A. longiflora* var. *alba* Haage ex v. Houtte, Fl. Serres 5: t. 536. 1849. *A. longiflora* var. *latifolia* Hanst. Linnaea 27: 706. 1856. *A. longiflora* var. *nobilis* Hanst. l.c. *A. longiflora* vars. *albida*, *ilicifolia*, *jauregiana*, *margaritae*, *rosea*, *sessilis* Hanst. op. cit. 708. *A. pauciflora* Oersted, Vidensk. Selsk. Skr. V. 5: 17. 1858. *Corazón de roca*; *maravilla celeste* (Guatemala); *pensamiento de monte* (Huehuetenango); *flor de pájaro* (Jalapa).

Usually on damp or wet, steep, shaded banks and cliffs, sometimes on rocks, in forest, often in pine forest, 250–2,600 m.; Chimaltenango, Chiquimula; Escuintla; Guatemala; Huehuetenango; Jalapa; Jutiapa; El Progreso; Quezaltenango; El Quiché; Sacatepéquez; Santa Rosa; Sololá; Suchitupéquez; Zacapa. Southern Mexico; Honduras and El Salvador to Panama.

Erect or ascending, slender herbs, the stems simple, 10–40 cm. tall, often reddish, villous; leaves opposite or ternate, short-petiolate, the blades ovate to lanceolate, mostly 2–8 cm. long, acute, cuneate at the base, thinly or densely short-villous, paler beneath or often reddish or purplish, margins serrate, the lateral veins 3–5 pairs; flowers axillary, solitary, subsessile or on pedicels 2–10 mm. long; calyx tube densely villous, the lobes linear-lanceolate, 7–12(15) mm. long, long-ciliate but otherwise nearly glabrous or only sparsely pubescent; corolla commonly purple or blue, but in some forms rose or white, or the tube white with purple lobes, usually white in the throat, commonly 3.5–6.5 cm. long, the slender tube erect in the calyx, neither saccate nor calcarate at the base, glabrous, not dilated above, abruptly expanded into the flat limb, this commonly 4–6 cm. broad, the lobes entire; style more or less puberulous; stigma bilobate.

This is probably the most common and certainly the most attractive species found in Central America.

**Achimenes misera** Lindl. Journ. Hort. Soc. London 3: 319. 1848; Morton, Bailey 10: 150. 1962. *Dicyrta warszewicziana* Regel, Flora 32: 181. 1849 (type a cultivated plant grown from material sent from Guatemala by *Warszewicz*). *A. warszewicziana* E. Otto ex Regel, l.c. *nomen*, in syn. *A. warszewicziana* H. E. Moore, Bailey 10: 45. 1962; The Gloxinian 12(6): 149. 1962. *A. calderonii* Standley, Field Mus. Bot. 8: 150. 1930.

Damp or wet, shaded banks, often on rocks, 300–2,000 m., Chiquimula; Escuintla; Huehuetenango; Jalapa; Santa Rosa; Zacapa. Mexico; El Salvador; Honduras.

Slender, weak, usually erect herbs, the stems simple, mostly 10–30 cm. tall, rather densely glandular-villous; leaves opposite, or sometimes ternate or quarter-

nate, those of a pair unequal or subequal, on petioles mostly 0.3–2.5 cm. long, the blades very thin, elliptic-oblong, ovate-elliptic, oblong-ovate, or almost lanceolate, mostly 2.5–8 cm. long, 1–4 cm. wide, acute to long-acuminate, acute to rounded at the base and asymmetric, the margins serrate or crenate, sparsely or densely villosulous above, usually more densely so beneath and more or less glandular, often densely viscid-villosulous on the veins and costae beneath, the lateral veins mostly 6–8 pairs; flowers axillary, usually solitary, sometimes geminate, the pedicels slender, longer than or about equalling the petioles; calyx glandular-villosulous, the tube at anthesis little more than 1 mm. long, but 2–4 mm. long in fruit, the lobes narrowly ovate to oblong-lanceolate, 4–7 mm. long, almost 2 mm. wide at base, acute or acuminate, often recurving in fruit; corolla 9–14 mm. long, the tube white with maroon or purplish spots or flushed with lavender, narrow but gradually ampliate toward the throat, the lobes white, 2–4 mm. long; filaments of stamens glabrous; stigma stomatomorphic.

Moore and Morton recognize *A. warszewicziana* as a distinct species, based on whether the corolla tubes have two or three grooves on the underside and on whether the color on the tubes is in spots or in patches, but I am unable to distinguish either of these characters on herbarium material. Of the grooves on the corolla tubes, Morton states in part, "These characters are doubtless easily visible in fresh flowers but are not readily seen in dried material. . ." Of the color, he states, "The corollas of *A. warszewicziana* are strongly and obviously purple-spotted on the tube, whereas those of *A. misera* are essentially unspotted, at least in dried material." This statement is followed by Moore's footnote, "The colors in living flowers are more pronounced. The corolla of *A. warszewicziana* is spotted with red or red-brown to maroon, that of *A. misera* is flushed with lilac patches below the lobes on the inner surface of the tube." Morton also stated that the leaf blades of *A. warszewicziana* are "strongly resinous-glandular beneath, but those of *A. misera* are not, or at least not obviously so." However, indument on leaves of specimens annotated by both Morton and Moore varies considerably, even on the same plant, and this character cannot be relied upon.

**Achimenes pedunculata** Benth. Pl. Hartweg. 78. 1841 (type from Santa Maria—perhaps Santa Mariá de Jesús, Sacatepéquez—*Hartweg 546*); Lindley in Edwards' Bot. Reg. 28: t. 31. 1842; Hooker in Curtis' Bot. Mag. 70: t. 4077. 1844; Moore, African Violets, Gloxinias, and their Relatives: 109. 1957. *Locheria pedunculata* Regel, Flora 31: 252. 1848. *Ji-lit* (Huehuetenango).

Damp or wet, shaded banks or rocks, usually in dense, mixed forest, 1,200–2,000 m.; Chimaltenango; Guatemala; Huehuetenango;



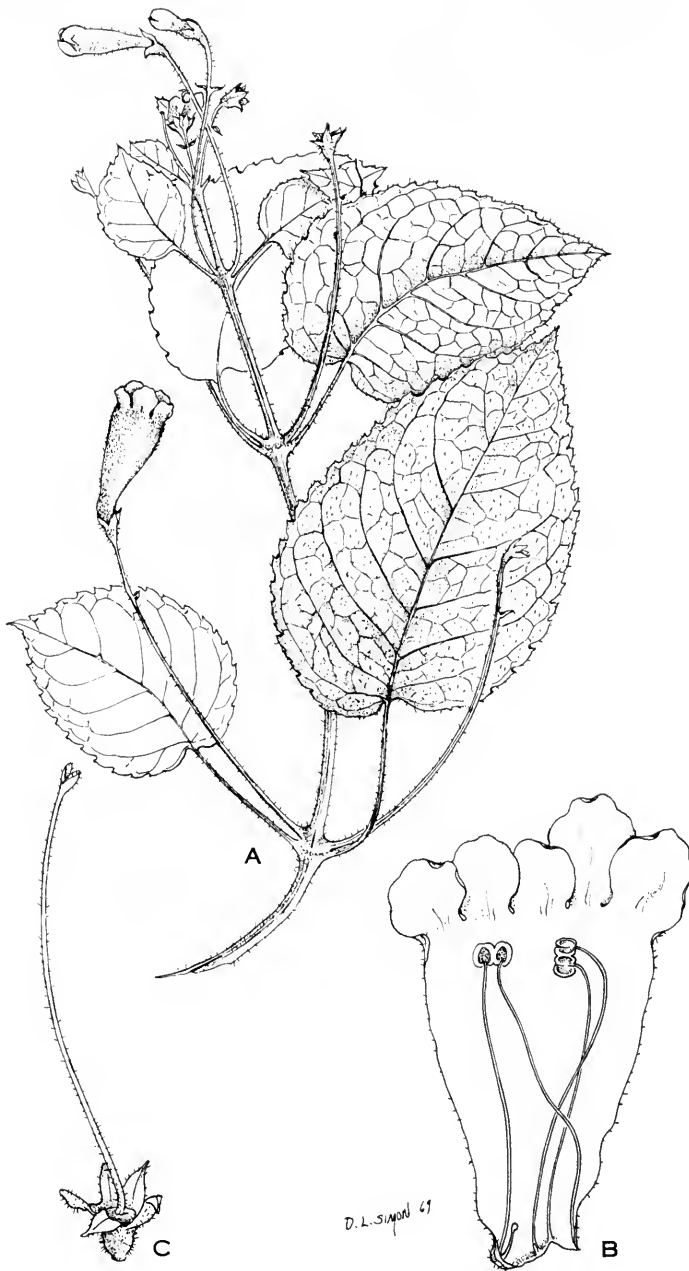


FIG. 43. *Achimenes pedunculata*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and staminodes,  $\times 1\frac{1}{2}$ ; C, calyx and pistil,  $\times 1\frac{1}{2}$ .

Sacatepéquez; Santa Rosa. Southern Mexico; Honduras; Costa Rica; Panama; Colombia.

Erect herbs to nearly a meter tall, the stems pilosulous or sometimes glabrate, often purplish or reddish; leaves opposite, those of a pair usually subequal, sometimes unequal, on petioles 0.5–4 cm. long, the blades ovate, mostly 4–14 cm. long, abruptly acuminate, obliquely rounded or subcordate at the base, the margins serrate, usually sparsely villous or villosulous above, paler beneath and puberulent, the lateral veins (6)8–12 pairs; pedicels axillary and solitary or 1-several on a common peduncle 2.5–8 cm. long, the pedicels 3–8 cm. long, bracteate, frequently bearing small, bracteolate clusters of tiny, scale-like propagules (these also sometimes occurring in the upper leaf axils); calyx lobes oblong-ovate and abruptly acuminate or broadly triangular, 3–4 mm. long, densely puberulent; corolla 2.5–3.5 cm. long, the tube bright orange-red, sometimes orange or yellow on the underside beneath the throat, puberulous, oblique in the calyx, saccate at the base, the sac about 1 mm. long, the tube gradually ampliate upward, yellow inside, the limb oblique, the lobes 3–7 mm. long, orange-red, prominently lined and spotted with darker red, rounded, entire or nearly so; stigma bilobate.

**Achimenes skinneri** Gordon ex Lindl. Journ. Hort. Soc. London 2: 293, t. 4, f. 2. 1847; Moore, African Violets, Gloxinias, and their Relatives: 110. 1957. *A. hirsuta* Lindl. in Edwards' Bot. Reg. 29: t. 55. 1843 (based on plants grown in England from material sent from Guatemala by *Skinner*); Hooker in Curtis' Bot. Mag. 71: t. 4144. 1845, non *A. hirsuta* A. DC. in DC. Prodr. 7: 536. 1839. *Locheria hirsuta* Regel, Flora 31: 252. 1848.

Damp or wet banks or slopes in forest, 1,000–1,700 m.; Alta Verapaz; Baja Verapaz; Chiquimula; Sacatepéquez. Honduras; Costa Rica.

Erect or ascending herbs, the stems 15–60 cm. tall (in ours, but said to attain almost a meter in height), more or less pilosulous or glabrate, often reddish; leaves opposite, those of a pair usually subequal, sometimes unequal, on petioles mostly 0.5–4 cm. long, the blades broadly ovate to elliptic-ovate, mostly 3–9 cm. long, abruptly acuminate, rounded and oblique at the base, the margins rather coarsely serrate, sparsely or densely villous or villosulous above, paler beneath or sometimes reddish, puberulent, the lateral veins 6–8 pairs; common peduncle obsolete (in ours), the pedicels axillary, solitary, bracteate, pubescent, 2.5–8 cm. long, frequently bearing, near the middle, small, linear, inconspicuous, often caducous bracteoles, in the axils of which are borne clusters of tiny, scale-like propagules; calyx lobes lanceolate to linear-lanceolate, 5–7 mm. long, densely pubescent; corolla 3–4 cm. long, the tube rose, usually flushed with yellow beneath the throat, more or less puberulous, oblique in the calyx, saccate to very short-calcarate at the base, the sac or spur only 1–2 mm. long, the tube gradually ampliate upward, yellowish inside and only minutely red-dotted near the throat, the limb oblique, the lobes clear rose to purplish rose, 6–10 mm. long, rounded, somewhat crenate or minutely denticulate; stigma bilobate.

## ALLOPLECTUS Martius

*Reference:* W. T. Stearn, The Jamaican Species of *Columnea* and *Alloplectus* (Gesneriaceae), Bull. Brit. Mus. Bot. 4: 181-236. 1969.

Shrubs or herbs, usually epiphytic, occasionally terrestrial; leaves opposite, those of a pair equal, subequal, or unequal, petiolate, the blades entire or more or less serrate or denticulate; inflorescences axillary, bracteate, the flowers usually pedicellate, often fasciculate, sometimes short-racemose, rarely solitary; calyx often colored, the 5 lobes free, entire, incised, or dentate; corolla erect or oblique in the calyx, gibbous at the base, the tube cylindrical or more or less ventricose, usually somewhat contracted in the throat, very rarely a little ampliate upward, the limb narrow, nearly regular, the 5 lobes short, rounded, commonly entire; stamens 4, didynamous, the filaments connate at the base, the anthers first united in pairs by their tips, later free, thecae parallel, suborbicular (in ours), fully dehiscent; disc gland large, usually solitary, sometimes smaller glands present; ovary superior; stigma usually bilobate; fruit typically a bivalvate capsule but sometimes berrylike and indehiscent; seeds minute, shining, more or less ellipsoidal, striate.

About 80 species, all in tropical America, with five in Guatemala.

Plants always terrestrial; calyx segments concave and cucullate at the apex; corolla not ventricose, somewhat ampliate in the throat, the limb oblique.

Stems and lower leaf surfaces pilose . . . . . *A. cucullatus*.

Stems and lower leaf surfaces more or less strigose . . . . . *A. cucullatus*  
var. *substrigosus*.

Plants either epiphytic or terrestrial; calyx segments not as above; corolla more or less ventricose, more or less constricted in the throat, the limb nearly regular.

Leaves of a pair very unequal, the larger ones 9-10 times longer than the smaller ones . . . . . *A. viridis*.

Leaves of a pair mostly subequal to equal.

Leaves densely velutinous-sericeous on both surfaces; calyx segments ovate, entire . . . . . *A. calochlamys*.

Leaves not velutinous-sericeous; calyx segments not ovate, the margins more or less subulate-dentate.

Leaves with about 5 pairs of lateral veins; calyx segments spatulate-oblong . . . . . *A. calotrichus*.

Leaves with 7-9 pairs of lateral veins; calyx segments linear-lanceolate. *A. vinaceus*.

**Alloplectus calochlamys** Donn.-Sm. Bot. Gaz. 27: 437. 1899.

*Columnea calochlamys* Morton, Bol. Soc. Venez. Cienc. Nat. 23: 78. 1962.

Often on limestone in open places or thickets, rarely epiphytic in forest, 500-1,350 m.; Alta Verapaz (type from Sacoyoju, *Tuerckheim* 456).

Terrestrial or epiphytic, shrubby plants, usually erect and 30-60 cm. tall, the stems stout, simple, densely pilose with long, appressed, white hairs; leaves of a



FIG. 44. *Alloplectus calochlamys*. A, habit,  $\times \frac{1}{2}$ ; B, calyx opened to show corolla in early anthesis,  $\times 1\frac{1}{4}$ ; C, corolla opened to show pistil and stamens,  $\times 3$ ; D, detail of corolla lobe,  $\times 6$ .

pair subequal or unequal, the petioles stout, 0.5-3 cm. long, the blades thick, oblong-lanceolate, mostly 6-20 cm. long, 1.5-6 cm. wide, acute, attenuate to the base and often oblique, velutinous-sericeous on both surfaces, the margins serrate; inflorescence axillary, bracteate, the bracts linear, mostly 1-1.5 cm. long; pedicels 1-3 in leaf axils, 0.5-4 cm. long; calyx 1.5-2 cm. long, densely sericeous, the segments more or less ovate, usually red, obtuse or acute, entire; corolla red, but so densely sericeous with light tan to nearly white hairs that the color may be seen only on the tips of the lobes, the tube cylindric, slightly gibbous at the base, appearing straight due to the dense indument but actually slightly ventricose, commonly 2-2.5 cm. long, narrowed below the short lobes; anthers coherent in pairs, thecae parallel, suborbicular, fully dehiscent; staminode often present; ovary villous; disc gland solitary, bifid; fruit not seen.

***Alloplectus calotrichus*** (Donn.-Sm.) Stearn, Bull. Brit. Mus. Bot. 4(5): 189. 1969. *Columnea calotricha* Donn.-Sm. Bot. Gaz. 40: 9. 1905; Leeuwenberg, Acta Bot. Neerl. 7: 385. 1958.

Known in Guatemala only from the type, Alta Verapaz, Cubilguitz, 350 m., *Tuerckheim 8542*. Costa Rica; Suriname; French Guiana.

Epiphytic or terrestrial, usually shrubby plants, more or less pilose throughout, 10-30 cm. tall (in ours), the stems ascending, simple or branched, densely hirsute with reddish, multiseptate hairs; leaves of a pair usually subequal (rarely those of an occasional pair conspicuously unequal), the petioles pilose, 0.5-2.5 cm. long, the blades oblong-elliptic, mostly 6-12 cm. long, 2-5 cm. wide, acute or obtuse, cuneate and usually oblique at the base, pilose on both surfaces, red or purplish beneath, the lateral veins about 5 pairs, the margins obscurely crenulate; inflorescences axillary, the pedicels usually fasciculate, rarely solitary, 3-10 mm. long; bracts linear or oblong, acute, 5-9 mm. long; calyx 12-20 mm. long, the segments reddish, spatulate-oblong, acute, subequal, usually very sparsely and irregularly subulate-dentate, more or less pilose on both surfaces, especially near the apex; corolla orange-yellow, when young often appearing red due to the dense red indument on the outside, 2-3 cm. long, the tube slightly ventricose, gibbous at the base, only a little narrowed or contracted in the throat, the lobes 3-4 mm. long; anthers coherent in pairs, thecae parallel, suborbicular, fully dehiscent; disc gland solitary; fruit said to be red, ovoid, about 16 mm. long.

***Alloplectus cucullatus*** Morton, Contr. U. S. Nat. Herb. 29: 36. 1944.

Dense, wet, mixed forest, 750-2,000 m.; Alta Verapaz; El Quiché (type from forest in the Zona Reina, *Skutch 1812*); Huehuetenango. Mexico (Chiapas); Nicaragua.

Shrubs or herbs 1-3.5 m. tall, erect or ascending, usually simple, the young stems densely villous; leaves of a pair subequal to equal, long-petiolate, the blades elliptic or obovate-elliptic, mostly 12-30 cm. long, 5-13 cm. wide, abruptly short-acuminate, obliquely cuneate at the base, appressed-pilose above, pilose beneath with spreading or subappressed hairs, more densely so on costae and veins, the

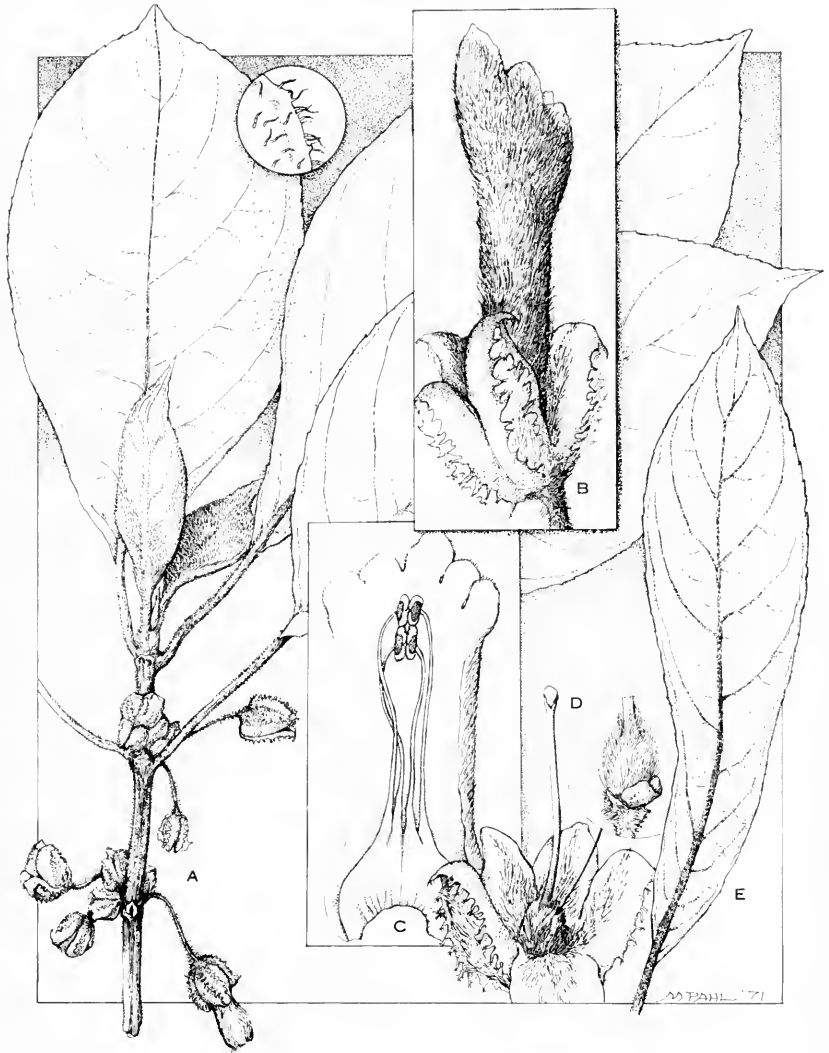


FIG. 45. *Alloplectus cucullatus*. A, section of flowering branch,  $\times \frac{1}{2}$ ; B, flower,  $\times 1\frac{1}{2}$ ; C, corolla opened to show stamens,  $\times 1\frac{1}{2}$ ; D, calyx and pistil,  $\times 1\frac{1}{2}$  (with insert showing large disk gland); E, detail of leaf,  $\times \frac{1}{2}$ .

lateral veins 8-9 pairs, the margins finely serrate; pedicels mostly 2-5 in the leaf axils, commonly 1-4 cm. long; bracts ovate or lance-ovate, mostly 5-8 mm. long, caducous; calyx red, the segments unequal, 4 of them suborbicular and about 2 cm. long, the posterior one smaller, all concave, curving outward and cucullate at the apex, pectinate-dentate, yellow-hirsute at the middle, outside and within; corolla red, 4-5 cm. long, densely pilose outside, oblique in the calyx, saccate at the base, the tube cylindrical but somewhat ampliate toward the throat, the limb oblique and shallowly bilabiate, the short lobes glabrous within; anthers coherent in pairs by their tips, the thecae suborbicular, fully dehiscent; ovary densely hirsute; disc gland solitary, large, bilobate; fruits not seen.

Corollas of these plants have been variously described by collectors as "red," "pink," "orange-red," and "flesh-colored," perhaps because of the heavy yellowish indument.

The corollas of *A. cucullatus* resemble those of *Drymonia* as the tubes are neither ventricose nor constricted in the throat as in typical *Alloplectus* species, and the oblique limb appears somewhat bilabiate. However, *Drymonia* anthers are oblong, sagittate at the base, and are united face to face, not by the tips as are those of this species.

*A. cucullatus* var. *substrigosus* Morton, Contr. U. S. Nat. Herb. 29: 37. 1944.

Dense, wet forest, 1,100-1,600 m., Alta Verapaz (type from Pansamalá, *Tuerckheim 733*).

Differs from the typical form only in the indument of the stems and lower leaf surfaces, which is more or less strigose rather than pilose.

*Alloplectus vinaceus* (Morton) D. Gibson, Phytologia 23: 334. 1972. *Columnea vinacea* Morton, Contr. U. S. Nat. Herb. 29: 38. 1944.

On trees in wet, mixed forest, 1,250-3,000 m.; San Marcos; Sololá (type from southern slopes of Volcán de Atitlán, *Steyermark 47408*); Suchitepéquez.

Shrubby epiphytes, the stems stout, hirsute at the apex; leaves of a pair equal or subequal, on petioles 0.5-2 cm. long, the blades elliptic-oblong to ovate-oblong, mostly 7-19 cm. long, 3-9 cm. broad, acute or acuminate, cuneate at the base and usually oblique, green and more or less pilose above, red or wine-colored beneath (sometimes mottled or speckled with red) and hirsute with subappressed hairs, lateral veins 7-9 pairs, the margins conspicuously serrulate; pedicels 1-2 cm. long; bracts of inflorescence caducous, lanceolate, densely appressed-pilose, about 0.5 cm. long; calyx 10-12(15) mm. long, the segments subequal, linear-lanceolate, acuminate, subulate-dentate, pilose; corolla dull yellow or greenish-yellow, densely pilose outside, 3-4 cm. long, the tube very slightly saccate at base, somewhat ventricose above, contracted in the throat, the limb almost regular, the lobes

subequal, to 5 mm. long, suborbicular, more or less undulate; anthers coherent in pairs, thecae suborbicular, fully dehiscent; ovary densely pilose; disc glands 5, with the 2 posterior ones connate, or 4, with the anterior one sometimes bifid or bilobate; fruits not seen.

A collection from Quezaltenango (*Roe, Roe, and Mori 723*) said to have reddish flowers, appears much like *A. vinacea* but the calyx lobes are somewhat reflexed, and the plants have considerably less indument. The three sheets of this number which I examined all lacked corollas.

***Alloplectus viridis*** (Morton) D. Gibson, *Phytologia* 23: 335. 1972. *Columnnea viridis* Morton, *Contr. U. S. Nat. Herb.* 29: 38. 1944.

Usually in dense, wet, mixed forest, epiphytic or terrestrial, often on limestone, near sea level to 2,000 m.; Alta Verapaz (type from Sepacuité, *Goll 187*); Izabal; Huehuetenango. Mexico (Chiapas); British Honduras; Honduras.

Epiphytic or terrestrial, shrubby plants to 1.5 m., simple or sparsely branched the stems erect, densely hirsute; leaves of a pair very unequal, the larger ones, on petioles 0.3–1.5 cm. long, the blades oblanceolate, mostly 10–25 cm. long, 3–9 cm. wide, abruptly short-acuminate, attenuate to the oblique base, hirsute on both surfaces, more densely so beneath, especially on costae and veins, the hairs spreading, multicellular, the lateral veins 8–9 pairs, the margins inconspicuously denticulate, the smaller leaves sessile, only 1.5–2.5 cm. long, lanceolate, long-attenuate, oblique; flowers 1–3 in an axil, subsessile or very short-pedicellate; bracts ovate-lanceolate or lanceolate, 1.5–2 cm. long, long-acuminate, subulate-dentate, green, long-hirsute; calyx 1.5–2 cm. long, the segments subequal, linear-lanceolate, long-acuminate, subulate-dentate, green, densely long-hirsute; corolla about 2 cm. long, pale yellow or greenish-yellow but appearing red to orange-red due to the dense, indument of long, dark red hairs outside, glabrous within, the tube cylindrical, ecalcarate but gibbous at the base, slightly ventricose but this hidden due to heavy indument, a little narrowed in the throat, the limb nearly regular, the lobes ovate, acute, about 2 mm. long; anthers coherent in pairs, thecae suborbicular, fully dehiscent; ovary hirsute; disc gland solitary, truncate; fruits white, sparsely, hirsute.

These plants are very similar to *A. cubensis* (Urban) Stearn, the only difference apparent in specimens available to me being that the indument on the lower leaf surfaces of *A. cubensis* is appressed rather than spreading. However, our West Indian material is sparse and none of our specimens from that area have mature corollas.

#### BESLERIA L.

*Reference:* C. V. Morton, A revision of *Besleria*, *Contr. U.S. Nat. Herb.* 26: 395–474. 1939.



Shrubs or perennial herbs, terrestrial (in ours), the stems terete or tetragonous; leaves opposite, petiolate, subequal or unequal, the blades more or less elliptic, acute or acuminate, membranaceous to coriaceous, dentate to subentire; inflorescences axillary, often appearing subumbellate when a common peduncle is present or well developed, but appearing fasciculate or cymose when the peduncle is obsolete or inconspicuous, the flowers pedicellate, the pedicels ebracteate, solitary or several; calyx more or less campanulate or urceolate, often brightly colored, the 5 segments imbricate, free or partially connate, usually subequal, entire or unevenly serrulate; corolla tubular, erect, oblique, or horizontal in the calyx, sometimes saccate or calcarate at the base, the tube usually ventricose, the limb regular or irregular, terminal or lateral; fertile stamens 4, didynamous, a staminode sometimes developing, the filaments broad, free, inserted on the base of the corolla tube, usually glabrous; anthers quadrate, coherent when young, bitheous, the thecae confluent at the apex; ovary superior, unilocular, the 2 parietal placentae ovuliferous only on the inner surface; style elongated, the stigma bilobate or stomatomorphic; disc annular or semiannular, glabrous or pubescent, often brightly colored, entire; fruit berrylike, globose, the exocarp thick, verrucose or almost smooth; seeds numerous, minute, red, spirally striate.

About 140 species, all in tropical America, with only four in Guatemala. Other species besides the following occur in other parts of Central America, from Honduras to Panama.

Pedicels solitary in the leaf axils, the common peduncle present but inconspicuous, indicated only by a node or joint; disc densely pubescent; corolla 3-3.5 cm. long, the limb lateral.....*B. pansamalana*.

Pedicels not solitary, the inflorescence appearing fasciculate, umbelliform, or cymose; disc glabrous; corolla 1.5-2.5 cm. long, the limb terminal.

Pedicels sessile or subsessile, the inflorescence appearing more or less fasciculate, the common peduncle obsolete or nearly so; calyx lobes not mucronate; corolla yellow.

Calyx lobes ovate or oblong; corolla about 1.5 cm. long, horizontal in the calyx, the tube conspicuously saccate or short-calcarate at the base.

*B. flava*.

Calyx lobes orbicular; corolla about 2 cm. long, erect in the calyx, the tube only slightly swollen at the base, neither saccate nor calcarate.

*B. conspecta*.

Pedicels pedunculate, the inflorescence appearing umbelliform or cymose; calyx lobes mucronate; corolla orange or orange-red.....*B. laxiflora*.

**Besleria conspecta** Morton, Contr. U. S. Nat. Herb. 26: 424. 1939.

Dense, wet, mixed forest, 1,000-2,000 m.; Huehuetenango; Quezaltenango (type from Palmar, *A. F. Skutch 1413*); San Marcos; Sololá; Suchitepéquez. Mexico (Chiapas).

Slender shrubs (reported also as a small tree) or suffruticose plants, commonly 1-3 m. tall, the branches densely strigose when young; leaves on petioles 1-10 cm. long, the blades obliquely elliptic or oblong-elliptic, commonly 8-25 cm. long and 4-10 cm. wide, acuminate, acute or attenuate to the base, entire or minutely denticulate, bearing a few scattered long hairs on the upper surface, paler beneath



FIG. 46. *Besteria laxiflora*. A, habit,  $\times \frac{1}{2}$ ; B, inflorescences,  $\times 1$ ; C, calyx opened to show pistil,  $\times 2$ ; D, flower,  $\times 2$ ; E, corolla opened to show stamens and staminode,  $\times 2$ .

and sparsely appressed-pilose on the costae and veins, the lateral veins 9-11 (13) pairs; inflorescence appearing fasciculate, the common peduncle obsolete or nearly so, the few pedicels subsessile to sessile, 1-2.5 cm. long, glabrate; calyx pale green, the lobes orbicular, about 5 mm. long, rounded at the apex, glabrous, the margins suberose, ciliolate; corolla yellow, about 2 cm. long, erect, the tube only slightly swollen at the base, about 4 mm. broad at the base, 8 mm. broad above, glabrous outside, the limb terminal, about 8 mm. broad, the lobes about 2 mm. long, equal; filaments of stamens glabrous; ovary and style glabrous; disc annular, glabrous; fruit 4-6 mm. in diameter.

**Besleria flava** Morton, Contr. U. S. Nat. Herb. 26: 463. 1939.

Damp or wet, mixed forest, 850-1,150 m.; Alta Verapaz (type from Quebradas Secas, *Harry Johnson 283*) collected also at Sepacuité and Pansamalá.

Shrubs or herbs 30-60 cm. tall, possibly taller, at least sometimes branched, the stems strigose; leaves on petioles 1.5-6 cm. long, the blades elliptic, commonly 6-18 cm. long and 3-7 cm. wide, acuminate, obliquely cuneate at the base, entire or minutely denticulate, sparsely strigose above, paler beneath, more or less strigose below, especially on the costae and veins, the lateral veins 9-11 pairs; common peduncle obsolete, the pedicels sessile, few-several, 7-15 mm. long, pilose; calyx lobes ovate to oblong, 4-5 mm. long, obtuse, membranaceous, scarious-marginate, more or less puberulent on both surfaces, ciliolate; corolla yellow, 1.4-1.7 cm. long, conspicuously saccate or short-calcarate at the base, horizontal in the calyx, glabrous outside, the tube ventricose, 5-7 mm. broad, the limb terminal, the lobes about 1.5 mm. long, obtuse; filaments of stamens glabrous, about equalling the corolla; ovary and style glabrous or nearly so; disc glabrous, more or less divided into 2 glands.

This has been reported from Guatemala as *B. glabra* Hanst.

**Besleria laxiflora** Benth. Lond. Journ. Bot. 5: 361. 1846. *B. chiapensis* Brandege, Univ. Calif. Publ. Bot. 6: 64. 1914.

Damp or wet, usually dense, mixed forest, 35-1,300 m.; Alta Verapaz; Huehuetenango; Izabal; Petén. Mexico (Chiapas); British Honduras (Pueblo Viejo); Honduras to Panama, along the Atlantic coast; northern South America, southward to the Amazon.

Shrubs or suffrutescent herbs, 0.5-1.5 m. tall, sparsely branched, the young branches densely strigose; leaves on petioles mostly 1.5-7 cm. long, the blades elliptic to narrowly oblong, commonly 8-21 cm. long and 3-8.5 cm. wide, acuminate, cuneate at the base, serrate, serrulate, or almost entire, paler beneath and sparsely strigillose on the costae and veins, the lateral veins 5-10 (13) pairs; inflorescences umbelliform or subcymose, the peduncles commonly 1.5-4.5 cm. long (rarely to 9 cm.), the flowers few, on pedicels 1-3.5 cm. long; calyx 5-14 mm. long, first pale green or yellowish, later usually dull orange to orange-red, the lobes ovate or lanceolate, subcoriaceous, connate only at the base, usually minutely fimbriate, mucronate; corolla orange or orange-red, erect in the calyx, not saccate at the base,



FIG. 47. *Besleria pansamalana*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens,  $\times 1$ ; C, stamen,  $\times 2$ ; D, pistil,  $\times 2$ . (From Plate XVII, Botanical Gazette, 1891.)

2-2.5 cm. long, slightly ventricose, glabrous outside, the limb terminal; ovary glabrous, style puberulent; disc annular; fruits orange.

This species has a much wider range than most others in the genus. It has been reported from Guatemala as *B. mucronata* Hanst. and *B. acutifolia* Hanst.

**Besleria pansamalana** Donn.-Sm. Bot. Gaz. 16: 197. t. 17. 1891.

Damp or wet, usually dense, mixed mountain forest, sometimes on white sand slopes, 1,150-2,800 m.; Alta Verapaz (type from Pansamalá, *Tuerckheim 196*); Baja Verapaz; Chimaltenango; Quezaltenango; El Quiché; Retalhuleu; San Marcos; Suchitpeque.

Erect or ascending, usually simple, more or less succulent herbs, commonly 0.5-1 m. tall, or the main stem repent, elongating as much as 2.4 m., rooting at the nodes and internodes, with lateral branches erect, nearly a meter tall, the young stems densely canescent or tomentulose; leaves on petioles 1-3 cm. long, the blades obovate-oblong or oblong-elliptic, mostly 7-20 cm. long and 4-9 cm. wide, acute, cuneate at the base, conspicuously serrate, especially above the middle, arachnoid-tomentulose beneath when young but soon glabrate except along the costae and veins, the lateral veins 5-7 pairs; peduncles axillary, 2-8 cm. long, each bearing a single pedicel 3-15 mm. long, the division between peduncle and pedicel indicated by a node or joint; calyx parted nearly to the base, the lobes ovate, acute, 8-13 mm. long, entire or unevenly serrulate, strigose outside, puberulent within; corolla orange or red-orange, 3-3.5 cm. long, horizontal in the calyx, the tube short-calcarate at the base, thinly puberulent outside, the limb lateral; filaments glabrous; staminode often present; style bilobate; disc annular but greatly enlarged posteriorly, densely pubescent.

A common species at many localities in the montane forests. The plants are handsome with their large, brilliantly colored flowers reminding one of the pouch of a *Cypripedium* flower.

### CAMPANEA Decaisne

Herbaceous or suffruticose perennials from scaly rhizomes, usually epiphytic, the stems usually scandent, more or less pubescent, often pendent; leaves opposite, petiolate, those of a pair very unequal, the blades mostly oblong-lanceolate, often asymmetric, oblique at the base, the margins crenate-serrate; peduncles usually much elongated and commonly pendent, bearing 1-several long-pedicellate, rather large flowers; calyx tube short, costate, pubescent, the lobes free, spreading, entire; corolla open-campanulate, erect in the calyx, the tube ecalcarate, somewhat ventricose, not contracted in the throat, the lobes spreading, broad, usually pale green with conspicuous maroon spots within; filaments pilosulous, the anthers coherent, thecae oblong, divergent, not confluent; ovary more than half inferior; style stout, exserted, the stigma stomatomorphic; disc glands 5, glabrous; fruit capsular, bivalvate.

The name *Campanea* is used instead of *Capanea* (Denham, "Campanea, an Orthographic Error for *Capanea* (Gesneriaceae)," *Baileya* 14: 37-39. 1966), as Denham's paper is based on an assumption; I have been informed, in a letter from Mr. C. V. Morton, that on the syntypes of *Besleria grandiflora* HBK. (the basionym of *C. grandiflora* Dcne.) in Paris, the name *Campanea* appears in the hand of Decaisne.

About 10 species, in Central and northern South America, with only one in Guatemala.

***Campanea picturata* Donn.-Sm. Bot. Gaz. 15: 28, t. 3. 1890.**

Usually in wet, mixed, mountain forest, 1,450-2,500 m.; Alta Verapaz (type from Chucaneb, *J. D. Smith 1501*); Chimaltenango; El Progreso; Quezaltenango; San Marcos.

Usually small, herbaceous epiphytes less than 1 m. long, creeping on tree trunks or over old logs, sometimes terrestrial and creeping, the stems, petioles, and peduncles densely villous with long, weak, spreading, multiseptate dark hairs; leaves on rather short, slender petioles, the blades thin, mostly oblong-lanceolate, commonly 12-25 cm. long and 4.5-9 cm. wide, acuminate to long-acuminate, acute or obtuse and very oblique at the base, the margins evenly crenate, abundantly long-villous on both surfaces, somewhat paler beneath; peduncles suberect or pendent, sometimes much exceeding the leaves, the 3-4 pedicels elongating, commonly 2-7 cm. long; calyx lobes narrowly lanceolate, at anthesis about 2 cm. long, long-attenuate, densely villous; corolla pale green or yellowish-green with numerous maroon spots on the lobes within, 4-5 cm. long, abundantly villous outside, the tube somewhat ventricose, the upper lip erect, about half as long as the tube, bilobate, the lower lip shorter, trilobate; filaments conspicuously curved, the anthers initially united in a dislike form.

The plants are usually abundant where they occur, but distribution is very local. All the species grow in places where there is a continuously supply of moisture; in Guatemala, often in places where dense fog prevails for much of the time. Dr. Standley has noted in manuscript that if the stems are broken, the leaves collapse and become limp almost immediately.

**CODONANTHE Hanstein**

*Reference:* Harold E. Moore, Jr., A Synopsis of the Genus *Codonanthe*, *Baileya* 19(1): 4-33. 1973.

Epiphytic (in ours) or sometimes terrestrial, creeping or pendent, shrubby or herbaceous plants growing mostly on ant nests in trees, the stems simple or branched, glabrous or pubescent, usually rooting at some or all of the nodes; leaves opposite, mostly short-petiolate, those of a pair equal or subequal, the

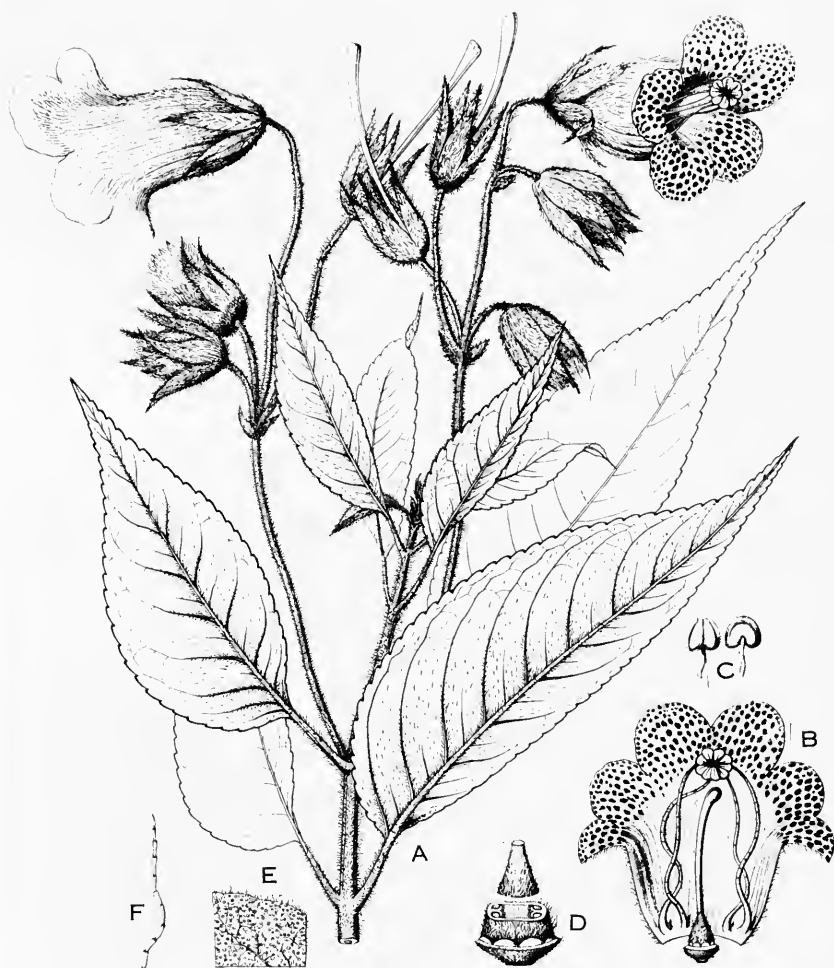


FIG. 48. *Campanea picturata*. A, habit,  $\times \frac{1}{2}$ ; B, flower with corolla opened to show stamens and pistil,  $\times \frac{1}{2}$ ; C, detail of anthers,  $\times 1$ ; D, ovary dissected,  $\times 1\frac{1}{2}$ ; E, section of leaf, showing indument of lower surface,  $\times 1$ ; F, multiseptate hair,  $\times 18$ . (From Plate III, Botanical Gazette, 1890.)

blades broad, more or less fleshy, becoming coriaceous when dried, entire or serrulate; flowers one to several in the leaf axils, on usually short pedicels; calyx segments 5 (in ours) or 2, slightly unequal, entire; corolla horizontal in the calyx, the tube saccate or calcarate at the base, ventricose or merely ampliate upward, the throat broad, the limb oblique, the 5 lobes rounded and spreading; stamens 4, didynamous, included, a small staminode often present, the filaments glabrous or pubescent, inserted below the middle of the corolla tube, connate or free at the base, the anthers united by tips and sides, the thecae subglobose, dehiscent by irregular pores, separated by a broad connective; ovary superior, the style included, the stigma bilobate or stomatomorphic; disc reduced to a single posterior gland; fruit berrylike, broadly ovoid to subglobose.

Possibly 15 species in tropical America, with only two in Guatemala. In addition to the two species treated here, a few plants from other parts of Central America (*Edwards P-390* from Honduras, *Bunting and Licht 1055* from Nicaragua, and *Jimenez 3709*, *Valerio 929*, and *Williams et al. 28481* from Costa Rica) were seen with variable leaf forms, with unkeeled sepals as in *C. crassifolia* (Focke) Morton, but with ventricose corollas 3–3.5 cm. long as in *C. decurrens* I. M. Johnston. It may be that one or both of our species is more variable than is known, or a third species may be involved.

Leaves mostly oblanceolate to elliptic, attenuate to the base; sepals more or less ribbed or keeled near the base, at least one keel prominent and decurrent on the pedicel; corollas 3–4 cm. long, the tube ventricose, the spur 4–5 mm. long . . . . . *C. macradenia*.

Leaves mostly ovate to lanceolate (rarely oval), the base usually rounded or acute; sepals not keeled; corollas 1.5–2.5 cm. long, the tube strongly ampliate upward, not ventricose, the spur about 2 mm. long . . . . . *C. crassifolia*.

**Codonanthe crassifolia** (Focke) Morton, Field Mus. Bot. 18: 1159. 1938. *Hypocerta crassifolia* Focke, Tijdschr. Nat. Wetensch. 5: 199. 1852. *Episcia hookeri* Hanst. Linnaea 34: 350. 1865; Morton in Fl. Trin. and Tob. 2(5): 309. 1955; Leeuwenberg, Acta Bot. Neerl. 7: 381. 1958. *C. confusa* Sandwith, Kew Bull. 492. 1931.

On earthen ant nests in trees in wet, often swampy forest, sea level to 500 m.; Alta Verapaz; Izabal; Petén. British Honduras, along the Atlantic coast to Panama; northern South America; Trinidad.

Small epiphytic shrubs or suffrutescent plants, creeping, scandent, or subscandent, often pendent, rooting at some or all of the nodes, the stems glabrous and lustrous or minutely puberulent when young; leaves of a pair equal or nearly so, short-petiolate, the blades coriaceous when dried, usually ovate to lanceolate, sometimes oval, mostly 2–5 cm. long, 1–2 cm. wide, usually acute or obtuse, sometimes short-acuminate, rounded or acute at the base, glabrous, the margins entire; flowers 1–4 in the leaf axils, on pedicels 0.5–1.5 cm. long; calyx lobes linear-



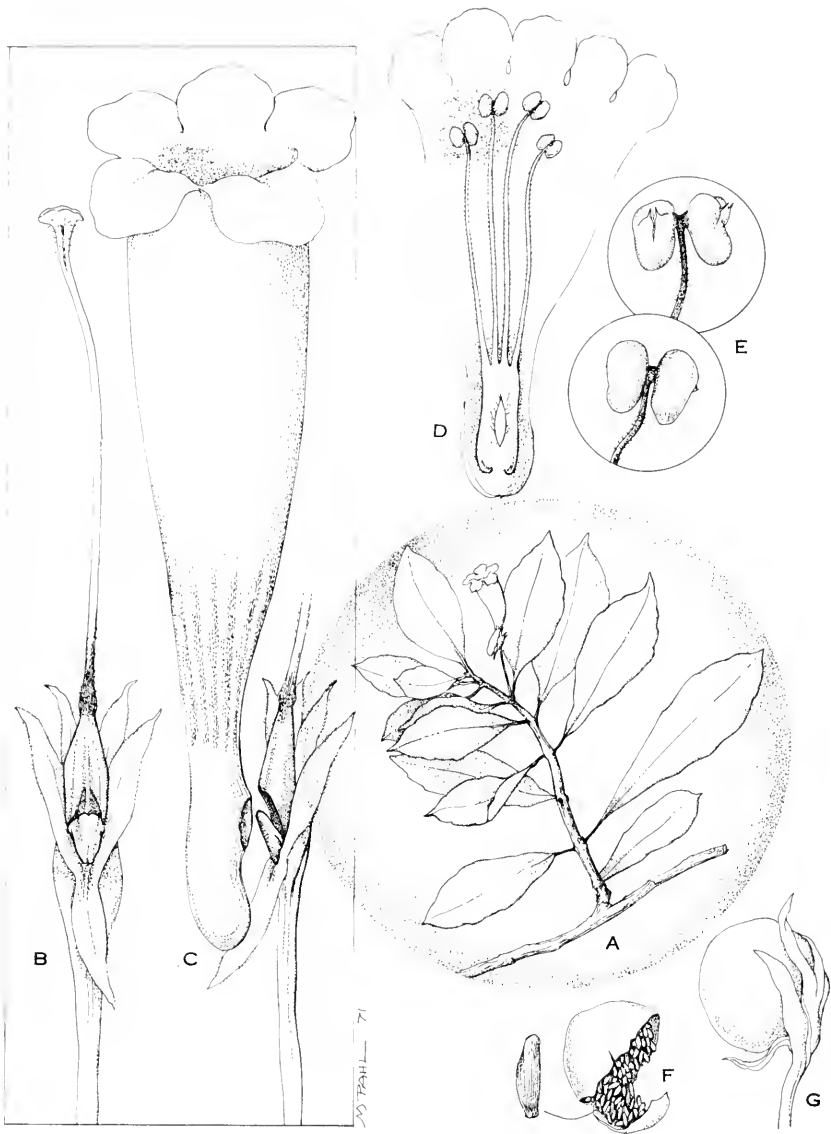


FIG. 49. *Codonanthe macradenia*. A, flowering branch,  $\times \frac{1}{2}$ ; B, calyx opened to show pistil with large disk gland,  $\times 4\frac{1}{2}$ ; C, corolla and side view of ovary with disk gland,  $\times 4\frac{1}{2}$ ; D, corolla opened to show stamens,  $\times 2\frac{1}{2}$ ; E, detail of anthers,  $\times 7\frac{1}{2}$ ; F, fruit opened to show seed,  $\times 2\frac{1}{2}$  (with one seed greatly enlarged); G, calyx with fruit,  $\times 2\frac{1}{2}$ .

lanceolate, acuminate, puberulent, 4–9 mm. long, slightly unequal; corolla white or yellowish, or white striped with pink, or the tube purplish and the lobes white, puberulent or glabrous outside, 1.5–2.5 cm. long, the tube strongly ampliate upward, not ventricose, the spur about 2 mm. long, the limb slightly irregular; filaments of stamens glabrous; style glabrous or minutely puberulent; fruit pink to pale purple, glabrous or nearly so, broadly ovoid to subglobose, 9–12 mm. long and 7–9 mm. in diameter.

**Codonanthe macradenia** Donn.-Sm. Bot. Gaz. 25: 154. 1898. *C. decurrens* I. M. Johnston, Sargentia 8: 275. 1949. *Columnea calcarata* Donn.-Sm. Bot. Gaz. 33: 254. 1902 (type from Alta Verapaz, *Tuerckheim 7645*), non *Codonanthe calcarata* Hanst. (1865).

On earthen ant nests located in tree tops in damp or wet forest, sea level to 350 m.; Alta Verapaz; Izabal; Petén. Mexico (Tabasco); British Honduras; Nicaragua.

Small epiphytic, suffrutescent plants, creeping or scandent, rooting at the nodes, the stems glabrous; leaves of a pair sometimes unequal, especially the lower ones, short-petiolate, the blades carnose, succulent, paler beneath and often flushed with pink, coriaceous when dried, oblanceolate to elliptic, mostly 3–6.5 cm. long, 1.5–3 cm. wide, short-acuminate, attenuate to the base and often decurrent on the petiole, glabrous, the margins entire or obscurely serrulate; flowers solitary in the upper leaf axils, short-pedicellate; calyx lobes narrowly lanceolate, acuminate, puberulent or glabrate, unequal, 3–5 mm. long, usually more or less ribbed or keeled near the base, at least one prominently so and decurrent on the pedicel; corolla white, pale pink, or white striped with pink or lilac, 3–4 cm. long, glabrous outside, the tube ventricose, the spur 4–5 mm. long; filaments of stamens pubescent; style pubescent; fruit rose-red to purple, globose or subglobose, 10–14 mm. in diameter.

## COLUMNEA L.

*Reference:* W. T. Stearn, The Jamaican species of *Columnea* and *Alloplectus* (Gesneriaceae), Bull. Brit. Mus. Bot. 4: 181–236. 1969.

Small shrubs, usually epiphytic, sometimes terrestrial, often subscandent or pendent; leaves opposite, those of a pair subequal to conspicuously unequal, usually short-petiolate, entire or somewhat serrate; inflorescence axillary; flowers mostly large and showy, pedicellate, solitary or fasciculate, usually ebracteate; calyx lobes 5, almost distinct, often colored, entire, dentate, or incised; corolla erect in the calyx, the tube saccate at base but ecalcarate, gradually ampliate upward, the limb conspicuously bilabiate, the upper lip trilobate, with the middle lobe galeiform, the 2 lateral lobes spreading from it, the lower lip entire; stamens 4, didynamous, the filaments connate at the base, free above, the anthers oblong (in ours), coherent, thecae parallel, fully dehiscent; staminode usually present; disc gland large, posterior, usually solitary but sometimes accompanied by 2–4 smaller glands; ovary superior; stigma usually bilobate; fruit more or less globose, fleshy and berrylike; seeds minute, more or less ellipsoidal, shiny, striate.

A large genus, with more than 100 species, all in tropical America. There are only five species known from Guatemala and they are never found in the abundance that is commonplace in Costa Rica.

Leaves of a pair conspicuously unequal.

Calyx segments linear, entire; corollas yellow . . . . . *C. sulfurea*.

Calyx segments more or less ovate, deeply laciniate-dentate; corollas red.  
*C. cobana*.

Leaves of a pair subequal.

Leaves linear to linear-lanceolate, mostly 4–10 cm. long . . . . . *C. crassifolia*.

Leaves neither linear nor linear-lanceolate, mostly 2–4 cm. long.

Leaf blades densely pilose on the upper surface; calyx segments ovate-oblong, obtuse . . . . . *C. tuerckheimii*.

Leaf blades glabrous on the upper surface; calyx segments linear-lanceolate, acuminate . . . . . *C. guatemalensis*.

***Columnea cobana*** Donn.-Sm. Bot. Gaz. 57: 424. 1914, *C. venusta* Standley, Field Mus. Bot. 17: 210. 1937 (type from Alta Verapaz, *Hatch & Wilson 154*).

On trees in wet forest, 900–2,500 m.; Alta Verapaz (type from Cobán, *Tuerckheim 2475*); El Progreso; Zacapa.

Shrubby epiphytes, erect, subscaudent, sometimes pendent, the stems stout, reddish or brownish, more or less villous with long, spreading, multiseptate, reddish hairs; leaves of a pair very unequal, short-petiolate, the blades oblanceolate or elliptic-lanceolate, the larger ones of each pair mostly 5–10 cm. long, the smaller of a pair mostly 1.5–3 cm. long, acuminate to long-acuminate, usually very unequal at the base, subobtuse or rounded on one side, cordate or auriculate on the other, glabrous or sparsely strigose above, paler beneath and thinly strigose, often villous with reddish hairs on the costae, veins, and margins; pedicels 2–6 cm. long, densely villous; calyx red-villous outside, glabrous within, the segments about 2 cm. long, more or less ovate, deeply laciniate-dentate, acuminate; corolla red, 6–7 cm. long, pilose, the tube saccate at the base, slightly curved, the anterior lip triangular-oblong, 1.5–2 cm. long, the galea 1.8–2.5 cm. long, about 1.5 cm. wide, broadly rounded and subemarginate at the apex; anthers about 3 mm. long; disc gland solitary, bifid; ovary pilose, the style sparsely villous; fruits unknown.

***Columnea crassifolia*** Brongniart ex Lemaire, L'Hort. Univ. 6: 203, t. 7. 1844; Hooker in Curtis's Bot. Mag. 73: t. 4330. 1847. *C. stenophylla* Standley, Journ. Wash. Acad. Sci. 16: 16. 1926 (type from Chiapas). *C. muenscheri* Standley, Field Mus. Bot. 22: 106. 1940 (Type from Suchitépéquez, *Muenscher 12449*). *Flor candelaria romerio* (Quezaltenango).

On trees or near the bases of trees in wet forest, 500–2,500 m.; Escuintla; Guatemala; Quezaltenango; San Marcos; Sololá; Suchitépéquez. Southern Mexico.

Usually small, shrubby epiphytes, rarely terrestrial, the stems stout, reddish or brown, when young pilose with stiff, appressed or ascending, multiseptate hairs; leaves subsessile or very short-petiolate, those of a pair subequal, the blades thick, linear or linear-lanceolate, mostly 4–10 cm. long and 0.5–1.5 cm. wide, usually long-attenuate, obliquely acute at the base, glabrous above, sparsely appressed-pilose beneath with lustrous hairs, the lateral veins inconspicuous, the margins often revolute; pedicels solitary, 3–12 mm. long, pilose; calyx lobes lanceolate or linear-lanceolate, 1.5–2 cm. long, about 3 mm. wide at base, long-attenuate, entire, green or reddish, appressed-pilose; corolla bright red to orange-red, mostly 6.5–8 cm. long, densely villous with long, slender, spreading red hairs, the tube about 1 cm. broad in the throat, the galea 2–3 cm. long, more or less rounded to nearly truncate at the apex, usually emarginate, the lateral lobes short, triangular, obtuse; the lower lip triangular-oblong, about 1.5 cm. long, subacute; anthers about 2.5 mm. long; ovary densely pilose; stigma shallowly bilobate; disc gland solitary, broad, obscurely or shallowly bilobate; fruits not seen.

This species is similar to *C. purpusii* Standley (Chiapas and Veracruz, Mexico) but *C. purpusii* has broader, more or less oblong leaves to 2 cm. wide, with conspicuous lateral veins; the calyx lobes are broader (5–7 mm. wide at base), and the hairs of the corolla tube are shorter and usually gland-tipped.

***Columnea guatemalensis* Sprague, Kew Bull. 448. 1908.**

On trees in dense, wet, mixed forest or thickets, 900–1,650 m.; Alta Verapaz (type from Sarax, *Tuerckheim 866*); Baja Verapaz; Chiquimula; Huehuetenango. Mexico (Chiapas).

Sparsely branched epiphytes, the stems short or elongating and pendent from trees, glabrous or more or less pilose; leaves of a pair subequal on short petioles 2–3 mm. long, the blades thick, subcoriaceous when dry, lanceolate to lance-oblong, mostly 2–4 cm. long, acuminate-obtuse, obtuse or acute at the base, glabrous above, sparsely strigose beneath, especially along the costae, or almost glabrous, the margins entire, often revolute; flowers solitary, the pedicels commonly 5–9 mm. long, appressed-pilose; calyx 1.5–2 cm. long, sparsely strigose or almost glabrous outside, glabrous within, the segments linear-lanceolate, acuminate, entire, reflexed, more or less tinged with red; corolla bright or pale red or brick red, 6–7 cm. long, appressed-pilose outside, the anterior lobe narrowly oblong, 1.5–2 cm. long, the galea about 2 cm. long and 1.5 cm. wide; anthers 2–3 mm. long; ovary villous; style pubescent; fruits not seen.

This species has been confused with *C. glabra* (Oerst.) Hanst., of Costa Rica, which has leaves attenuate to the base and calyx segments that are obtuse to subacute at the apex, never reflexed. Further, the flowers of *C. glabra* specimens available to me for examination often appear terminal, as they are usually in the uppermost leaf axils, while those of *C. guatemalensis* are more often in the middle or lower leaf axils.

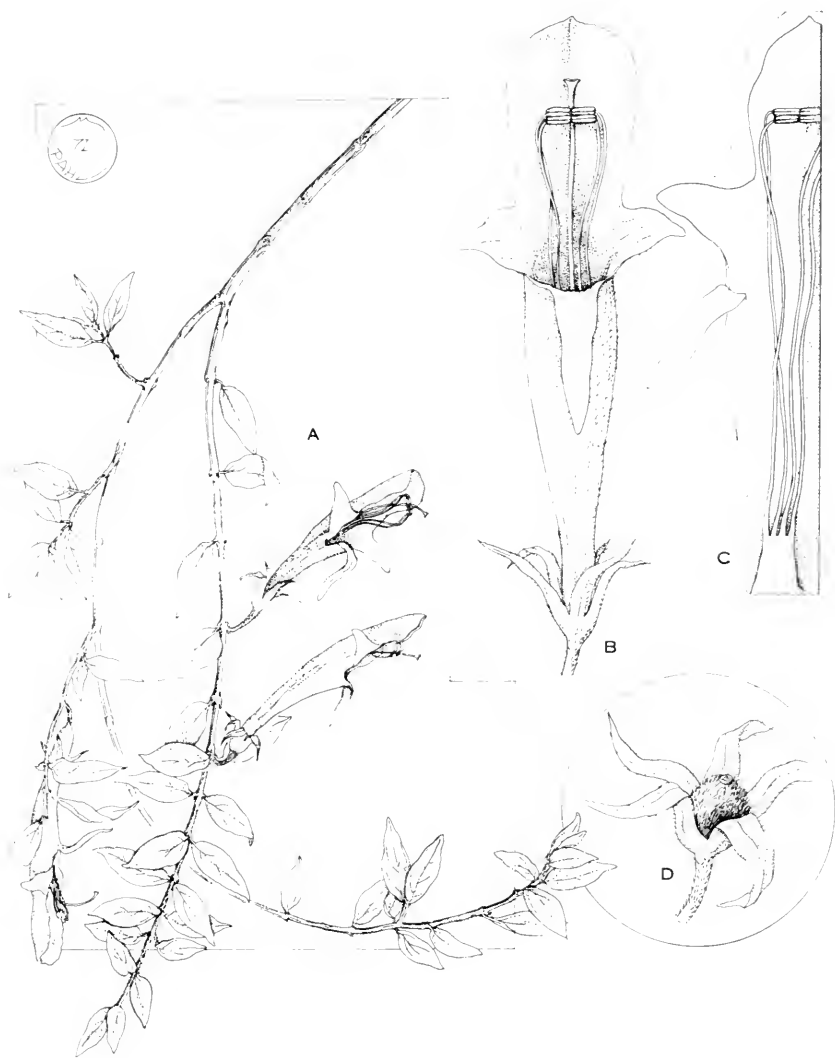


FIG. 50. *Columnnea guatemalensis*. A, habit,  $\times \frac{1}{2}$ ; B, flower,  $\times 1\frac{1}{2}$ ; C, corolla opened to show stamens,  $\times 1\frac{1}{2}$ ; D, calyx with young fruit,  $\times 1\frac{1}{2}$ .

***Columnea sulfurea* Donn.-Sm. Bot. Gaz. 31: 117. 1901.**

On trees in wet forest, sea level to 400 m.; Alta Verapaz (type from Cubilguitz, *Tuerckheim 7646*); Izabal; Petén. Mexico (Chiapas); British Honduras.

Small coarse epiphytes, the stems reddish or brown, thinly hirsute with long, spreading, often reddish hairs; leaves of a pair unequal, short-petiolate, the blades oblong-elliptic, elliptic, or rarely nearly obovate, the larger leaves of a pair mostly 6–11 cm. long, 2.5–4 cm. wide, the smaller leaves of the pairs mostly 2–5 cm. long, obtuse to acuminate, narrowed to the very unequal, cuneate base, rather sparsely pilose on both surfaces with very long and slender, spreading hairs, green above, red or maroon beneath, the margins entire or somewhat crenate; pedicels solitary or binate, longer than the petioles, mostly 8–16 mm. long; calyx long-pilose, the segments green or red, linear, attenuate, 1.5–2.8 cm. long; corolla yellow, 5.5–7 cm. long, thinly pilose with long spreading hairs, the tube slightly arcuate, 7–10 mm. broad at the apex, gibbous at the base, the posterior lip 2–3 cm. long, the galea 1–1.5 cm. long and almost as wide, entire, the lower lip 10–12 mm. long; anthers oblong, 2–3 mm. long; disc reduced to one bidentate gland; ovary densely pilose, the style pubescent toward the apex; fruit white, about 12 mm. in diameter.

***Columnea tuerckheimii* Sprague, Kew Bull. 42. 1912. *C. lutea* Donn.-Sm. Bot. Gaz. 57: 425. 1914 (type from Cubilguitz, Alta Verapaz, 350 m., *Tuerckheim 7930*).**

On trees in wet, mixed forest, 280–350 m.; apparently endemic in Alta Verapaz (type from Cubilguitz, *Tuerckheim 7640*); also collected southwest of Sibicté, *Steiermark 44928*.

Slender, shrubby epiphytes, the elongating, pendent branches terete, densely fuscous-pilose with spreading hairs; leaves sessile or on petioles 1–4 mm. long, those of a pair subequal, the blades 2–4 cm. long, elliptic-oblong, ovate-oblong, or broadly falcate, obtuse or subacute, rounded or subcordate at the base, rather densely hirsute on both surfaces, with 4–5 pairs of lateral veins conspicuous beneath, the margins entire, revolute; pedicels pilose, 5–15 mm. long; calyx segments ovate-elliptic to ovate-oblong, obtuse, narrowed at the base, 6–9 mm. long at anthesis, 3–4 mm. broad, in fruit 10–12 mm. long, densely long-hirsute on both surfaces, especially so within; corolla commonly deep red, 5.5–6.5 cm. long, villous outside, the tube incurved, slightly saccate at the base, the anterior lobe narrowly oblong or oblong-linear, 20–30 mm. long, 4–6 mm. wide, the galea 12–15 mm. long, 15–22 mm. wide, subtruncate or emarginate at the apex; filaments of stamens glabrous, the anthers about 2 mm. long; ovary densely pilose, the style puberulent; young fruit globose, pinkish or lavender, pilose.

Although the original description states that the calyx segments are remotely denticulate, my examination of the type specimen as well as other collections does not confirm this.

In his description of *C. lutea*, which is known only from the type specimen with faded corollas, Donnell-Smith stated, "*Corolla ex cl.*



FIG. 51. *Columnea sulfurea*. A, habit,  $\times \frac{1}{2}$ ; B, flower with partly opened corolla,  $\times 1\frac{1}{2}$ ; C, corolla limb before anthesis,  $\times 1\frac{1}{2}$ ; D, detail of anthers,  $\times 3$ ; E, basal portion of corolla tube opened to show ovary, disk gland, and base of filaments,  $\times 1\frac{1}{2}$ , with disk gland removed (foreground),  $\times 1$ .

*repertore lutea* . . .". The specimen differs from *C. tuerckheimii* in no other respect.

These plants have been reported from Guatemala as *C. microcalyx* Hanst., a Costa Rican species apparently closely related, differing in its sparsely hirsute leaves and in its more narrow calyx lobes, 2–3 mm. broad, that are acute to subacute at the apex and only sparsely hirsute to nearly glabrous within.

### DIASTEMA Bentham

Small, usually delicate herbs, perennial from scaly rhizomes, the stems short, simple, more or less villous; leaves opposite, petiolate, the blades very thin, those of a pair subequal, coarsely dentate, crenate, or serrate; inflorescences axillary or terminal, pedunculate, racemose, few-flowered, the flowers bracteate, the bracts opposite; calyx tube short-turbinate, the 5 lobes free, elongated, spreading, green, entire; corolla small, white, sometimes marked with rose or lavender, tubular or funnellform, erect in the calyx, ecalcarate, the tube not ventricose, little ampliate upward, the limb nearly regular or obscurely bilabiate; stamens 4, and a small staminode usually present, the filaments inserted on the base of the corolla tube; anthers first coherent in pairs by their tips, later becoming separated, the thecae distinct, suborbicular, dehiscent above by a slit; ovary half-inferior, the style slender, the stigma shallowly bilobate; glands of the disc 2–5, linear; capsule obovoid, membranaceous, convex or short-conic at the apex, bivalvate; seeds numerous, minute.

About 40 species, all in tropical America, with only one in Guatemala.

***Diastema rupestre*** Brandegee, Univ. Calif. Publ. Bot. 6: 65. 1914.

Damp or wet, mixed, mountain forest, sometimes on cliffs, 700–1,500 m.; San Marcos; Suchitépéquez. Mexico (Chiapas); Nicaragua.

Erect herbs, commonly 10–25 cm. tall, the stems succulent, simple, sometimes reddish, sparsely white-villous or glabrate; leaves on long, slender petioles, the blades broadly elliptic or ovate-elliptic, mostly 5–10 cm. long, obtuse to acuminate, rounded and oblique at the base, coarsely crenate-dentate, sparsely villous on both surfaces with weak, multiseptate hairs; racemes mostly 4–6 cm. long, sparsely short-villous, the 5–10 pedicels slender, usually 2–3 times longer than the calyx, the bracts linear or linear-lanceolate, 3–4 mm. long, green, ciliate; calyx tube at anthesis little more than 1 mm. long, in fruit about 3 mm., glabrate, the lobes oblong-linear, green, about 3 mm. long, acute, ciliate; corolla white, 10–15 mm. long, the tube tinged outside with lavender, glabrous outside, about 2.5 mm. broad in the throat, the lobes rounded, 2–3 mm. long; style included, glabrous; stamens included; glands of the disc 5, linear-clavate; capsule obovoid, bivalvate.





FIG. 52. *Diastema rupestre*. A, habit,  $\times \frac{1}{2}$ ; B, multiseptate hairs, greatly enlarged; C, calyx opened to show pistil and linear disk glands,  $\times 5$ ; D, corolla opened to show stamens and staminode,  $\times 5$ ; E, calyx with one lobe removed, showing opened capsule and seeds,  $\times 5$ , with two seeds greatly enlarged.

This species is very similar to the Costa Rican *D. cristatum* Hanst., which has larger corollas, 15–22 mm. long and about 4 mm. broad.

### DRYMONIA Martius

Shrubby or suffrutescent, often scandent, epiphytic or terrestrial plants, the stems more or less quadrangular; leaves opposite, those of a pair equal or subequal, petiolate, the blades usually membranaceous, rarely coriaceous, and more or less pubescent; flowers axillary, solitary or several; bracts large and foliaceous or small and inconspicuous, often caducous; calyx segments 5, broad, free or partially connate, green or colored, often dentate or fimbriate; corolla more or less funnel-form, oblique to horizontal in the calyx, more or less saccate to calcarate at the base, ampliate upward, the throat broad, the limb spreading, obliquely bilabiate, the 5 lobes rounded, often fimbriate; stamens 4, didynamous, included, a small staminode sometimes present, the filaments inserted on or near the base of the corolla tube, short-connate at the base, the anthers narrowly oblong, sagittate at the base, thecae parallel, united by their inner faces with the pores uppermost until the pollen is shed, then the filaments coiling and the anthers separating; disc reduced to one posterior gland; ovary superior, the style elongating, included, stigma stomatomorphic or bilobate; fruit capsular, broadly ovoid to globose, first fleshy, becoming coriaceous, purplish, red, or orange inside, bivalvate; seeds obliquely ellipsoid.

Species 25 to 30, in tropical America, with six in Guatemala.

Stems, petioles, and leaf blades glabrous..... *D. psila*.

Stems, petioles, and leaf blades more or less pubescent.

Leaves commonly more than 15 cm. long, sometimes as much as 30–40 cm. long or more.

Bracts small and inconspicuous; calyx segments deeply sinuate-dentate or fimbriate-dentate, mucronate; corolla 2.5–3 cm. long.... *D. macrophylla*.

Bracts large and foliaceous; calyx segments entire, obtuse, not mucronate; corolla 6–7 cm. long..... *D. macrantha*.

Leaves commonly less than 15 cm. long, mostly 4–14 cm. long.

Margins of leaf blades conspicuously sinuate-dentate; calyx segments commonly sinuate-denticulate (rarely merely sinuate)..... *D. serrulata*.

Margins of leaf blades entire or nearly so; calyx segments entire.

Young stems long-hirsute; lower leaf surfaces red or purple; lateral veins 4–5 (6) pairs..... *D. oinochrophylla*.

Young stems short-pilosulous; lower leaf surfaces green; lateral veins 7–8 pairs..... *D. guatemalensis*.

***Drymonia guatemalensis*** (Morton) D. Gibson, *Phytologia* 23: 336. 1972. *Alloplectus guatemalensis* Morton, *Contr. U. S. Nat. Herb.* 29: 37. 1944.

Known only from the type, San Marcos, south-facing slopes of Volcán de Tajumulco, *Steiermark 37403*, 1,400–1,700 m.

Shrubby epiphyte, the stems simple or sparsely branched, densely short-pilosulous when young; leaves on petioles 1-3.5 cm. long, the blades broadly oblanceolate, those of a pair more or less unequal, mostly 6-15 cm. long, 3-5 cm. broad, short-acuminate, obliquely cuneate at the base, entire or nearly so, sparsely and minutely strigillose on both surfaces, the lateral veins 7-8 pairs; bracts caducous; pedicels 1-3 in the leaf axils, shorter than the calyx, densely short-pilosulous; calyx pale green and more or less suffused with rose-red, sparsely strigillose, the segments subequal, ovate to lance-ovate, erect, 1.5-2.5 cm. long, rather abruptly long-attenuate, subcordate at base, entire; corolla creamy-white, 3-4 cm. long, sparsely short-pilose or almost glabrous outside, oblique in the calyx, the tube saccate at the base, ampliate above, the limb about 2 cm. broad, the lobes subequal, broad, suberose and somewhat undulate; anthers oblong, about 5 mm. long, sagittate at the base, thecae parallel, dehiscent only at the basal end; ovary densely tomentose; stigma bilobate; disc gland solitary; fruits unknown.

**Drymonia macrantha** (Donn.-Sm.) D. Gibson, *Phytologia* 23: 336. 1972. *Alloplectus macranthus* Donn.-Sm. *Bot. Gaz.* 31: 117. 1901.

Damp, mixed or pine forest, 350-1,400 m.; Alta Verapaz (type from Cubilgüitz, *Tuerckheim 7642*); Sololá.

Small, epiphytic or terrestrial shrubs with thick branches, minutely strigillose on the stems, leaves, and inflorescences; leaves short-petiolate, the blades thin, oblong-elliptic to broadly ovate-elliptic, very large, mostly 20-45 cm. long and 10-20 cm. wide, acute or short-acuminate, cuneate at the base and decurrent on the petiole, the lateral veins 7-10 pairs, the margins subentire or crenate-serrate; flowers often numerous, the pedicels clustered in the upper leaf axils; bracts large and foliaceous; calyx first green, becoming yellowish or orange, 2-3.5 cm. long, the segments short-connate, subequal, oblong, obtuse, entire; corolla white outside, yellow within, puberulent outside, 6-7 cm. long, the tube gradually ampliate, the limb 3-4 cm. broad, the lobes unequal, rounded, more or less fimbriate or the anterior one fimbriate and the others nearly entire; anthers oblong, appearing sagittate at the base, about 5 mm. long, dehiscent basally; ovary densely pubescent; stigma stomatomorphic; fruit broadly ovoid or subglobose, about 17 mm. long; seeds red, about 1 mm. long.

**Drymonia macrophylla** (Oerst.) H. E. Moore, *Baileya* 3: 109, *f.* 43. 1955. *Caloplectus macrophyllus* Oerst. *Centralam. Gesner.*: 45. 1858. *Drymonia mucronulosa* Hanst. *Linnaea* 34: 363. 1865-66 (type specimen in Herb. Wendland said to have been collected in Guatemala by "Sell"). *Alloplectus macrophyllus* Hemsl. *Biol. Centr. Am.* 2: 484. 1882. *D. oroleuca* Standl. *Field Mus. Bot.* 12: 413. 1936 (type from British Honduras, *Schipp S-901*), non Poepp. & Endl. 1845. *D. belizensis* Standl. *Trop. Woods* 52: 29. 1937.

On trees in damp or wet forest, 50-400 m.; Alta Verapaz; Izabal; El Quiché. British Honduras; Costa Rica.

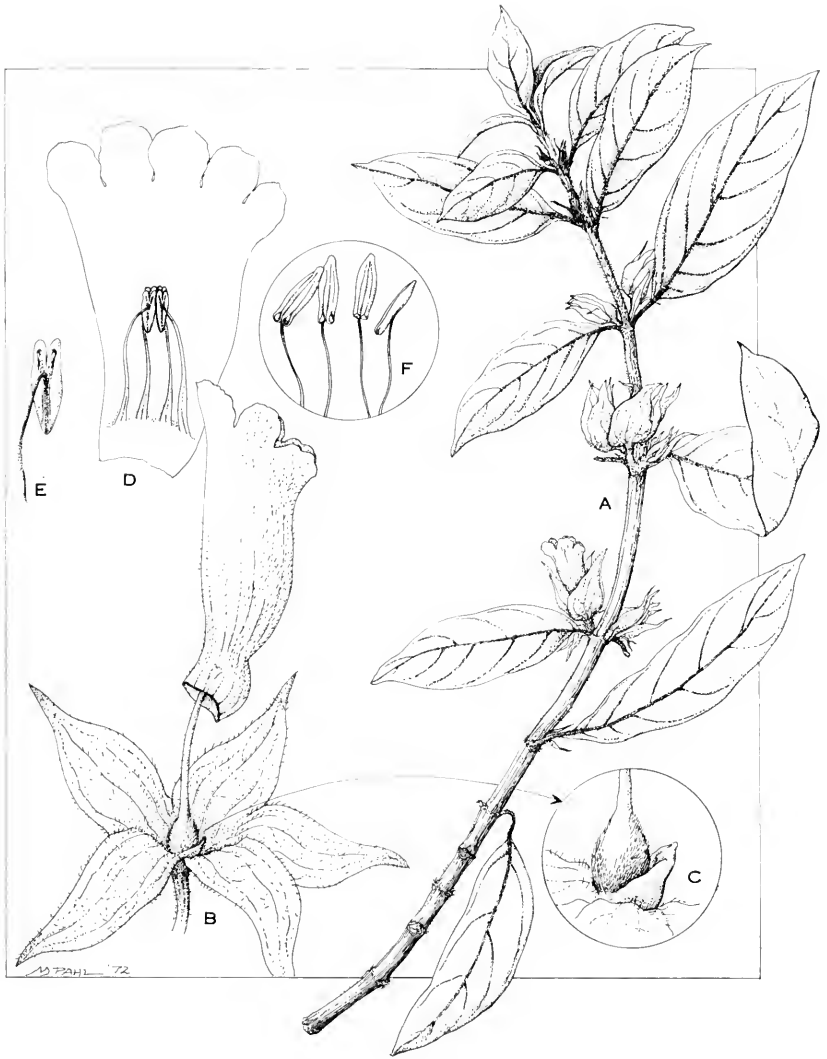


FIG. 53. *Drymonia oinchrphylla*. A, habit,  $\times \frac{1}{2}$ ; B, calyx opened, with corolla partly removed to show pistil and disk gland,  $\times 1\frac{1}{2}$ ; C, ovary and disk gland,  $\times 3$ ; D, corolla opened to show stamens,  $\times 1\frac{1}{2}$ ; E, dorsal view of anther,  $\times 3\frac{1}{2}$ ; F, anthers after pollen has been shed,  $\times 3$ .

Shrubby or suffrutescent epiphytes, the stems thick, puberulent or glabrate; leaves short-petiolate, those of a pair subequal or unequal, the blades elliptic, oblong-ovate, or oblanceolate, sometimes falcate, very shortly acuminate or acute, cuneate or obtuse at the base, more or less strigose-puberulent on both surfaces, more densely so beneath on costae and veins, mostly 15–35 cm. long, 5–14 cm. wide, lateral veins 5–7(8) pairs, the margins denticulate or crenate; bracts small and inconspicuous, lanceolate, acuminate, sometimes abruptly so; pedicels 1–3, pubescent, shorter than the calyx; calyx segments thin, foliaceous, papery when dried, puberulent to pilosulous, subequal, 10–15 mm. long, broadly ovate to ovate-oblong, mucronate, the mucro 2–4 mm. long, the margins fimbriate-dentate; corolla cream-colored or pale yellow with lavender or maroon markings, 2.5–3 cm. long, the tube short-calcerate at the base, gradually ampliate upward, densely puberulent outside, the lobes rounded, at least the anterior ones minutely fimbriate; anthers 3–4 mm. long, sagittate at base, dehiscent at basal end only; style minutely pubescent; stigma stomatomorphic; disc gland solitary; fruits not seen.

**Drymonia oinochrophylla** (Donn.-Sm.) D. Gibson, *Phytologia* 23: 336. 1972. *Alloplectus oinochrophyllus* Donn.-Sm. *Bot. Gaz.* 54: 239. 1912.

On trees in wet forest, 750–1,700 m.; Alta Verapaz (type from Pansamalá, *Tuerckheim 1080*); Huehuetenango.

Usually shrubby epiphytes, often branched, usually scandent, the young stems villous-hirsute with long, spreading, multiseptate reddish hairs; leaves on hirsute petioles mostly 0.5–2 cm. long, the blades subcoriaceous, those of a pair subequal to unequal, ovate to ovate-elliptic or oblong-elliptic, mostly 5–12 cm. long and 2.5–5 cm. wide, abruptly short-acuminate, obliquely cuneate at the base, entire or nearly so, sparsely strigose to glabrate on the upper surface, red-purple beneath and often villous along the costae, the lateral veins 4–5 (6) pairs; pedicels 1–3 in the leaf axils, pilose, 0.5–1 cm. long; bracts lanceolate, reddish, 0.5–1 cm. long; calyx green or more or less suffused with red, sparsely villous, the segments subequal, 2.5–3 cm. long, lance-ovate, long-attenuate, subcordate to cordate at the base, entire; corolla white or cream-colored, 3.5–4 cm. long, sparsely pilose outside, oblique in the calyx, the tube saccate at the base, ampliate above, the limb oblique, the lobes suborbicular, about 1 cm. long, more or less crenulate; anthers oblong, sagittate at the base, about 5 mm. long, the thecae parallel, dehiscent at the basal end only; ovary densely tomentose; stigma bilobate; disc gland solitary, obscurely bilobate; fruits unknown.

**Drymonia psila** D. Gibson, *Phytologia* 23: 335. 1972.

Damp forest, 1,200–1,300 m., Alta Verapaz; Izabal (type from Cerro San Gil, *Steyermark 41980*).

Shrubby, sometimes scandent epiphytes, glabrous throughout, the stems often red or purplish; leaves on petioles 1–3.5 cm. long, the blades coriaceous, broadly elliptic to oblanceolate, mostly 9–25 cm. long, short-acuminate, cuneate and often oblique at the base, glabrous on both surfaces, paler beneath, margins entire, lateral veins 5–7 pairs; pedicels 1–3; bracts small, linear-lanceolate, caducous;



FIG. 54. *Drymonia psila*. A, leafy stem,  $\times \frac{1}{2}$ ; B, two views of one calyx, the upper one opened to show pistil with disk gland,  $\times 2$ ; C, corolla opened to show stamens (left) and view of base of corolla tube (right),  $\times 2$ ; D, detail of anthers,  $\times 3$ ; E, ovary with disk gland,  $\times 3$ .

calyx glabrous, the 5 segments unequal, one considerably smaller than the others, oblong-ovate to lanceolate, acute, accrescent, 1-2 cm. long; corolla white or cream-colored, sometimes marked with purple, glabrous, 3-3.5 cm. long, the tube ampliate above, the limb oblique, the lobes more or less rounded, crenate, the anterior one more or less fimbriate; anthers about 3 mm. long, appearing sagittate at the base, united face to face; ovary glabrous; disc gland solitary; stigma stomatomorphic; fruits unknown.

**Drymonia serrulata** (Jacq.) Mart. ex DC. Prodr. 7: 543. 1839. *Besleria serrulata* Jacq. Hort. Schönbr. 3: 21, t. 290. 1798. *Besleria spectabilis* HBK. Nova Gen. & Sp. 2: 400. 1817. *Drymonia spectabilis* Mart. ex DC. Prodr. 7: 543. 1839. *D. bicolor* Lindl. Bot. Reg. 24: t. 4. 1838. *D. jacquinii* G. Don, Gen. Syst. 4: 653. 1838. *D. chiapensis* Brandegee, Univ. Calif. Pub. Bot. 6: 64. 1914.

On trees in wet forest, 300-1,100 m.; Alta Verapaz; Petén; Santa Rosa; Sololá; Suchitupéquez. Southern Mexico; British Honduras to Panama; Colombia.

Woody or suffrutescent, often scandent epiphytes, the stems simple or branching, reddish, sparsely strigose, puberulent toward the apex; leaves petiolate, those of a pair equal or subequal, the blades usually oblong to elliptic, sometimes obovate, mostly 8-12 (15) cm. long, 3-7 cm. wide, acuminate to subacute, cuneate to rounded at the base, sparsely strigillose on both surfaces or puberulent beneath, the margins conspicuously sinuate-dentate, the lateral veins 6-8 pairs; pedicels solitary or 3 together, pubescent or puberulous, mostly 1-1.5 cm. long; calyx segments ovate to lanceolate, 2-4(5) cm. long, accrescent, commonly sinuate-denticulate, rarely merely sinuate, acuminate, rounded or subcordate at the base, sparsely strigillose or puberulent; corolla finely puberulent outside, yellowish white or sometimes flushed or variously marked with pink, lavender, or maroon, 3.5-5 cm. long, the tube ampliate above, the lobes rounded, all more or less erose-fimbriate or the larger anterior one conspicuously so and the dorsal lobes sometimes nearly entire; anthers oblong, 4-6 mm. long, sagittate at the base, united face to face, dehiscent only at the base; stigma bilobate; capsule globose to broadly ovoid, puberulous; seeds very numerous, fusiform, shining, about 1 mm. long.

Called "viejito" in Chiapas.

### KOHLERIA Regel

*Reference:* C. V. Morton, The Genus *Kohleria* in Mexico [Gesneriaceae], Bailey 15: 61-78. 1967.

Terrestrial herbs, shrubs, or subshrubs, abundantly pubescent with usually multiseptate hairs; leaves opposite or whorled, petiolate, those of a pair subequal or unequal, the blades usually thick, the margins serrate or crenate; inflorescences axillary, the flowers pedicellate, solitary or several in the axils of reduced leaves and the inflorescence then appearing terminal and often racemiform, or the pedicels fasciculate or 2-4 or more on a common peduncle, the pedicels then subtended by



FIG. 55. *Drymonia serrulata*. A, habit,  $\times \frac{1}{2}$ ; B, corolla, natural position,  $\times \frac{1}{2}$ ; C, corolla dissected to show stamens,  $\times 1$ ; D, calyx and pistil,  $\times 1$ .



a pair of bracts and the inflorescence subumbellate; calyx tube more or less turbinate, the 5 lobes free, about equalling or considerably longer than the tube, pubescent; corolla tubular, erect or somewhat oblique in the calyx, usually ventricose near the middle toward the throat, hirsute with usually reddish hairs, the limb narrow, more or less bilabiate or nearly regular, the 5 lobes short, often variously spotted or striped within; fertile stamens 4, the filaments inserted on the base of the corolla tube, a small staminode present; anthers initially coherent, later coherent or free, the thecae distinct, fully dehiscent; disc glands usually 5, distinct or not, sometimes the 2 posterior ones connate, or all of them united to form a thin, entire, crenate, or very shallowly lobate annulus; ovary more than two-thirds inferior, the placentae ovuliferous on both surfaces; style pubescent or pilosulous, elongating after the anthers have shed their pollen, the stigma stomatomorphic or bilobate; fruit capsular, conic or rostrate at the apex, bivalvate; seeds small, very numerous.

Sixty or more species, in tropical America, with eight in Guatemala.

Leaves in area of inflorescence much reduced, often bractlike; flowers axillary but the total inflorescence appearing terminal and often racemiform; common peduncle usually obsolete.

Leaves often in whorls of 3 or 4; pedicels commonly 2-5 in leaf axils; corolla lobes red throughout or only 2-3 lobes spotted; disc glands free or the 2 posterior ones connate.

Indument of pedicels and calyx reddish or brownish; calyx lobes ovate to oblong-ovate, often recurving, 3-5 mm. long; corolla with 2-3 lobes more or less spotted. . . . . *K. spicata*.

Indument of pedicels and calyx white or whitish; calyx lobes triangular, erect, about 2 mm. long; all corolla lobes unspotted. . . . . *K. longifolia*.

Leaves opposite, not in whorls; pedicels always solitary in leaf axils; corolla lobes all conspicuously spotted; disc glands united to the middle to form a ring. . . . . *K. lanata*.

Leaves in area of inflorescence little if at all reduced; inflorescences conspicuously axillary and often appearing umbelliform, the pedicels 1-4 on a common peduncle.

Pedicels usually solitary, the peduncle marked only by the presence of bracts at the base of the pedicel.

Leaf blades glabrous or more or less pilose above; common peduncle 1.5-3.5 cm. long; indument of lower leaf surfaces, pedicels and calyces appressed. . . . . *K. fruticosa*.

Leaf blades scabrous above, often rugose to bullate; common peduncle 0.2-1 cm. long; indument of lower leaf surfaces, pedicels and calyces spreading. . . . . *K. rupicola*.

Pedicels 2-4 on a conspicuous common peduncle.

Leaf blades mostly 12-28 cm. long; bracts subtending the pedicels obovate, leaflike; calyx lobes broadly ovate to obovate. . . . . *K. skutchii*.

Leaf blades mostly 6-15 cm. long; bracts subtending the pedicels linear or very narrowly oblanceolate; calyx lobes not as above.

Calyx lobes 2-6 mm. long, broadly or narrowly triangular and acute, or sometimes narrowing abruptly to a subulate apex; corolla commonly 2-2.5 cm. long. . . . . *K. deppeana*.

Calyx lobes 6-10 mm. long, linear to linear-lanceolate, attenuate or narrowing gradually to a subulate apex; corolla commonly 3-4 cm. long.

Indument of inflorescence spreading; corolla 3.5–4 cm. long. .*K. elegans*.

Indument of inflorescence appressed; corolla about 3 cm. long.

*K. elegans* var. *pedunculata*.

***Kohleria deppeana*** (Schlecht. & Cham.) Fritsch in Engler & Prantl, Pflanzenf. IV. 3b: 174. 1894. *Gesneria deppeana* Schlecht. & Cham. Linnaea 5: 110. 1830. (?) *Columnea umbellata* Bertol. Fl. Guat. 426. 1840 (type from San Lucar, i.e. San Lucas, probably in Sacatepéquez, *Velasquez*). *Moussonia costaricensis* Klotzsch ex Oersted, Centralamer. Gesner. 33. 1858; Hanstein, Linnaea 34: 286. 1865. *Isoloma deppeanum* Hemsl. Biol. Centr. Amer. Bot. 2: 478. 1882. *Gesneria lasiantha* Zucc. Abh. Math. Phys. Kl. Acad. Wiss. 1: 300. 1832. *K. deppeana* var. *lasiantha* Fritsch, Bot. Jahrb. 50: 425. 1913. *Chompipe*, *Susana sylvestre* (Escuintla); *khos-corrusumal*, *sel-dia* (Guatemala); *kak-rok-kiché* (Chichipín, San Marcos).

Damp or wet thickets, mixed forest or pine forest, sometimes on clay bluffs or sandy banks near rivers and streams, rarely in marshes, usually 1,200–2,700 m., but sometimes as low as 500 m.; Alta Verapaz; Chimaltenango; Chiquimula; Escuintla; Guatemala; Huehuetenango; El Progreso; Quezaltenango; El Quiché; Sacatepéquez; San Marcos. Mexico; Honduras; Costa Rica.

Usually erect shrubs or suffruticose herbs to 2 m. tall, the stems sometimes weak and reclining on other plants or pendent from banks or cliffs, the branches densely villous-tomentose with spreading or subappressed, often reddish hairs; leaves on usually short, rarely somewhat elongated petioles, the blades of a pair more or less unequal, oblong-lanceolate to oblong-ovate, mostly 5–17 cm. long, acuminate, obtuse or acute at the base and often oblique, the margins crenate or serrate, densely and softly pilose to velutinous on both surfaces with spreading or appressed, multiseptate hairs, paler beneath, the costae and veins often reddish to maroon; peduncles mostly 3–8 cm. long, villous, 3–4-flowered, the flowers on villous or pilosulous pedicels 1–3 cm. long, the pedicels subtended by a pair of linear or narrowly oblanceolate bracts; calyx densely short-villous or pilosulous with spreading or appressed hairs, the hypanthium turbinate, 2–3 mm. long at anthesis, the lobes commonly broadly or narrowly triangular and acute, sometimes recurved 2–4 mm. long, but frequently becoming abruptly subulate at the apex, then 3–6 mm. long; corolla 2–2.5 cm. long (rarely to 3 cm.), bright red or orange-red outside and densely pilosulous with reddish hairs, yellow inside, the lobes marked with red within; stamens short-exserted; style pubescent; capsule 6–9 mm. long, densely pubescent.

A highly variable, widely distributed, and often misunderstood species, frequently confused in herbaria with *K. elegans* (Dcne.) Loes. which has linear to linear-lanceolate calyx lobes and a larger corolla (3–4 cm. long).

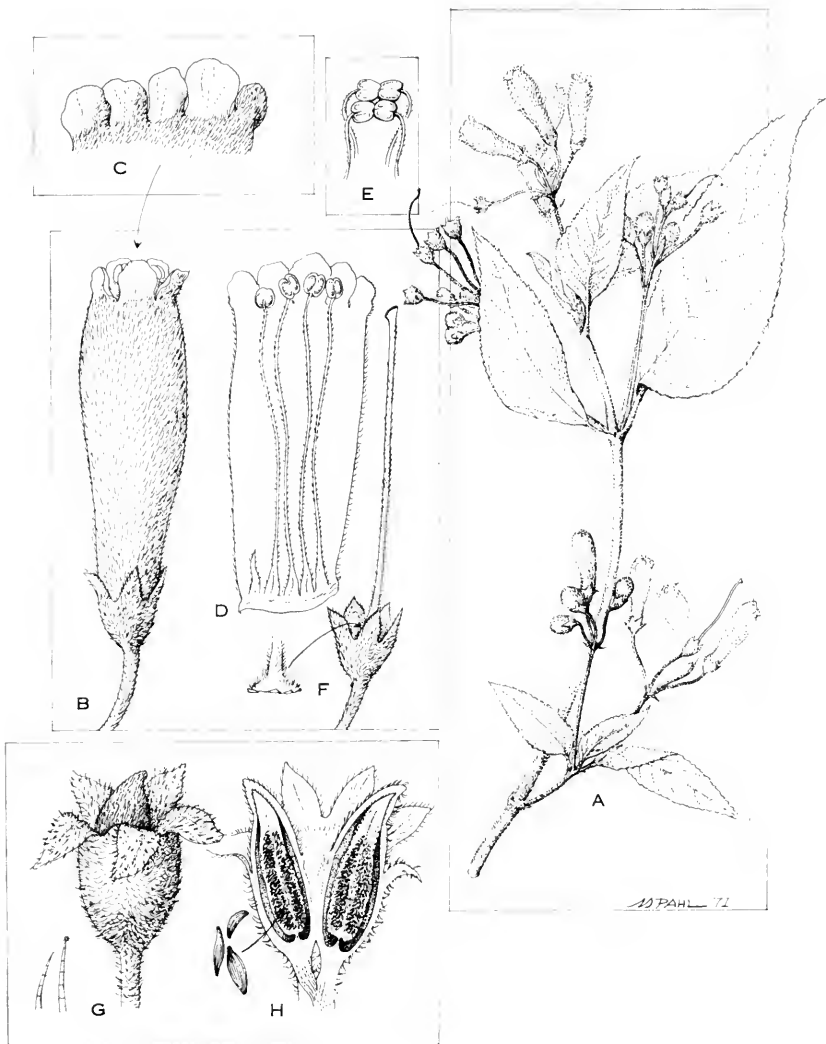


FIG. 56. *Kohleria deppeana*. A, habit,  $\times \frac{1}{2}$ ; B, flower at anthesis,  $\times 2$ ; C, detail of corolla lobes,  $\times 2\frac{1}{4}$ ; D, corolla opened to show stamens and staminode,  $\times 2$ ; E, detail of anthers (initially coherent),  $\times 2$ ; F, calyx and style, with separate view of top of the almost wholly inferior ovary,  $\times 2$ ; G, calyx enclosing capsule,  $\times 3$  (with two multiseptate hairs, greatly enlarged); H, calyx and capsule opened centrally (ovary is unilocular),  $\times 3$ .

Specimens of *Tuerckheim 10*, cited by Fritsch (1913) as *K. deppeana* var. *lasiantha*, differ from the typical form only in their appressed indument, but *Skutch 1857*, annotated by Morton as var. *lasiantha*, has calyx lobes subulate at the apex and with relatively wide sinuses. Numerous collections (i.e., *Standley 59727, 63019*, and *64643, Molina, Burger, & Wallenta 16184, Steyermark 33282, Williams, Molina, & Williams 25141, Heyde & Lux 4443*, and *Salas 1401*) with very short, whitish hairs on pedicels and calyces, have calyx lobes similar to *Skutch 1857*, certainly more obviously subulate than triangular, usually 3–6 mm. long, and appear to fit the description of *Moussonia costaricensis* Klotsch ex Oersted. Fritsch placed this species in synonymy with *K. elegans*, explaining that after comparing the Berlin specimen of *M. costaricensis* with the plate of *M. elegans*, he felt justified in uniting them, although he was aware of their differences in indument color and length. His discussion does not mention differences in length of calyx lobes. Morton (1967) listed *M. costaricensis* as a possible synonym of *K. elegans*, indicating his uncertainty by his use of a question mark and his statement that he had not seen the former. Hanstein (1865) recognized *M. costaricensis* as a separate species and placed it immediately after *M. deppeana*, with the remark, "Omino praecedenti similis," distinguishing it from *M. deppeana* by its whitish hairs, by its calyx lobes a little longer than the tube, and by its narrower corollas. He also described the corollas of both *M. deppeana* and *M. costaricensis* as about 1 in. (2.5 cm.) long, and accepted Decaisne's description of the corollas of *M. elegans* as "sesquipollicaris" (3.7 cm. long). Although I have not seen the Berlin specimen of *M. costaricensis*, it seems to me that Hanstein was perhaps closer to the truth than Fritsch, that *M. costaricensis* is more closely related to *K. deppeana* than to *K. elegans* and may indeed be synonymous with the var. *lasiantha*. It is also quite possible that all three may be parts of an aggressive complex.

It is interesting that one collection, *Heyde & Lux 6210*, cited by Fritsch as *K. elegans*, may have been a mixed collection. Two specimens of that number, F.M. 265011 and U.S. 1336322, have the small calyx lobes, 2–4 mm. long, typical of *K. deppeana*, but a third sheet, U.S. 258885, consisting of three specimens, is mixed. The center and right-hand specimens have calyx lobes only 2–3 mm. long, but the specimen on the left has flower buds with calyx lobes 6, 7, and 8 mm. long, as in *K. elegans*. The other Guatemalan collection cited by Fritsch as *K. elegans*, *J. D. Smith 1867*, has short white

indument, longer calyx lobes, 3–5 mm. long, and corollas only 2.5 cm. long, matching the description of *M. costaricensis*, and I have therefore placed it in *K. deppeana*.

Hanstein, Fritsch, and Morton all placed "*Gesneria elongata* Mart. & Gal. (Bull. Acad. Brux. 9(2): 32. 1842), *non* HBK." in synonymy with *K. deppeana*. It is omitted here because Martens and Galeotti (l.c.: 33) pointed out that the calyx lobes of the specimen they considered to be *G. deppeana*, (Galeotti 1906), were linear-lanceolate, 5–6 lines long (11.5–13.8 mm.) and quite different from the ovate lobes, only 2 lines long, of the specimens they determined to be *G. elongata* "H.B. et. Dec.," Galeotti 1903 and 1918.

***Kohleria elegans*** (Dcne.) Loesener, Bull. Herb. Boiss. 7: 574. 1899. *Moussonia elegans* Dcne. ex Planch. Fl. Serres 5: t. 489. 1849 (type cultivated in Europe from material said to have been originally received from Guatemala). *Isoloma elegans* Hemsl. Biol. Centr. Amer. Bot. 2: 478. 1882. *K. collina* Brandegees, Univ. Calif. Publ. Bot. 6: 66. 1914 (type from Cerro del Boquerón, Chiapas, Mexico).

Damp or wet thickets or forest, often on slopes and cliffs, 1,000–2,300 m.; Alta Verapaz; Baja Verapaz; El Quiché; San Marcos. Western and southern Mexico; Costa Rica (?).

Shrubs or suffruticose herbs 1–3 m. tall, the stems and branches densely villous with short, spreading, brownish or reddish to dark red, multiseptate hairs; leaves short-petiolate, the blades of a pair unequal to subequal, ovate to ovate-oblong or elliptic, mostly 5–15 cm. long, acuminate to long-acuminate, usually rounded to subcordate at the base, rarely acute, densely villous, especially beneath, with spreading, multiseptate hairs, the margins serrate or crenate; peduncles axillary, 3–10 cm. long, the pedicels 1–4, mostly 1.5–6 cm. long, villous with usually reddish to purplish (rarely whitish) hairs about 1 mm. long, subtended by a pair of linear bracts; calyx densely villous with spreading, usually reddish hairs, the tube turbinate, the lobes usually linear or linear-lanceolate, rarely lanceolate, attenuate or gradually narrowing to a subulate apex, 6–10 mm. long at anthesis, sometimes longer in fruit, twice as long as the tube or longer; corolla usually deep red or bright red, sometimes orange-red, commonly 3–4 cm. long (in ours), about 1 cm. broad in the throat, usually densely red-villous outside, the lobes more or less rounded with margins shallowly and unevenly denticulate, inconspicuously spotted or striped within; stamens short-exserted; style pubescent, the stigma stomatomorphic; capsule about 1.5 cm. long.

This species appears to have been long misunderstood and rather widely confused with *K. deppeana* (Schlecht. & Cham.) Fritsch, and the two may represent extremes of an aggressive complex. The calyx lobes of the typical form of *K. deppeana* are commonly triangular and only 2–4 mm. long; these sometimes become abruptly subulate at the apex and are then 3–6 mm. long. The corollas of *K. deppeana*

are 2–2.5 cm. long. The illustration of *Moussonia elegans* Dcne. is of a plant with linear calyx lobes apparently 6–10 mm. long, and the corolla is described as “sesquipollicaris” (3.7 cm. long). While some corollas of several collections of Mexican plants determined by Morton to be *K. elegans* are only 2.5 cm. long, mature corollas on all of the Guatemalan specimens are 3–4 cm. long.

***Kohleria elegans* var. *pedunculata*** (Brandegee) Morton, *Baileya* 15: 75. 1967. *K. pedunculata* Brandegee, Univ. Calif. Publ. Bot. 6: 67. 1914 (type from Cerro del Boquerón, Chiapas, Mexico, *Purpus* 6664).

Damp or wet thickets or forest, 2,000–2,500 m.; Quezaltenango. Chiapas, Mexico.

Differs from *K. elegans* in its appressed indument and shorter corollas, 2.8–3 cm. long. One isotype, F.M. 415527, is a mixed collection; the specimen on the right side of the sheet is part of the type collection, but the specimen on the left is *K. fruticosa* Brandegee.

***Kohleria fruticosa*** Brandegee, Univ. Calif. Publ. Bot. 6: 67. 1914 (type from Cerro del Boquerón, Chiapas, Mexico, *Purpus* 7007).

Damp thickets and forest, 2,300–2,800 m.; Quezaltenango; San Marcos. Mexico.

Branching shrubs 1–2 m. tall, the stems villous with appressed or ascending hairs; leaves opposite, short-petiolate, those of a pair subequal to unequal, the blades oblong to oblong-lanceolate or sometimes obovate, mostly 5–8 cm. long, acuminate, the base nearly rounded to cuneate, glabrous or more or less pilose above, appressed-villous below, especially so on costae and veins, the margins serrate; inflorescences axillary, the peduncles slender, 1.5–3.5 cm. long; pedicels solitary, 1.5–2.5 cm. long, subtended by a pair of linear bracts 3–5 mm. long; calyx lobes narrowly linear-lanceolate, 10–14 mm. long, tapering to an almost filiform apex, more or less appressed-pilose; corolla red, about 3 cm. long, the tube gradually ampliate, finely appressed-pilose outside or nearly glabrous, the lobes more or less minutely pectinate-denticulate; disc glands indistinct; ovary sparsely pubescent; style glabrous or nearly so, the stigma stomatomorphic; capsule pubescent.

Mature leaves of the Mexican plants are glabrous above with the young leaves pilose, while all leaves of the Guatemalan plants are more or less pilose.

**Kohleria lanata** Lemaire, *Illustr. Hortic.* 8: t. 287. 1861; Moore, *Gentes Herb.* 8: 379. 1954. *Gesneria maculata* Mociño & Sessé ex DC. *Prodr.* 7: 532. 1838, *non* Martius (1829).

Not reported from Guatemala but may be expected there. Mexico (Chiapas and Guerrero), 850–1,350 m.

Herbs, commonly 10–40 cm. tall, villous to pilose throughout, the stems usually densely villous with whitish to pale yellowish hairs; leaves opposite, those of a pair subequal, on petioles 0.5–5 cm. long, the blades ovate to oblong-ovate, acuminate, mostly 4–13 cm. long and 3–9 cm. wide, the margins crenate to serrate, sparsely or densely pilose above, more or less villous beneath, often densely so and appearing velvety; pedicels solitary in the axils of reduced leaves, 0.5–2.5 cm. long, densely villous, the common peduncle obsolete; calyx densely villous, the lobes oblong, acute or obtuse, mostly 6–9 mm. long, broadly spreading; corolla red to orange-red, normally about 3 cm. long (sometimes only 2 cm.), the tube densely villous with usually light (sometimes reddish) hairs, the 5 lobes spreading, conspicuously purple-spotted within; disc with 5 glands united to the middle into a ring; ovary villous, the style villous to pubescent, the stigma bilobate; fruits not seen.

**Kohleria longifolia** (Lindl.) Hanst. *Linnaea* 29: 524. 1858. *Gesneria longifolia* Lindl. in Edwards *Bot. Reg.* 27: misc. 92, 1841 (based on a plant cultivated in England from material collected in Guatemala by Hartweg); *op. cit.* 28, t. 40. 1842. *Isoloma longifolium* Dene. *Rev. Hort.* 465. 1848. *K. linkiana* Hanst. *Linnaea* 26: 160, t. 1, f. 18. 1854; *op. cit.* 29: 522, 565. 1858. *Gesneria linkiana* Kunth & Bouché, *Ind. Sem. Hort. Berol.* 13. 1848 (based on cultivated material said to be of Guatemalan origin). *I. linkianum* Hemsl. *Biol. Centr. Am. Bot.* 2: 478. 1882. *K. chiapensis* Brandege, *Univ. Calif. Publ. Bot.* 6: 66. 1914 (type from Chiapas, Mexico).

Usually in damp or wet thickets or forest, sometimes on open or brushy slopes and banks, 300–2,000 m.; Chimaltenango; Escuintla; Quezaltenango; El Quiché; Retalhuleu; Sacatepéquez; San Marcos; Santa Rosa; Sololá; Suchitupéquez. Southern Mexico; El Salvador; Nicaragua; Costa Rica (fide Standley).

Erect, stout, herbaceous or suffruticose plants to one meter tall, simple or sparsely branched, the stems densely pilose with appressed or ascending white hairs; leaves opposite or ternate, short-petiolate, the blades lance-oblong, mostly 8–20 cm. long, acute or acuminate, acute or attenuate to the base, villous-sericeous with white hairs, densely so beneath, the margins crenate or serrate; inflorescences appearing racemiform, the area of inflorescence mostly 10–25 cm. long, the flowers 1-many on slender or stout pedicels in the axils of reduced leaves; calyx densely white-sericeous or strigose, the tube short and broad, the lobes triangular, acute, about 2 mm. long; corolla brick red, 1.5–2 cm. long, the tube a little ventricose above, densely red-pilose outside, spotted with darker red in the throat, the lobes

unspotted, 2–4 mm. long, spreading or reflexed; filaments glabrous; disc glands 5, free; style densely pilosulous, the stigma bilobate; capsule about 8 mm. long, the free portion conic, densely strigose.

This species appears to be closely related to *K. spicata* (HBK.) Hanst., which occurs in much of the same area and in similar locations.

***Kohleria rupicola*** Standl. & L. Wms., *Ceiba* 3: 62. 1952.

Damp banks, in pine woods or mixed forest, 2,000–2,500 m.; Jalapa; Zacapa. Honduras (type from Dept. Intibucá, *Standley 25168*).

Shrubs or suffruticose herbs to 2 m. tall, sparsely branched, the stems and branches densely villous with multiseptate hairs; leaves opposite, those of a pair mostly 3–12 cm. long, 1.5–5 cm. wide, acuminate, more or less rounded at the base, scabrous and more or less papillose-rugose to bullate on the upper surface, usually densely villous with spreading hairs below, the margins crenate, lateral veins 7–9 pairs; peduncles axillary, short, 0.2–1 cm. long, often inconspicuous; pedicels solitary or geminate, 1.5–4 cm. long, densely villous, subtended by a pair of linear bracts 5–7 mm. long; calyx lobes linear to narrowly linear-lanceolate, attenuate to the apex, variable in length, 5–17 mm. long, densely villous; corolla red, about 2.5 cm. long, the tube white strigose outside, the lobes about 5 mm. long, rounded, entire or obscurely and irregularly denticulate; disc annular, nearly entire or very shallowly and irregularly lobate; ovary villous; style pubescent, the stigma stomatomorphic; capsule densely villous.

The leaves of the plants from Jalapa are not as rugose nor as hairy as those from Zacapa and Honduras. It is also interesting that on the type sheet, there are three specimens, two of which have calyx lobes 5–7 mm. long, and one (on the right) has calyx lobes 13 mm. long. Those of a second Honduran collection, *Molina & Molina 24435*, range from 7–12 mm. in length. The specimen from Zacapa, Steyermark *42476*, has short calyx lobes, 5–7 mm. long; all specimens from the two collections from Jalapa, *Steyermark 32710* and *Williams 13177*, have calyx lobes 12–17 mm. long.

***Kohleria skutchii*** Morton and Gibson, *Phytologia* 23: 336. 1972.

Damp or wet mountain forest, 2,400 m., Quezaltenango (type from Fuentes Georginas, near Zunil, *Skutch 906*). Mexico (Chiapas).

Slender shrubs 2–3 m. tall, the stems and branches velutinous with multiseptate, reddish hairs; leaves opposite, those of a pair subequal, on velutinous petioles 3–7 cm. long, the blades oblong-ovate to elliptic-oblong, mostly 12–28 cm. long, 5–13 cm. wide, acuminate, oblique and rounded to subcordate at base, densely velutinous to tomentose above, velutinous below, the margins serrate to crenate, lateral veins 9–10 pairs; inflorescences axillary, the common peduncle



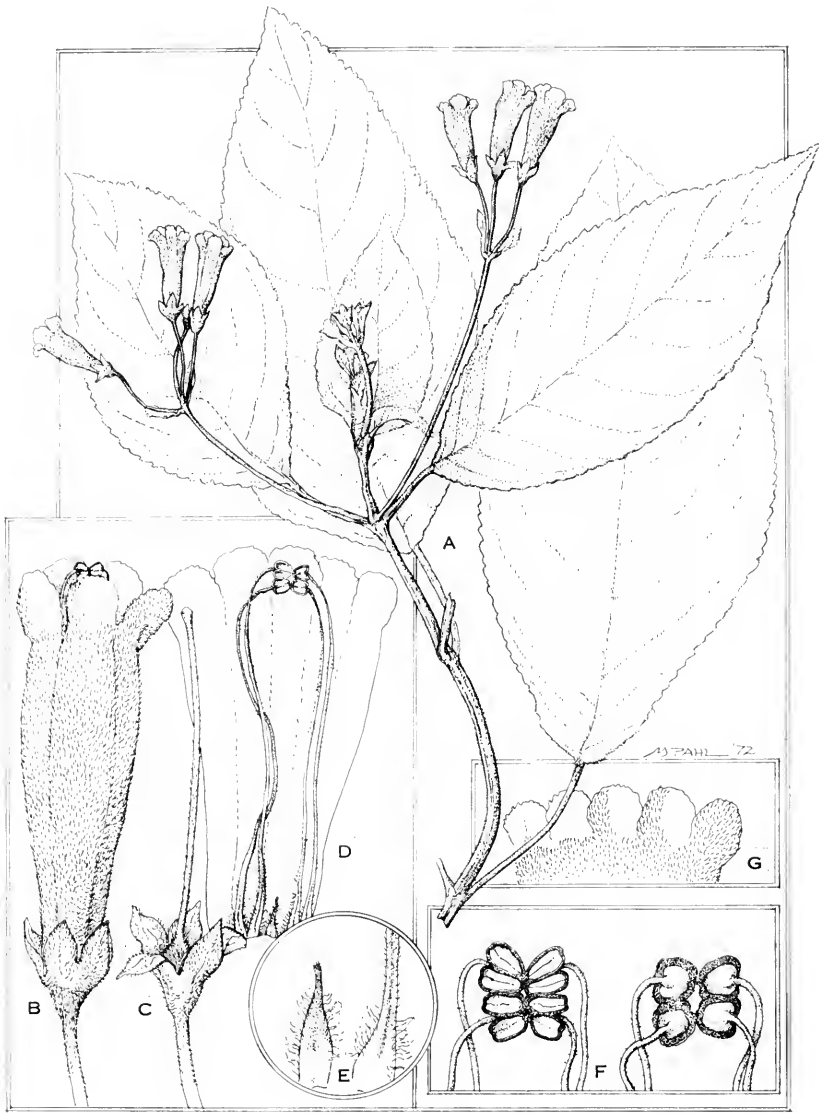


FIG. 57. *Kohleria skutchii*. A, flowering branch of plant,  $\times \frac{1}{2}$ ; B, flower,  $\times 2$ ; C, calyx with pistil,  $\times 2$ ; D, corolla opened to show stamens and staminode,  $\times 2$ ; E, two ovaries,  $\times 5$ ; F, two views of anthers,  $\times 5$ ; G, detail of corolla lobes,  $\times 2$ .

elongating, 7-9 cm. long, velutinous, the pedicels usually 4, sometimes 3, velutinous, 3-4 cm. long, subtended by a pair of leaflike bracts 10-15 mm. long; calyx densely velutinous, the lobes broadly ovate to obovate, acute or obtuse, 4-5 mm. long; corolla erect in the calyx, 3.5-4 cm. long, the tube orange-red, velutinous outside, slightly dilated at the base but not saccate, more or less ventricose above, 10-15 mm. wide, the lobes yellowish, marked with red, 7-9 mm. long, suborbicular, the margins more or less pectinate-denticulate; stamens short-exserted, the filaments inserted on the base of the corolla tube, pubescent, dilated at base, the anthers initially coherent in a square; ovary densely villous; style pubescent; stigma stomatomorphic; disc annular, the glands much reduced, irregular and inconspicuous; capsule unknown.

One sterile specimen from San Marcos, *Williams, Molina, & Williams 26252*, previously identified as *K. skutchii*, does have the large leaves of the species, but the stems and petioles are long-villous with spreading, whitish hairs and the indument of the leaf blades is comparatively sparse.

***Kohleria spicata*** (HBK.) Hanst. *Linnaea* 29: 520. 1858. *Gesneria spicata* HBK. *Nov. Gen. & Sp.* 2: 393, *t.* 188. 1817. *G. spicata* var. *schiedeana* DC. *Prodr.* 7: 531, 1839. *G. schiedeana* Hook., *Curtis's Bot. Mag.* 71. *t.* 4152. 1845. *Isoloma spicatum* Dcne. *Rev. Hort.* 465. 1848. *K. ignorata* Regel, *Bot. Zeit.* 1851: 893. 1851; *Gartenflora* 1: 1, *t.* 1. 1852. *K. wagneri* Regel, *Ind. Sem. Hort. Turic.* 1853; *Gartenflora* 3: 347, *t.* 103. 1854. *I. kramerianum* Lehm. *Hamb. Gartenz.* 10: 458. 1854. *K. schiedeana* Hanst. *Linnaea* 29: 518. 1858. *K. tetragona* Oerst. *Vidensk. Selsk.* 5: 101. 1858. *I. schiedeana* Hemsl. *Biol. Centr. Amer. Bot.* 2: 479. 1882. *I. tetragonam* Hemsl. *op. cit.* 480. *Khos-corrusumal* (fide Aguilar), and *mazoroo* (Guatemala).

Damp or wet thickets or pine forest; sometimes on open slopes or roadside banks, sea level to 1,500 m.; Alta Verapaz; Chiquimula; Guatemala; Izabal; Petén; El Quiché; Zacapa. Southern Mexico to Panama; northern South America.

Stout, erect, usually simple, herbaceous or suffruticose plants to 3 meters tall, the stems villous-hirsute with spreading reddish or brownish hairs; leaves opposite or ternate, petiolate, the blades elliptic to lance-elliptic or oblong-ovate, mostly 7-20 cm. long, acute or acuminate, obtuse to cuneate at the base, hirtellous to velutinous above, villous-tomentose and paler beneath, often with red veins, the margins crenate-serrate; inflorescences appearing racemiform, 5-35 cm. long, dense or interrupted, the flowers 1-4 in the axils of reduced bractlike leaves, the pedicels usually stout, to 2.5 cm. long; calyx villous-hirsute with spreading, brownish or reddish hairs, the tube 2-3 mm. long, the lobes green within, ovate to oblong-ovate, often becoming recurved, acute or obtuse, 3-4(5) mm. long; corolla red to orange-red, 1.2-2 cm. long, red-villous outside, the tube ventricose, more or

less curved, the throat slightly contracted, the lobes spreading or reflexed, slightly unequal, 2 or 3 more or less spotted; filaments glabrous, dilated at base, the anthers about 2 mm. long; style pilosulous; stigma shallowly bilobate; disc glands 5 and free, or the 2 posterior ones more or less connate; capsule about 8 mm. long, densely villous-hirsute.

Morton (*Baileya* 15: 77. 1967) separates *K. schiedeana* from *K. spicata*, stating that the typical form of *K. spicata* occurs from Costa Rica to South America, that its inflorescences are much more elongated than those of the Mexican plants and that the corolla lobes "are more generally red and with large red blotches toward the center but without a definite central red line (or lines) and with no red lines or rows of dots extending down into the tube on the ventral side." However, as areas of inflorescence of Guatemalan plants vary from 5 to 35 cm. in length, and as color markings within the corollas are rarely discernible in herbarium specimens, I am unable to distinguish two species. As noted by Morton, an extreme form with slender, elongated pedicels occurs in Mexico and Guatemala.

### MONOPYLE Moritz

Slender perennial herbs, erect or subscandent, the stems sparsely branched or simple, often reddish; leaves of a pair connected by a stipular line, mostly very unequal, the smaller ones often stipuliform, the blades thin, serrate or crenate; inflorescences terminal, more or less paniculate, few-many-flowered, the flowers pedicellate; calyx lobes 5, equal or nearly so, entire; corolla open-campanulate, narrowed at the base or sometimes a little saccate, minutely pubescent outside, the limb broad, the lobes spreading, subequal; stamens 4, with a staminode usually present, the filaments inserted on the base of the corolla tube, incurved above; anthers coherent, bitheous, thecae slightly divergent; ovary almost wholly inferior, the placentae ovuliferous on both sides; style short and thick, glabrous; stigma stomatomorphic; disc absent; fruit capsular, linear-oblong, enclosed in the calyx, opening by 2 longitudinal slits.

About eight species, ranging from Guatemala to Bolivia. Only one is known from Guatemala, but another, *M. maxonii* Morton, is found in southern Central America.

**Monopyle puberula** Morton, *Field Mus. Bot.* 18: 1184. 1938.

Damp or wet forest, usually on limestone, 500–1,500 m.; Alta Verapaz. Costa Rica.

Plants erect, 30–80 cm. tall, the stems reddish, simple or sparsely branched, sparsely pilosulous with short, whitish, uncinat hairs; leaves of a pair very unequal, the larger ones on pubescent petioles 5–14 mm. long, the blades oblong or lance-oblong, mostly 5–13 cm. long and 1.5–5 cm. wide, acuminate, very oblique and

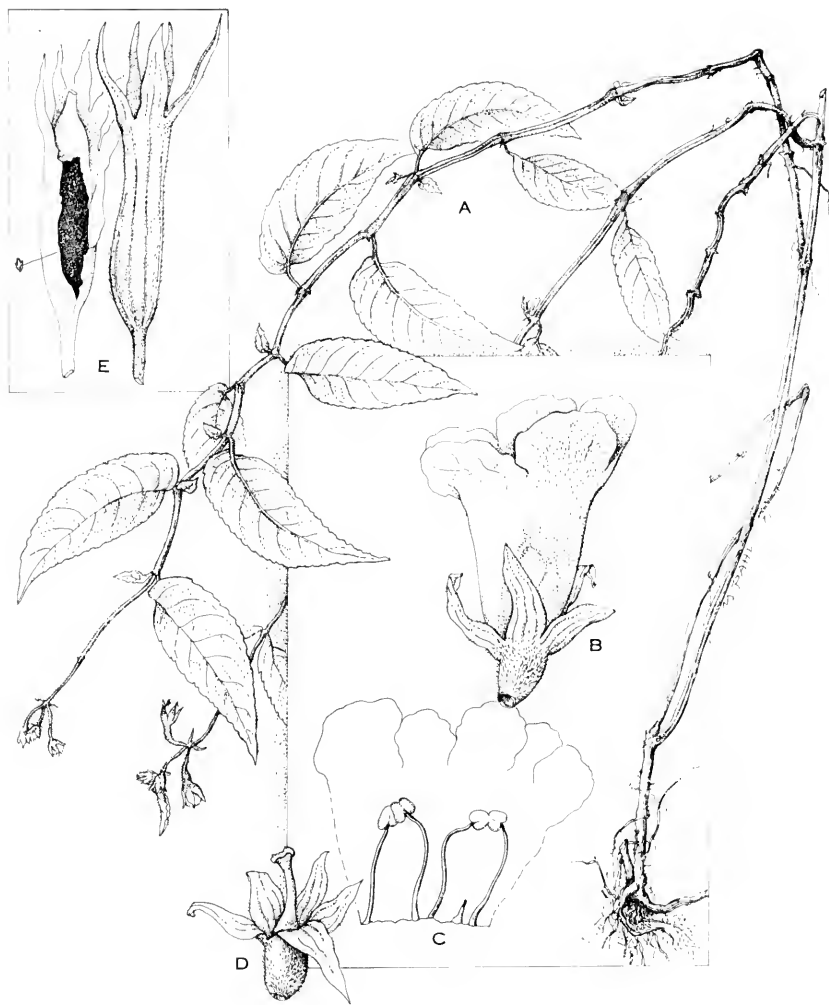


FIG. 58. *Monopyle puberula*. A, habit,  $\times \frac{1}{2}$ ; B, flower,  $\times 2\frac{1}{2}$ ; C, corolla opened to show stamens and staminode,  $\times 2\frac{1}{2}$ ; D, calyx and pistil,  $\times 2\frac{1}{2}$ ; E, two views of fruiting calyx, one opened to show seeds within capsule,  $\times 2\frac{1}{2}$ .

obtuse at the base, the margins finely crenate-serrate or serrate, green above and pilosulous, reddish beneath, puberulent on the costae and veins, minutely strigillose between the veins; smaller leaves mostly 0.5–1 cm. long, subsessile or short-petiolate, mostly ovate to rounded, or sometimes stipuliform; inflorescences 5–15 cm. long, subumbellate, pedunculate, the bracts commonly small and inconspicuous; pedicels usually 2–3 together, unequal, 5–15 mm. long; calyx tube cylindric, in anthesis 3–4.5 mm. long, about 2 mm. broad, attenuate to the base but in fruit becoming more or less saccate at the base, densely pilosulous with uncinata, eglandular hairs, the lobes linear-oblong, 5–6.5 mm. long, green or tinged with rose; corolla 20–28 mm. long, the tube white and the limb lavender, the tube appressed-pilosulous outside, abruptly ampliate above, the limb about 2.8 cm. broad, the lobes subequal, rounded, entire, eciliate, glabrous within; stamens included, the anthers about 1 mm. long; capsule linear-oblong, 12–15 mm. long, enclosed in the calyx.

It should be noted that, although according to the original description the petioles of this species are commonly not more than 5 mm. long, the collection from Chicoy, at about 600 m., *Tuerckheim 7929*, annotated and cited by Morton as *M. puberula*, has numerous petioles 7–14 mm. long, one to 18 mm., and that the leaves are nearly glabrous beneath, as in the Costa Rican *M. maxonii* Morton. Some calyx lobes on this collection are linear or linear-oblong but a few, on younger flowers, are ovate-oblong to lanceolate, and somewhat recurved as in *M. maxonii*. However, the hairs on the petioles are not as long as those on the typical *M. maxonii*.

### NAPEANTHUS Gardner

*Reference:* A. J. M. Leeuwenberg, Revision of *Napeanthus*, in the Gesneriaceae of Guiana, Acta Bot. Neerl. 7: 340–354. 1958.

Terrestrial, usually perennial, herbaceous or sometimes suffruticose plants, the stems very short; leaves crowded at the apex, appearing rosulate, sessile or subsessile, the blades (in ours) oblanceolate to oblong-spathulate, acute or obtuse, narrowed to the base, the margins dentate or serrate or almost entire; inflorescences axillary, cymose or subumbellate or the pedicels rarely solitary, but usually pedunculate and bracteate at the base of the pedicels; calyx campanulate, the 5 segments oblong or lanceolate, acuminate, entire, more or less venose, first connate for one-third to one-half their length but later often becoming more deeply parted; corolla campanulate (in ours) or subrotate, the tube short, the limb nearly regular or somewhat bilabiate, the 5 lobes obtuse, subequal, spreading; stamens 4 with a staminode usually present, or 5, included or exerted, the filaments inserted on the base of the corolla; anthers free, the thecae confluent at the apex, fully dehiscent; ovary superior, the style often curved, the stigma obscurely bilobate; placentae ovuliferous on both sides; disc absent; capsule shorter than the calyx, bivalvate (in ours); seeds ellipsoidal.

Twelve species, all in tropical America, from Guatemala southward to Bolivia, with only one in Guatemala.

**Napeanthus bracteatus** Morton, Contr. U. S. Nat. Herb. 29: 39. 1944.

Dense, wet, mixed mountain forest, mostly on limestone, Alta Verapaz (type from Secoyoté near Finca Sepacuité, *Cook & Griggs 614*).

Plants 10–25 cm. tall, in age developing a woody, simple stem 5–10 cm. long; leaves sessile, densely crowded at the apex of the stem, the blades thin, 7–27 cm. long and 2–8 cm. wide, oblanceolate to oblong-spathulate, acute, attenuate almost to the base and subcordate, more or less strigillose above, subtomentose beneath, especially on the costae and the 10–15 pairs of lateral veins, the margins dentate or denticulate; inflorescences usually numerous, the peduncles 5–10 cm. long, sparsely pilose, the pedicels 2–5 cm. long, bibracteate below, the bracts foliaceous, ovate or broadly lanceolate, acute, entire, 1–2 cm. long, sparsely pilose; calyx 7–10 mm. long, the segments equal or nearly so, lanceolate, acuminate, entire, sparsely pilose outside, venose, ciliate; corolla white, campanulate, 10–12 mm. long, the tube about 6 mm. long, minutely puberulent or almost glabrous, the limb slightly bilabiate; stamens 4, didynamous, included; capsule one-half to one-third as long as the calyx, glabrous.

Known only from Alta Verapaz, where it appears not to be uncommon.

### NIPHAEA Lindley

Low terrestrial herbs, the stems short, erect, simple (in ours); leaves petiolate, crowded at the top of the stem (in ours), the blades thin, ovate or elliptic, serrate or dentate; inflorescences axillary; pedicels 2-several in each leaf axil; bracts none; calyx turbinate-campanulate, the tube adnate below to the ovary, the 5 lobes equal or nearly so; corolla subrotate, the tube very short, the 5 lobes broad, the lateral ones outside in bud; stamens 4 or 5, or 4 with a staminode, the filaments short, erect, inserted on the base of the corolla, the anthers oblong, introrsely dehiscent, thecae confluent at the apex; disc absent; ovary half-inferior, the style rather stout, curved, the stigma stomatomorphic (in ours) but not much dilated; capsule half-inferior, the free portion conic, bivalvate; seeds very numerous.

Of the four or five species in Central and South America, only one is known from Guatemala.

**Niphaea oblonga** Lindl. Bot. Reg. 27: Misc. 80. 1841; 28: *t. 5*. 1842.

Based on plants cultivated in England, sent from Guatemala by Hartweg. About 1,500 m.; Guatemala; Santa Rosa.



FIG. 59. *Napeanthus bracteatus*. A, habit of plant,  $\times \frac{1}{2}$ ; B, pedicels arising from bracts. (Illustrations of floral details could not be made, as no corollas were found on any of the specimens examined, including the type material.)

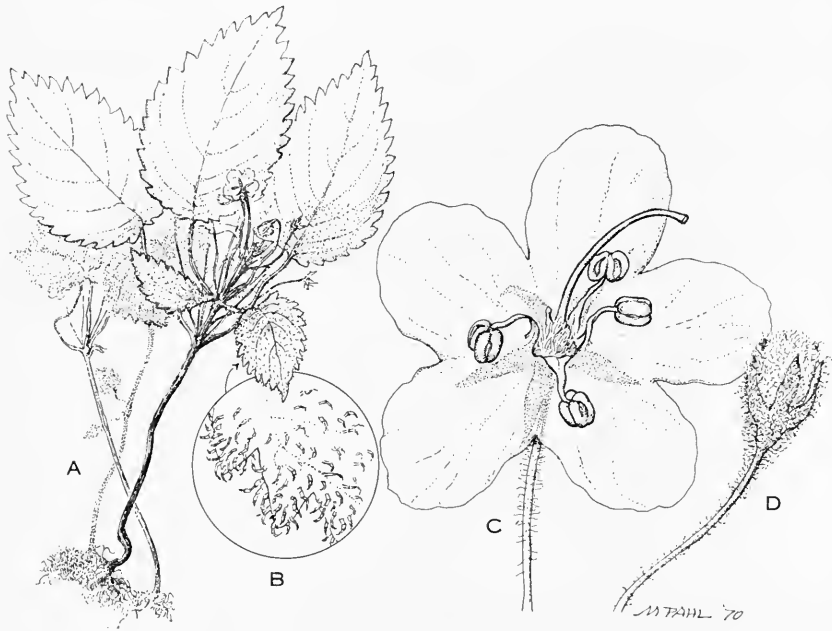


FIG. 60. *Niphaea oblonga*. A, habit,  $\times \frac{3}{8}$ ; B, detail of indument, greatly enlarged; C, flower,  $\times 3\frac{1}{2}$ ; D, calyx with corolla in bud,  $\times 3\frac{1}{2}$ .

Small, erect herbs, the stems slender, reddish, 3–15 cm. tall, villous; leaves few, crowded at the top of the stem, on petioles 1–5 cm. long, the blades ovate, obtuse or acute, cordate or rounded at the base, 4–10 cm. long, 2.5–7 cm. wide, more or less hirsute, the margins coarsely serrate to biserrate; pedicels 2–several in the upper leaf axils; calyx tube densely villous, the lobes lanceolate, acute, green, entire, accrescent, 3.5–7 mm. long, sparsely villous; corolla white, more or less villous outside, deeply lobate, the lobes broad, rounded, the limb 2–2.5 cm. broad; stamens 4, the anthers 1.5–2 mm. long.

### PHINAEA Bentham

Low, terrestrial, perennial herbs, the stems short, simple, erect or ascending; leaves opposite, often clustered at the apex of the stem, petiolate, the blades thin, soft, the margins dentate, serrate, or crenate; inflorescences axillary, the pedicels filiform, 2 to many in the upper leaf axils; calyx turbinate-campanulate, the tube adnate to the ovary, the 5 lobes spreading, equal or nearly so; corolla subrotate, the tube very short, the limb spreading, the 5 lobes broad; stamens 4, with a staminode usually present, the filaments inserted on the base of the corolla, the anthers obovate to subglobose, thecae distinct, not confluent at the apex, dehiscent above by a short slit; disc none; ovary more than half inferior, the style rather stout, usually somewhat curved, the stigma only a little dilated; fruit capsular, bivalvate; seeds numerous.



Nine species, ranging from Mexico to northern South America, with two in Guatemala and British Honduras.

Leaves subsessile or on petioles usually less than 1 cm. long; corolla limb about 10 mm. in diameter.....*P. repens*.

Leaves on petioles 1-3 cm. long; corolla limb 6-7 mm. in diameter...*P. parviflora*.

***Phinaea parviflora*** (A. Brongn. & Bouché) Benth. ex Solereder, Beih. Bot. Centralbl. 24, Abt. 2: 437. 1909. *Niphaea parviflora* A. Brongn. & Bouché, Linnaea 25: 299. 1852.

Described from plants grown in Europe, said to have been collected in Guatemala by Warscewicz. Mexico (Chiapas); British Honduras.

Low herbs, the stems simple, to about 10 cm. long, reddish, pilose with white hairs; leaves on pubescent to pilose petioles 1-3 cm. long, the blades subequal or unequal, elliptical, obovate, or elliptic-ovate, 4-11 cm. long, 2-7 cm. wide, obtuse to subacute, acute or cuneate at base, pubescent with short hairs on both surfaces but often also pilose beneath on costae and veins, lateral veins 7-10 pairs, the margins irregularly bidentate or crenate-dentate; pedicels few to numerous in the leaf axils, mostly 3-6 cm. long, filiform, pubescent; calyx pilose at base, the segments 2-3 mm. long, ovate-oblong to lance-oblong, acute or subacute, entire or sometimes more or less denticulate near the apex, pubescent; corolla white, the limb deeply lobate, about 7 mm. in diameter; capsule subglobose, included in the calyx.

According to the original description, the plants are white-villous and the calyx segments are ovate and acuminate. Our plants are pubescent to pilose, with ovate-oblong to lance-oblong calyx segments. However, other characters, such as the unusually small corolla, do match. To describe a new species at this time, without having seen the original material of *P. parviflora*, seems unwise.

***Phinaea repens*** (Donn.-Sm.) Solereder, Beih. Centralbl. 24, Abt. 2: 435. 1909. *Napeanthus repens* Donn.-Sm. Bot. Gaz. 31: 118. 1901.

On rocks or tree trunks in wet, dense forest, 350-1,200 m.; Alta Verapaz (type from Cubilgüitz, *Tuerckheim 7647*); Chimaltenango.

Small herbs, the stems 2-6 cm. long, pilose with weak white hairs; leaves mostly clustered at the end of the stem, subsessile or on petioles usually less than 1 cm. long, rarely to 2 cm., the blades oblong-elliptic, mostly 4-12 cm. long, 2-5 cm. wide, obtuse or acute, usually acute at the base, rarely nearly rounded, more or less pilose on both surfaces, the lateral veins 6-10 pairs, the margins serrate-dentate; pedicels few, filiform, 1-4 cm. long, pilosulous; calyx segments linear-lanceolate to ovate-lanceolate, entire, about 2 mm. long at anthesis, pubescent; corolla white, sparsely pubescent, the limb about 1 cm. in diameter, the lobes

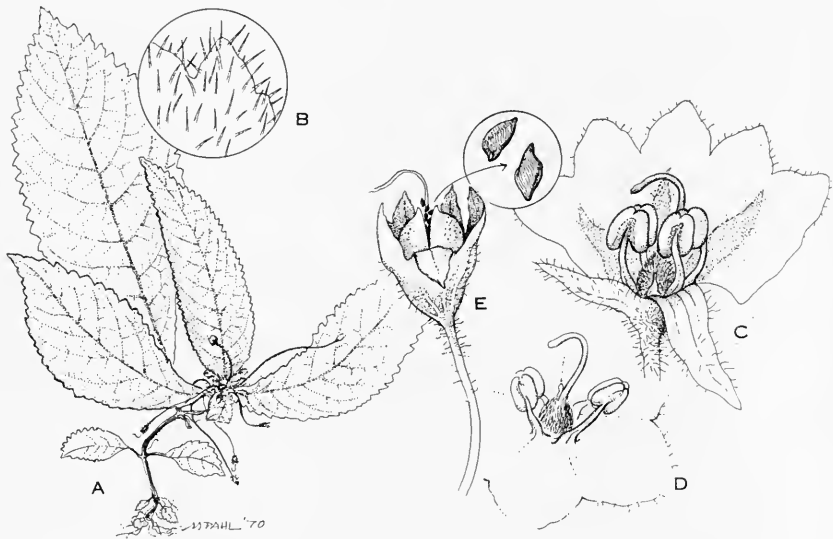


FIG. 61. *Phinaea repens*. A, habit,  $\times \frac{1}{2}$ ; B, detail of indument, greatly enlarged; C, flower with corolla opened to show stamens, staminode, and pistil,  $\times 5$ ; D, view within corolla, showing filament attachment,  $\times 4$ ; E, calyx with capsule,  $\times 4$ , and inset of two seeds, greatly enlarged.

ovate, rounded, 3–4 mm. long; stamens glabrous, the filaments 1–2 mm. long; ovary pubescent; capsule subglobose, included in the calyx.

## RECHSTEINERIA Regel

*Reference:* Moore, H. E., A Proposal for the Conservation of the Name *Rechsteineria*, *Baileya* 2: 24. 1954.

Terrestrial, herbaceous or somewhat suffruticose perennials from well-developed tubers, usually abundantly pubescent throughout, the stems erect, mostly simple; leaves opposite or in whorls of 3 to 5, petiolate or sessile, the blades crenate or dentate; inflorescences variable, axillary, the pedicels solitary, bracteate, fasciculate or cymose, sometimes pedunculate and subumbellate, or often appearing subracemose and terminal; calyx campanulate, nearly free from the ovary, the tube adnate only at the base, the 5 lobes shorter than the tube (in ours); corolla usually red or orange, tubular, erect, usually dilated to saccate at the base, only a little contracted in the throat, the limb more or less bilabiate with the upper lip erect and bilobate (in ours) or with 5 subequal short lobes; stamens 4, didynamous, the filaments inserted on the base of the corolla tube, the anthers united by their tips to form a square, circle, or a cross, thecae slightly divergent at base, fully dehiscent; disc glands commonly 5, sometimes fewer, the 2 posterior ones larger, sometimes connate, the others smaller or sometimes absent; ovary almost wholly

superior; style exerted, stigma stomatomorphic; fruit capsular, bivalvate; seeds numerous, shining, fusiform.

About 75 species, most numerous in South America, but extending as far north as Mexico. The name *Rechsteineria* has been conserved; the generic name *Corytholoma* has most commonly been used for these plants in Central America, where only one species occurs.

***Rechsteineria warscewiczii*** (Bouché & Hanst.) O. Kuntze, Rev. Gen. 2: 474. 1891. *Gesnera warscewiczii* Bouché & Hanst. Ind. Sem. Hort. Berol. 1861; App. 9. 1861; Linnaea 34: 273. 1865-66. *Corytholoma warscewiczii* Standley, Field Mus. Bot. 8: 43. 1930.

Damp or dry, open or brushy, sometimes rocky slopes, 300-2,300 m.; Chiquimula; Huehuetenango; Jutiapa; El Quiché; Santa Rosa; Zacapa. Southern Mexico; Honduras; Canal Zone. Described from cultivated plants believed to have been of Guatemalan origin.

Erect, herbaceous or somewhat suffruticose plants, the stems stout, simple or sparsely branched, to 1 m. tall, densely villous with rather short, spreading hairs; leaves opposite or whorled, a larger one often accompanied by small axillary leaves, on short or elongated, stout petioles, the blades oblong-ovate to elliptic-oblong or obovate-oblong, mostly 5-13 cm. long, obtuse or subacute, attenuate to the base, rather thick, densely villous-hirsute on both surfaces, more densely so beneath, the margins crenate; flowers axillary but the inflorescences appearing terminal and racemiform, leafy below, the uppermost leaves reduced and bract-like, the flowers on stout, erect, or ascending, bracteate pedicels equalling or shorter than the calyx, broadly campanulate, 1-1.5 cm. long and broad, green or tinged with red, densely short-villous, the lobes triangular, acute, shorter than the tube; corolla orange-red or orange (rarely yellow, fide Steyermark), 3.5-4 cm. long, densely short-villous, the tube somewhat dilated at the middle, slightly contracted in the throat, the limb very oblique, bilabiate, the upper lip erect and bilobate, about 1 cm. long, the lower lip very short; stamens exerted, anthers 1-1.5 mm. long; disc glands usually 4, the posterior one large and bilobate, or 2 glands connate, the others much smaller; capsule 12-15 mm. long, ovoid, acute, densely hispidulous, little exceeding the somewhat accrescent calyx; seeds very numerous minute, fusiform.

Handsome, showy plants, in general appearance much like some species of *Kohleria*.

### RHYNCHOGLOSSUM Blume

*Reference:* Burt, B. L., Studies in the Gesneriaceae of the Old World, XXIII: *Rhynchoglossum* and *Klugia*, in Notes Royal Bot. Gard. Edinb. 24(2): 167-171. 1962.

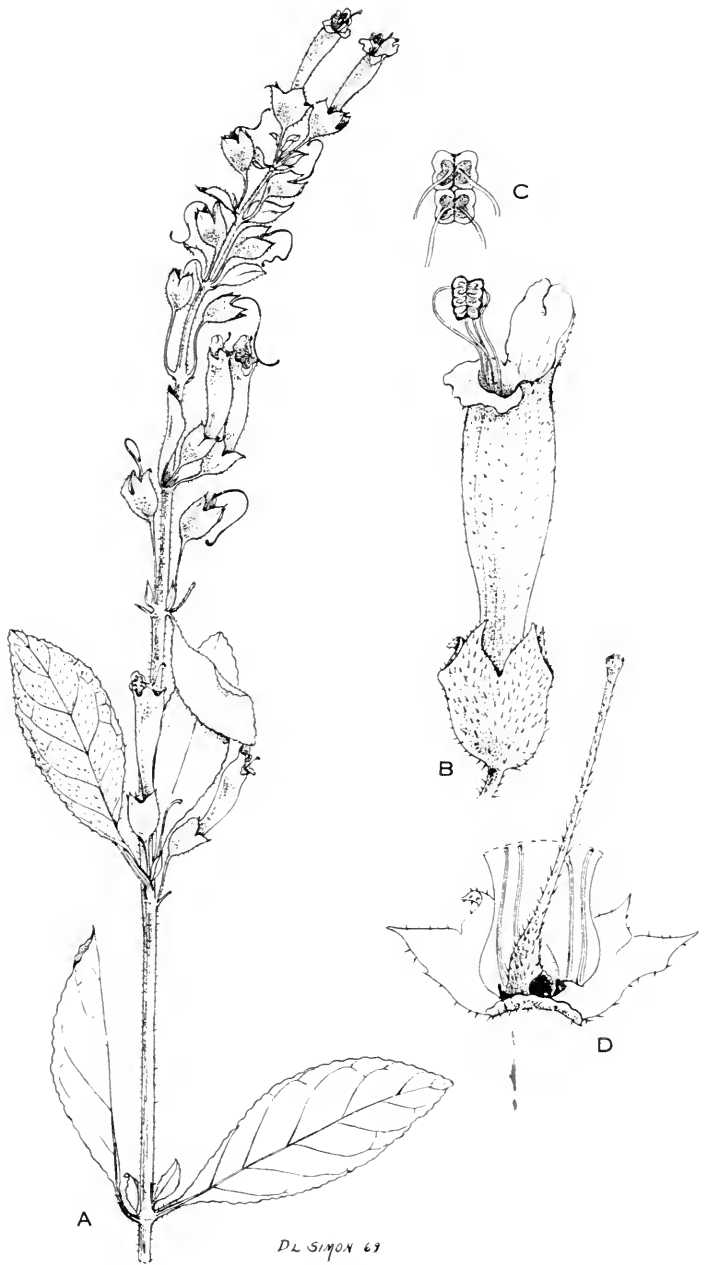


FIG. 62. *Rechsteineria warszewiczii*. A, habit,  $\times \frac{1}{2}$ ; B, flower,  $\times 1\frac{1}{2}$ ; C, detail of anthers, dorsal view,  $\times 2$ ; D, dissection showing pistil and disk glands,  $\times 1\frac{1}{2}$ . (Leaf pubescence not shown.)

Somewhat succulent terrestrial herbs, sometimes becoming fragile or brittle, often rooting at the lowest nodes, the stems erect or ascending, simple or branched, glabrous or pubescent; leaves alternate or one of the leaves of a pair small and stipuliform, the blades thin, inequilateral, obliquely asymmetrical at the base; flowers secund and lax in terminal racemes or the racemes finally opposite the leaves, the bracts minute; flowers pedicellate, the pedicels becoming pendulous; calyx tubular-campanulate, the tube symmetric or sometimes gibbous or calcarate at the base, the 5 lobes shallow or parted to the middle; corolla tube cylindric, symmetric at the base or somewhat gibbous, little ampliate above, almost closed in the throat, the limb bilabiate, the posterior lip very short, erect-spreading, entire or bilobate, the anterior lip large, convex, sinuate or broadly and shallowly trilobate; perfect stamens 4 (in ours), didynamous, included, the filaments slightly flattened, inserted above the middle of the corolla tube; anthers united in a disclike form (in ours), the thecae divaricate but confluent at the apex; a staminode sometimes present; disc carnose, cupular, surrounding the superior ovary; style elongated, the stigma obliquely dilated, obscurely bilobate; placentae ovuliferous on all sides; capsule included in the calyx, ovoid or elliptic, bivalvate.

A remarkably disjunct genus, with 13 species distributed in New Guinea, Philippine Islands, Borneo, Malaya, China, India, Ceylon, Colombia, Central America, and Mexico. Only one species is known in Guatemala.

**Rynchoglossum azureum** (Schlecht.) Burtt, Notes Royal Bot. Gard. Edinb. 24(2): 168. 1962. *Klugia azurea* Schlecht. Linnaea 8: 248. 1833.

Damp or wet, mixed, mountain forest, 1,200–2,500 m.; San Marcos; Suchitepéquez. Southern Mexico; Costa Rica.

Somewhat succulent herbs, erect or nearly so, commonly 30–50 cm. tall, simple or sparsely branched, the stems stout, finely and often very inconspicuously puberulent; leaves alternate, on petioles mostly 1–2.5 cm. long, the blades thin, ovate, ovate-oblong, or elliptic, mostly 7–15 cm. long and 3–8 cm. wide, acuminate or long-acuminate, very unequal at the base, rounded or semicordate on one side, semicuneate on the other, glabrous above or nearly so, glandular-punctulate beneath, the margins undulate-dentate or subentire; racemes short-pedunculate, usually many-flowered, equalling or shorter than the leaves, the pedicels and bracts alternate; bracts linear, 2–3 mm. long; pedicels slender, 5–8 mm. long; calyx purple or bluish, accrescent, 6–10 mm. long, a little saccate at the base, glabrous, the lobes shallow, triangular, obtuse or subacute; corolla bright violet-blue, about 2.5 cm. long, not gibbous at the base, glabrous, the lobes denticulate; anthers heart-shaped to reniform; capsule ovoid.

## SOLENOPHORA Bentham

Terrestrial shrubs or suffruticose herbs, often large and coarse, pubescent or glabrate, sparsely branched or simple; leaves opposite, petiolate, often very large,



FIG. 63. *Rhynhoglossum azureum*. A, habit,  $\times \frac{1}{2}$ ; B, flower dissected to show pistil and stamens,  $\times 3\frac{1}{4}$ ; C, detail of anthers,  $\times 4\frac{1}{2}$ ; D, flower,  $\times 2\frac{1}{4}$ ; E, calyx opened to show dehiscent capsule,  $\times 3\frac{1}{2}$ ; seed,  $\times 5$ .

those of a pair equal, subequal, or unequal, the margins of the blades dentate or serrate; inflorescences usually pedunculate (the common peduncle rarely obsolete), axillary, the flowers pedicellate, solitary or few; pedicels bibracteate; calyx tube adnate below to the ovary, free above, much exceeding the ovary, the limb 5-lobate, sometimes bilabiate; corolla (in ours) reddish orange, orange, or yellow, the tube elongated, ampliate above, ecalcarate, the throat broad, the limb suberect, the 5 lobes usually shallow, broad; stamens 4, included or exerted, the filaments inserted at or near the base of the corolla tube, dilated at the base, the anthers coherent to form a square, rectangle, or circle, the thecae parallel or a little divergent, distinct, dehiscent throughout; a small staminode sometimes present; disc usually reduced to one more or less bilobate gland, rarely 2, 3, or 5 glands present; ovary wholly inferior, flat or scarcely convex at the apex, the style elongated, thickened at the apex, the stigma dilated, stomatomorphic or shallowly bilobate; fruit capsular; seeds numerous, minute, more or less fusiform.

Sixteen or more species, in Mexico and Central America, with 10 in Guatemala.

Corollas 6-8 cm. long.

Calyx pilose, the limb at anthesis truncate or nearly so; corolla pilose. *S. toucana*.

Calyx glabrous or only sparsely hirsute, the limb never truncate; corolla glabrous or nearly so.

Calyx in bud conspicuously urceolate, the limb narrowly contracted; at anthesis calyx 3.5-4 cm. long. . . . . *S. obliqua*.

Calyx in bud urn-shaped to tubular-campanulate; at anthesis calyx 2.5-3 cm. long. . . . . *S. purpusii*.

Corollas 2-5 cm. long.

Leaf blades mostly 15-30 cm. long, 8-15 cm. wide.

Common peduncle 1-2 cm. long; calyx 2-2.5 cm. long; corolla 2.5-3 cm. long, spotted or striped inside with maroon. . . . . *S. maculata*.

Common peduncle 5-10 cm. long; calyx 1-2 cm. long; corolla 4-5 cm. long, not spotted nor marked inside. . . . . *S. pirana*.

Leaf blades mostly 4-15 cm. long, 2.5-8 cm. wide.

Plants completely glabrous throughout. . . . . *S. erubescens*.

Plants more or less villous, at least in part.

Common peduncle 2-8 cm. long. . . . . *S. tuerckheimiana*.

Common peduncle usually less than 1 cm. long, sometimes obsolete.

Calyx lobes irregularly semiorbicular or shallowly ovate to very broadly triangular, mostly 1-3 mm. long; corolla yellow, sometimes marked with maroon lines, the limb 2-3 cm. wide.

Leaf blades very sparsely short-villous above, often rough to the touch; calyx sparsely short-pubescent, 1.5-2 cm. long at anthesis; corolla limb about 2 cm. wide, the lobes conspicuously fimbriate-pectinate, the projections 1 mm. long or more. . . . . *S. wilsonii*.

Leaf blades densely villous above, not rough to the touch; calyx densely villous, 1-1.5 cm. long at anthesis; corolla limb about 3 cm. wide, the lobes nearly entire or obscurely denticulate, the projections much less than 1 mm. long. . . . . *S. abietorum*.

Calyx lobes almost regular and distinctly triangular, mostly 4-5 mm. long; corolla orange, the limb to 1.5 cm. wide. . . . . *S. chiapasensis*.

**Solenophora abietorum** Standl. & Steyerl. Field Mus. Bot. 23: 236. 1947.

Damp or wet, mountain forest, sometimes with *Abies*, 1,500–2,800 m.; Huehuetenango (type from Cerro Huitz, Sierra de los Cuchumatanes, between Mimanhuitz and Yulhuitz, *Steyermark 48643*) collected also on Cerro Cananá, near Cananá.

Shrubs or suffruticose herbs, erect or decumbent, simple or sparsely branched, 50 cm. tall or more, the stems obtusely tetragonous, sparsely or densely villous with long, lax, whitish, multiseptate hairs; leaves of a pair subequal, the slender petioles 3–5.5 cm. long, the blades broadly ovate to obovate-elliptic, mostly 4–9 cm. long, 2.5–5.5 cm. wide, acute or short-acuminate, somewhat unequal at the base and rounded or obtuse, serrate-dentate with somewhat appressed teeth, green above and densely villous, often wine-colored beneath, densely and laxly villous on the veins and costae, the lateral veins 6–9 pairs; flowers axillary, solitary, the peduncle about 0.5 cm. long, pedicels 1–2.5 cm. long, densely villous, subtended by a pair of linear bracts 7–10 mm. long; calyx 12–17 mm. long, broadly campanulate, green, sometimes marked with red, densely villous, the 5 lobes semiorbicular to very broadly ovate, 2–4 mm. long, ciliate, obscurely denticulate; corolla yellow with brown or purple lines within the throat, 3.5–4 cm. long, sparsely villous outside, the tube ampliate above, about 1 cm. broad at the apex, the limb about 3 cm. broad, sparsely villous within the throat, almost regular, shallowly lobate, the lobes obscurely denticulate; filaments glabrous; style villosulous; disc gland solitary, bilobate, pubescent; capsule not seen.

**Solenophora chiapasensis** D. Gibson, *Phytologia* 23: 337. 1972.

Not reported from Guatemala, but may be expected there. Chiapas, Mexico, 2,000–2,800 m. (type from Tenejapa, 2,775 m., *Breedlove 15187*).

Weak shrubs, subrepent or ascending to perhaps a meter tall, branching, the older stems glabrate, the younger stems and branches more or less villous with very short, reddish, multiseptate, spreading hairs; leaves of a pair subequal to unequal, on petioles 1–4 cm. long, the blades elliptic to oblanceolate, mostly 3–9 cm. long, 1.5–4.5 cm. wide, acute or abruptly short-acuminate, cuneate or attenuate to the base and often oblique, the margins serrate, sparsely pubescent to somewhat scabrous above, glabrous below except on the costae and veins which are more or less short-villous, often red or reddish, the lateral veins 7–8 pairs; inflorescences axillary, the pedicels usually solitary, sometimes geminate, sparsely short-villous, 2–3.5 cm. long, subtended by a pair of small, inconspicuous, linear bracts, the common peduncle obsolete or if present, inconspicuous, 3–8 mm. long; calyx rose-red or reddish, tubular-campanulate, 8–15 mm. long, almost glabrous or thinly villosulous, more densely so near the base, the lobes triangular, mostly 4–5 mm. long, acute, denticulate; corolla orange, about 3 cm. long, sparsely villous or almost glabrous, the limb 1–1.5 cm. wide, the lobes semiorbicular, 3–5 mm. long, the margins fimbriate-pectinate, usually conspicuously so; stamens about equalling the corolla or slightly exserted, the anthers 1.5–2 mm. long; disc gland solitary, large, very shallowly and irregularly bifid or bilobate, more or less pubescent, at



least near the apex; style pubescent; stigma stomatomorphic; capsule about 8 mm. long, enclosed in the accrescent calyx; seeds broadly fusiform.

**Solenophora erubescens** Donn.-Sm. Bot. Gaz. 16: 197. 1891.

Damp or wet, mixed mountain forest, sometimes in rocky places, 1,100-2,000 m.; Alta Verapaz (type from Pansamalá, growing on rocks about a waterfall, *Tuerckheim 631*); Huehuetenango.

Plants herbaceous or suffrutescent, to 1 m. tall, usually simple, glabrous throughout, the stems terete, often reddish, with conspicuous interpetiolar lines between the bases of the petioles; leaves of a pair subequal, on petioles 1-5 cm. long, the blades coriaceous when dried, broadly ovate to oblong-elliptic, mostly 4-8 cm. long, acute to very obtuse or almost rounded at the apex, acute or obtuse at the base, the margins sinuate-serrate, paler beneath, sometimes dull red or purple-red beneath; peduncles axillary, 0.5-1 cm. long, flowers 1-3, on pedicels 1-2 cm. long, bibracteate; calyx green or sometimes spotted with red, 13-15 mm. long, the tube obconic, the lobes short, erect, ovate to broadly triangular, usually obscurely dentate; corolla deep yellow, 2-2.5 (3) cm. long, glabrous outside, the tube 3-5 mm. broad, the limb about 1.5 cm. broad, with maroon lines within, the lobes broad, rounded, undulate, more or less crenate, one lobe sometimes obscurely pectinate or denticulate; stamens included; capsule said to be ovoid, about 1 cm. long, crimson, crowned with the persistent bilobate gland.

**Solenophora maculata** D. Gibson, Phytologia 23: 339. 1972.

Known only from the type, *Steyermark 35992*, collected between Todos Santos and Finca El Porvenir, middle slopes of Volcán Tajumulco, San Marcos, 1,300-2,500 m.

Shrubs or suffruticose herbs, simple or sparsely branched, the young stems reddish, usually villous, later more sparsely villous or glabrate; leaves of a pair subequal, on glabrous petioles 5-10 cm. long, the blades broadly elliptic or ovate-elliptic, mostly 11-25 cm. long, 8-14 cm. wide, short-acuminate, oblique at the base, sparsely short-villous above, glabrate beneath, the costae and veins rose-red, the margins doubly serrate, the lateral veins 9-12 pairs; inflorescences axillary, the common peduncle 1-2 cm. long, sparsely pubescent or glabrate, bracts oblong-lanceolate or oblong-elliptic, 0.5-1 cm. long, pedicels glabrous, 2-3 cm. long; calyx suffused with rose or maroon, sparsely villous near base, glabrous above, 2-2.5 cm. long, the triangular lobes unequal, 2-4 mm. long, more or less denticulate; corolla 2.5-3 cm. long, deep yellow or orange-yellow, spotted or striped with maroon within, the tube erect, ampliate above, about 1 cm. broad below the lobes, villous outside, the lobes about 4 mm. long, irregularly undulate; stamens exserted, the anthers about 2 mm. long; style exserted; stigma stomatomorphic; disc gland solitary, more or less bilobate; capsule not seen.

**Solenophora obliqua** Denham and Gibson, Phytologia 23: 340. 1972. *Zacate de vaca* (San Marcos).



FIG. 64. *Solenophora maculata*. A, leafy stem with axillary inflorescences,  $\times \frac{1}{2}$ ; B, flower,  $\times 1\frac{1}{2}$ ; C, detail of anthers,  $\times 2\frac{1}{2}$ ; D, disk gland and base of style,  $\times 3$ .



FIG. 65. *Solenophora obliqua*. A, section of flowering branch,  $\times \frac{1}{2}$ ; B, calyx,  $\times 1\frac{1}{4}$ ; C, flower with calyx cut away and corolla opened at base to show disk gland, staminode, and portions of style and filaments,  $\times 1\frac{1}{4}$ ; D, two views of fruiting calyx, the upper one opened to show persistent disk gland and seeds,  $\times 1$ ; E, two seeds, greatly enlarged.

Damp or wet, mixed forest, usually on white sand slopes, often in wet ravines, 1,300–2,700 m.; Chimaltenango; Quezaltenango (type from western slopes of Volcán Zunil, *Steyermark 35182*); San Marcos; Suchitupéquez.

Shrubs or weak trees to 6 m. tall, the stems and branches glabrate or sparsely, bifariously pubescent with multiseptate hairs; leaves opposite, those of a pair subequal, the petioles essentially glabrous, mostly 3–12 cm. long, the blades oblong-ovate to elliptic-oblong, acuminate or acute, cuneate or rounded at the base and usually very oblique, mostly 14–30 cm. long, 7–17 cm. wide, sparsely pilose above, glabrous or glabrate beneath, the margins doubly serrate, the lateral veins 10–14 pairs; inflorescences cymose, the common peduncle 1–2 cm. long or sometimes the flowers solitary, the peduncle then much reduced and inconspicuous, the pedicels 0.5–3 cm. long, bibracteate, the bracts leaflike, mostly 2–3 cm. long, sometimes caducous in age; calyx glabrous, brownish or green with orange-brown stripes, 3.5–4 cm. long, 3 to 4 times longer than the ovary, more or less bilabiate, conspicuously urceolate in bud, the limb narrowly contracted, the 5 lobes irregular, short, 3–8 mm. long, triangular to lanceolate, appearing irregularly denticulate but the lobules actually rounded and obtuse, the tube in anthesis becoming deeply cleft on one side for about two-thirds of its length, the calyx then appearing narrowly tubular-campanulate; corolla 6.5–7.5 cm. long, glabrous or nearly so, pale orange to reddish-orange outside, orange-yellow and sometimes marked with maroon within, the tube gradually ampliate, the limb somewhat oblique, about 3 cm. wide, the lobes broadly suborbicular, spotted with purple or maroon within, the margins more or less fimbriate-pectinate; stamens short-exserted, the filaments glabrous, the anthers initially coherent, the thecae oblong; style densely pubescent; stigma stomatomorphic; disc gland solitary and usually deeply bilobate, pubescent; fruit far surpassed by the calyx tube, the capsule rupturing irregularly near the middle when mature, containing many minute, reddish-brown, shining, ellipsoidal to fusiform seeds.

**Solenophora pirana** Morton, *Phytologia* 1: 149. 1935.

Damp or wet, mixed mountain forest, 2,300–3,800 m.; Chimaltenango (type collected near Chichavac, *Skutch 680*); Quezaltenango; El Quiché; San Marcos. Mexico.

Shrubby or suffruticose plants, 1–4 m. tall, the stems erect, stout, simple or sparsely branched, the young stems sparsely villous with long, spreading, multiseptate hairs; leaves of a pair subequal, on petioles 4–12 cm. long, these more or less villous, the blades elliptic or ovate-elliptic, mostly 14–30 cm. long, 9–15 cm. wide, acute or abruptly short-acuminate, oblique at the base and usually rounded or subcordate, rarely broadly cuneate, sparsely villous above, usually short-villous on the veins beneath but sometimes glabrate, the margins doubly serrate, the lateral veins 9–12 pairs; inflorescences axillary, subumbellate or subracemose, with 3–5 or more flowers, the peduncles commonly 5–10 cm. long, the bracts oblong to elliptical, mostly 1–2 cm. long, the pedicels mostly 1–4 cm. long, more or less villous or glabrate; calyx at anthesis campanulate, almost turbinate in age, accrescent, 1–2.5 cm. long, villous below, nearly glabrous above, somewhat oblique at the apex, shallowly lobate, the short lobes irregular, more or less ovate

to broadly triangular, denticulate; corolla yellow, unmarked within, 4-5 cm. long, erect, the tube thinly villous, slightly ventricose above, 1-1.5 cm. broad, the limb narrow, 1-1.5 cm. broad, the short lobes subequal, more or less rounded to nearly truncate, the margins irregularly undulate; stamens exserted, the filaments glabrous, the anthers 1.5-2 mm. long; style pubescent; disc glands 1, 2, 3, or 5, at least the large posterior one pubescent.

Although *S. pirana* was originally described as having five disc glands, and that is true of some dissections prepared from type material, at least one later dissection proved to have only three glands (one large posterior, more or less bilobate gland and two smaller anterior ones). Dissections were then prepared from material taken from *Skutch 346* (Chimaltenango), *Standley 67491* and *85936* (Quezaltenango), *Proctor 25528* (El Quiché), and *Contreras 5197* (El Quiché). All had only one large, more or less bilobate gland, except *Contreras 5197*, which had two, the posterior one large and bilobate, the anterior one small and entire.

***Solenophora purpusii*** Brandegee, Univ. Calif. Publ. Bot. 6: 65. 1914.

Wet, mixed mountain forest, often in thickets along streams, 2,300-2,700 m.; San Marcos; Suchitepéquez. Mexico (type from Cerro del Boquerón, Chiapas).

Large, coarse herbs or shrubs 1.5-4.5 m. tall, simple or sparsely branched, the young stems thick, thinly villous with long, weak, multiseptate hairs; leaves large, those of a pair unequal to subequal, on petioles 3-10 cm. long, the blades thin, elliptic, broadly elliptic, or ovate-elliptic, mostly 10-30 cm. long and 7-15 cm. wide, acute or short-acuminate, very oblique at the base and more or less cuneate or rarely subcordate, the margins doubly dentate, sparsely short-villous on the upper surface, slightly paler beneath and often almost glabrous, usually puberulent or villosulous along the veins; peduncles 0.5-3 cm. long, few-flowered, the flowers on pedicels 1-3 cm. long, these subtended by a pair of foliaceous bracts 1-2 cm. long; calyx 2.5-3 cm. long, glabrous, green tinged with dark red, deeply cleft on one side, the lobes short, irregular, subequal, denticulate, the tube about 1 cm. broad, conspicuously venose; corolla 7-8 cm. long, deep yellow to orange-yellow, the lobes spotted with maroon within, glabrous outside, the tube gradually ampliate upward, about 2 cm. broad above, the lobes short, rounded, sinuate-denticulate; style pubescent; stigma stomatomorphic; disc gland solitary, more or less bilobate.

Showy and handsome plants, producing an abundance of large, brightly colored flowers.

***Solenophora toucana*** Denham and Gibson, Phytologia 23: 341. 1972. *Trompeta ortigosa* (Guatemala).

Known in Guatemala from a single collection, *Morales 947* from Palencia, Guatemala, 1,480 m. El Salvador; Honduras.

Shrubs 2-4 m. tall, the stems and branches more or less pilose with multi-septate hairs; leaves of a pair subequal, on pilose petioles mostly 5-12 cm. long, the blades oblong-ovate to broadly oblong-elliptic, mostly 16-30 cm. long, acuminate, obliquely cuneate to nearly rounded at base, sparsely or densely pubescent to pilose above, pilose below on costae and veins, otherwise pubescent or glabrate, the margins doubly serrate, the lateral veins about 10 pairs; inflorescences cymose, the common peduncle seldom more than 5 mm. long, the pedicels 5-15 mm. long, bibracteate, the bracts linear; calyx campanulate, 1.5-2.5 cm. long, more or less pilose, densely so near the base, very shallowly lobate but appearing almost truncate, the margins unevenly denticulate; corolla orange outside, yellow within, 5.5-7 cm. long, the tube gradually ampliate, pilose outside, the limb 3-3.5 cm. in diameter, the lobes suborbicular, broadly rounded, spotted with red within, the margins fimbriate-denticulate; stamens short-exserted, the filaments somewhat pubescent, the anthers coherent; style exserted, densely pubescent; stigma stomatomorphic; disc gland solitary and usually deeply bilobate, pubescent; capsule unknown.

**Solenophora tuerckheimiana** Donn.-Sm. Bot. Gaz. 46: 114. 1908.

Wet, mixed, mountain forest, 1,600-2,800 m.; Alta Verapaz (type from the region of Cobán, *Tuerckheim II. 2028*) Huehuetenango (Cerro Cananá, Sierra de los Cuchumatanes).

Herbs or shrubs 1-1.5 m. tall, simple or sparsely branched, the stems and petioles often reddish, densely villous with very short, multiseptate, spreading hairs, or merely furfuraceous-villosulous; leaves of a pair subequal to unequal, on petioles 1-7 cm. long, the blades rather thick when dried, elliptic, obovate-elliptic, or broadly obovate, mostly 8-15 cm. long and 4-7.5 cm. wide, acute or abruptly short-acuminate, oblique at the base and usually more or less acute, sometimes obtuse, rather densely or sparsely villosulous above with very short, thick hairs, often wine-red beneath, short-villous on the veins, glabrous between the veins, margins serrate-dentate, lateral veins 8-10 pairs; inflorescences few-flowered, subumbelliform or cymose, the peduncles mostly 3-8 cm. long, the pedicels 1-2.5 cm. long, often reflexed, subtended by a pair of linear bracts; calyx rose-red, broadly obconic-campanulate, 7-12 mm. long, thinly villosulous, the lobes very broadly and irregularly suborbicular to broadly subtriangular or ovate, very short, mostly 1-2 mm. long, rarely to 3 mm., obtuse to almost rounded, denticulate; corolla orange, 3-4 cm. long, thinly long-villous, the limb about 15 mm. broad, the lobes semiorbicular, 5-7 mm. long, at least the largest one obscurely short-pectinate, the others entire or pectinate-denticulate only near the base; stamens exserted, the anthers 1.5-2 mm. long; disc gland shallowly bilobate but often appearing entire due to indument; capsule said to be 1 cm. long or longer.

According to the original description, the calyx lobes are “. . . deltoidei 4 mm. longi”; however, no calyx lobes on the type collection or on later collections accurately match this description.

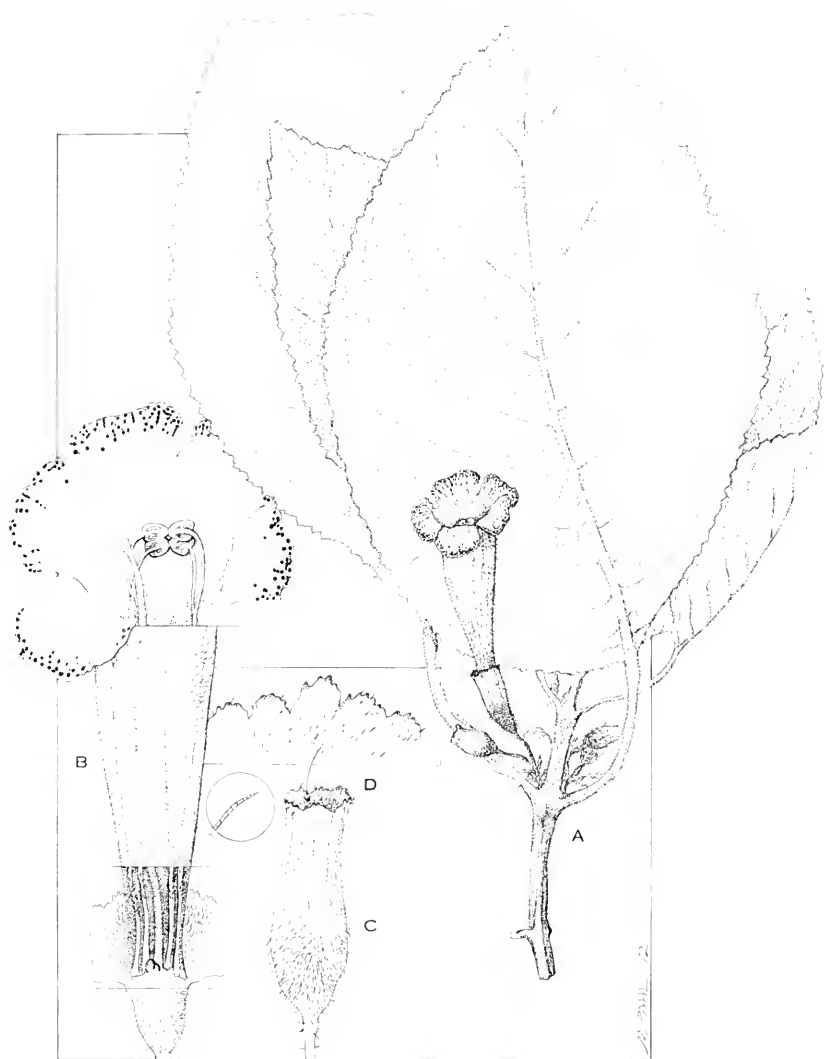


FIG. 66. *Solenophora toucana*. A, section of flowering branch,  $\times \frac{1}{2}$ ; B, flower with one corolla lobe removed to show anthers and style, and with part of corolla tube removed to show disk gland and base of filaments and style,  $\times 1\frac{1}{4}$ ; C, calyx,  $\times 1\frac{1}{2}$ ; D, detail of calyx lobes,  $\times 2\frac{1}{2}$ .



FIG. 67. *Solenophora wilsonii*. A, habit,  $\times \frac{1}{2}$ ; B, flower in bud,  $\times 1\frac{1}{2}$ ; C, corolla opened to show stamens and staminode,  $\times 1\frac{1}{2}$ ; D, dorsal and ventral views of anthers,  $\times 3\frac{1}{2}$ ; E, calyx opened to show pistil and disk gland,  $\times 1\frac{1}{2}$ ; F, dehiscent capsule,  $\times 1\frac{1}{2}$ .



**Solenophora wilsonii** Standley, Field Mus. Bot. 17: 210. 1937.  
*Reina de las flores* (Huehuetenango).

Dense, wet, mixed forest 300–2,000 m.; Alta Verapaz (type from Chacirociha, Finca Seamay, Senahú, *Hatch & Wilson 201*); Huehuetenango; Izabal.

Erect herbs or shrubs to 1 m. tall, usually simple, the young branches densely covered with very short, thick hairs which although multiseptate, appear almost papilliform without high magnification; leaves of a pair subequal, on pubescent or short-villous petioles mostly 2–8 cm. long, the blades broadly elliptic, oblong-elliptic, or obovate-elliptic, mostly 7–15 (18) cm. long and 3–8 cm. wide, short-acuminate, oblique at the base and cuneate to very obtuse or almost rounded, the margins coarsely dentate to obscurely appressed-serrate, very sparsely short-villous above, often rough to the touch, glabrous beneath except on the veins and costae which are covered with very short, thick, almost papilliform hairs, the lateral veins 9–10 pairs; flowers axillary, solitary or collected in sessile cymose inflorescences, the common peduncle only 2–5 mm. long or obsolete, the flowers on short, more or less villosulous pedicels 2–7 mm. long, subtended by a pair of linear bracts 7–10 mm. long; calyx broadly campanulate, 1.5–2 cm. long, green, sometimes striped with rose or purple, almost 1 cm. broad, sparsely villosulous, the lobes short, broad, subequal, shallowly ovate to broadly triangular, obtuse or acute, more or less dentate; corolla yellow, 3.5–4 cm. long, sparsely long-villous, the limb about 2 cm. broad, the lobes subequal, rounded, glabrous within, the margins closely and conspicuously fimbriate-denticulate; stamens included, the anthers about 1.5 mm. long; disc gland solitary, very shallowly bilobate; capsule unknown.

This species conforms in many ways with the description of the Mexican *S. obscura* Hanst. except in corolla color, described by Hanstein as "albidis." Our plants also closely resemble the type-photograph of *Liebman 9322* (F.M. Neg. 22715), except that the calyx lobes of *S. obscura* appear nearly regular and distinctly triangular. Mr. Dale Denham, of the Gesneriad Gardens, Boulder, Colorado, who has seen the type specimen, has informed me (*personal communication*) that the bracts in the *S. obscura* inflorescences are foliar, to 5 mm. wide; the bracts on our plants are only 1–2 mm. wide.



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LENTIBULARIACEAE. Bladderwort Family.

DOROTHY NASH GIBSON

*Reference:* J. H. Barnhart, Segregation of genera in Lentibulariaceae, Mem. N. Y. Bot. Gard. 6: 39-64. 1916. Peter Taylor, Lentibulariaceae, in Flora of Trinidad and Tobago 2: 288-300. 1955; Lentibulariaceae in Maguire, Bot. Guayana Highlands, VII, Mem. N. Y. Bot. Gard. 17: 205-228. 1967.

Annual or perennial, insectivorous herbs, growing in water or wet soil, sometimes epiphytic; leaves forming a basal rosette or on stolons or reduced to small alternate cauline scales; scapes erect, the inflorescence racemose or the flowers solitary; bracts at the base of the pedicels minute, the bracteoles minute or none, rarely present at the base of the flower and larger; calyx segments 2, 4, or 5, open in bud; corolla gamopetalous, the limb bilabiate, the tube short, the lower lip usually spurred; stamens 2, the filaments inserted on the base of the corolla, alternate with the lobes of the anterior lip, included; anthers usually transversely constricted, more or less bithecos, dorsifixed, dehiscent by a common longitudinal slit; disc none; ovary superior, ovoid or globose, unilocular, the ovules 2 to many on a free-central placenta; stigma bilamellate, sessile or borne on a very short style; fruit capsular, globose or ovoid, usually 2-4-valvate or circumscissile, rarely indehiscent; seeds small, variously shaped, the testa striate, rugose, or reticulate.

Four genera with probably considerably fewer species than the 200 or more reported, widely distributed in tropical and temperate regions of both hemispheres. Three genera are represented in Central America.

- Calyx segments 2.....*Utricularia*.  
Calyx segments 4 or 5.  
    Scapes ebracteate, bearing a single flower.....*Pinguicula*.  
    Scapes bracteate, usually bearing more than one flower.....*Genlisea*.

GENLISEA St. Hilaire

Small, terrestrial or subaquatic herbs; foliage leaves rosulate, arising from a short perennial rhizome, the blades obovate or spatulate to filiform; trap leaves descending, flask-shaped; scapes slender, simple, erect, bearing minute scales or bracts; inflorescence racemose, the flowers usually few, each pedicel subtended by

a small bract, minutely bibracteolate at the base; calyx lobes 5, equal or subequal, the calyx sometimes somewhat bilabiate; corolla bilabiate, the spur incurved, the posterior lip erect, entire or emarginate, the anterior one larger, spreading, usually trilobate, the lobes reflexed-spreading; stamens 2, the filaments stout, incurved or straight, the anthers dorsifixed, thecae divaricate, confluent; capsule circumscissile; seeds ovoid, reticulate.

Perhaps 15 or more species, mostly in South America, with three in tropical Africa, and only one in Central America.

**Genlisea filiformis** St. Hilaire, Voyage Distr. Diam. 2: 430. 1833. *G. luteo-viridis* Wright in Sauvalle, Anal. Acad. Cien. Habana 6: 314. 1869; Fl. Cub. 90. 1873.

In swampy ground, at or near sea level, British Honduras (All Pines, *Schipp 607*). Cuba; Brazil; Colombia; Venezuela; British Guiana.

Small, slender plants, the leaves few or numerous, forming a basal rosette, the blades obovate-spathulate to suborbicular, 3–5 mm. long, rounded or very obtuse at the apex, narrowed at the base into a slender, winged petiole as long as or longer than the blade; scape filiform, commonly 8–20 cm. tall, wiry, flexuous, bearing a few long, gland-tipped hairs and 3–5 minute, ovate, acute bracts; flowers 2–4, remote, slender-pedicellate; calyx lobes subobtuse, elliptic-oblong or lance-oblong, ciliolate; corolla greenish yellow or lemon-yellow, about 4 mm. long, the spur thick, very obtuse, only a little longer than the lips; seeds compressed, obovate, angulate.

This genus is apparently known in continental North America by the single collection cited above.

## PINGUICULA L.

*References:* Alfons Ernst, Revision der Gattung *Pinguicula*, Bot. Jahrb. 80, Heft 2: 145–194. 1961. Rogers McVaugh and John T. Mickel, Notes on *Pinguicula*, sect. *Orcheosanthus*, Brittonia 15: 134–140. 1963. S. Jost Casper, Gedanken zur Gliederung der Gattung *Pinguicula* L. Bot. Jahrb. 82: 321–335. 1963; Once More: The Orchid-Flowered Butterworts, Brittonia 18: 19–28. 1966; Monographie der Gattung *Pinguicula* L., Bibliotheca Botanica, Heft 127/128: 1–209. 1966.

Terrestrial herbs, growing in wet or very damp places; leaves radical, forming a rosette, pale green, entire, broad, fleshy, and with an oily or fatty texture (hence the English name “butterwort” sometimes given to the plants), the surface viscidulous and with an almost crystalline appearance; scapes erect, naked, bearing a solitary flower; calyx segments 4 or 5, sometimes appearing bilabiate, the posterior lip trilobate, the anterior one emarginate, bifid, or bilobate; corolla bilabiate, the lobes spreading, entire or emarginate, the 2 posterior ones slightly or much shorter than the others; anthers transverse, confluent, monothecous; lamina of the stigma



FIG. 68. *Gentisea filiformis*. A, habit,  $\times 1$ ; B, flower,  $\times 13$ ; C, corolla dissected to show pistil and stamens,  $\times 15$ ; D, section of placenta with seeds, greatly enlarged.

very unequal, the posterior one larger, often fimbriate; capsule 2-4-valvate; seeds oblong, rugulose.

Casper lists 46 species, widely distributed in temperate, cold, and tropical regions, with three in Guatemala. Some species produce both a "winter" and a "summer" rosette of leaves, these forms often varying greatly in size and shape.

Corolla deep red-violet or purple, the spur commonly 15-30 (40) mm. long.  
*P. moranensis*.

Corolla white, or pale lilac, or white marked with lilac, the spur less than 6 mm. long.

Leaves 15-25 mm. long; corolla 11-12 mm. long, the spur 3.5-5 mm. long.  
*P. lilacina*.

Leaves 5-10 mm. long; corolla scarcely 6 mm. long, the spur about 2 mm. long.....*P. crenatiloba*.

***Pinguicula crenatiloba*** A. DC. in DC. Prodr. 8: 30. 1844.  
*P. nana* Mart. et Gal. ex Hemsl. Biol. Centr. Am. Bot. 2: 471. 1882, *nomen*.

Grassy slopes or more commonly on bare, wet clay banks, usually in pine forest, 800-2,100 m.; Chiquimula; Huehuetenango; Zacapa. Mexico; El Salvador; Honduras; Panama.

Leaves few, rosulate and flat on the ground, very pale green, thick and succulent, broadly obovate, 5-10 mm. long, rounded at the apex, more or less pilose on the upper surface, the margins often inrolled; scapes 1-several, slender, erect, mostly 3-6 cm. long, minutely pilosulous; flowers solitary; calyx 1-2 mm. long, usually minutely pilosulous, the segments ovate; corolla white, usually with a yellow throat, rarely purplish white, the lips very unequal, the larger lip shallowly trilobate, the spur slender, about 2 mm. long, often minutely pilosulous.

Very small and inconspicuous plants, difficult to see among the grasses where they usually grow.

***Pinguicula lilacina*** Schlecht. & Cham. Linnaea 5: 94. 1830.  
*P. obtusiloba* A. DC. in DC. Prodr. 8: 30. 1844. *P. scopulorum* Brandegee, Zöe 5: 257. 1908. *P. clivorum* Standl. & Steyerl. Field Mus. Bot. 23: 179. 1944 (type from Huehuetenango, *Steyermark 50061*). *Flor de piedra* (Huehuetenango).

Damp or wet slopes and banks, often in oak or oak-pine forest, 1,900-2,400 m.; Alta Verapaz; Huehuetenango. Mexico.

Leaves numerous, forming a dense rosette closely appressed to the soil, sessile, the blades pale green and thin, broadly obovate to suborbicular, 15-25 mm. long, broadly rounded at the apex, broadly cuneate at the base, the margins usually inrolled, nearly glabrous or with scattered hairs above, obscurely punctulate; scapes 1-several, slender, filiform or nearly so, 5-10 cm. long, short-pilosulous or

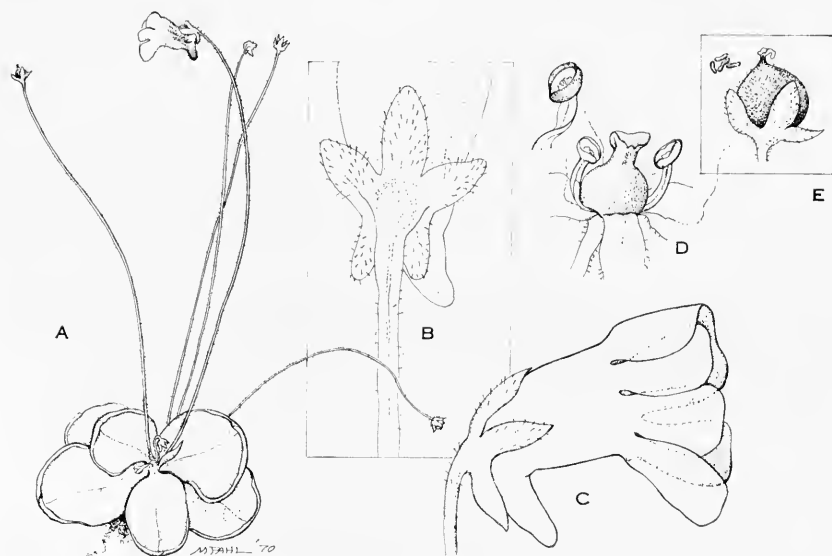


FIG. 69. *Pinguicula lilacina*. A, habit,  $\times \frac{3}{4}$ ; B, posterior view of calyx,  $\times 4$ ; C, flower,  $\times 4$ ; D, pistil and stamens,  $\times 4$ ; E, calyx and capsule,  $\times 3$ , with seeds greatly enlarged.

glandular-pilosulous near the top; calyx 2–3 mm. long, sparsely and minutely glandular-pilosulous, the lobes unequal, ovate to oblong, obtuse or rounded at the apex; corolla pale lilac or white, or white with lilac markings, 11–12 mm. long, glabrous or very minutely glandular-pilosulous outside, the larger lip trilobate, the smaller lip about half as long, bilobate; spur nearly straight, 3.5–5 mm. long; capsule subglobose.

***Pinguicula moranensis*** HBK. *Nova Gen. & Sp.* 2: 226. 1817; Casper, *Brittonia* 18: 26. 1966. *P. caudata* Schlecht. *Linnaea* 7: 393. 1832; Hemsley, *Biol. Cent. Am. Bot.* 2: 470. 1882, *pro parte*; Ernst, *Bot. Jahrb.* 80: 158. 1961, *pro parte*. *P. flos-mulionis* Morr., *La Belge Hort.* 22: 371. 1872. *P. sodalium* Fourn., *Bull. Soc. Bot. Fr.* 20: 67. 1873. *P. bakeriana* Sander, *Gard. Chron. n.s.* 15: 541. 1881. *P. rosei* Watson, *Gard. Chron. ser. 3*, 49: 82. 1911.

On shaded, steep slopes, banks, or cliffs, on earth or limestone, often in pine or pine-oak forest, usually in places saturated with water, 1,800–3,700 m.; Baja Verapaz; Chimaltenango; Chiquimula; Huehuetenango; El Progreso; Quezaltenango; El Quiché; San Marcos. Central and southern Mexico; El Salvador; Honduras.

Plants with numerous leaves forming a dense rosette, more or less appressed to the soil, the blades thick and fleshy, mostly 3–6 cm. long, glabrous or nearly so, rounded at the apex, the winter leaves spatulate, the summer leaves obovate

to elliptic or suborbicular, cuneate or attenuate to the base and decurrent on short petioles; scapes erect, fairly stout, 5–20 cm. tall, usually solitary, bearing a single flower, the upper part of the scape and the calyx often minutely glandular-pilous; corolla large and showy, deep reddish violet to purple, the limb about 2 cm. long, the spur slender, straight or somewhat curved, commonly 1.5–4 cm. long, the larger lip deeply trilobate, the lobes broadly oblong to cuneate-obovate, rounded at the apex.

Fairly common plants in some regions of Guatemala. The leaves of the “winter rosette” vary greatly in size and form from those of the “summer rosette.”

### UTRICULARIA L.

*References:* Peter Taylor, The genus *Utricularia* L. (Lentibulariaceae) in Africa (south of the Sahara) and Madagascar, Kew Bull. 18(1): 1–245. 1964; Lentibulariaceae, in Maguire and Collaborators, The Botany of the Guayana Highlands—Part VII, Mem. N. Y. Bot. Gard. 17(1): 206–228. 1967.

Annual or perennial, terrestrial, epiphytic, or floating aquatic herbs lacking true roots, the stems becoming variously modified to form vegetative parts functioning as roots (rhizoids), stems (stolons), and leaves (erect, thalloid, or divided into capillary segments), or carnivorous traps; leaves rosulate from the base of the inflorescence or alternate, opposite, or verticillate on the stolons; traps borne on one or more of the vegetative parts; inflorescence a simple or branched scape, usually erect, glabrous, filiform, bracteate (the bracts sometimes sterile scales), bearing one to several flowers disposed in a raceme; pedicels usually short, subtended by a bract and often 2 bracteoles; calyx deeply bilabiate, the 2 segments equal or subequal, persistent, sometimes accrescent; corolla bilabiate, the upper lip usually erect, the lower lip usually longer and spreading, spurred at the base; stamens 2, the filaments inserted at the base of the corolla, usually curved, the anthers dorsifixed, with more or less confluent thecae; ovary unilocular, style usually short, persistent, the stigma bilamellate, one lamella usually much larger than the other; ovules numerous on a basal or free-central placenta; fruit capsular, dehiscent by valves or pores or sometimes circumscissile or rarely indehiscent; seeds usually many, variously shaped and sculptured.

Species variable, often polymorphic, perhaps 150 widely distributed in both hemispheres. In addition to the 13 listed here, a few more are found in southern Central America.

Plants free-floating aquatics, commonly with elongating stolons, the leaves submerged, bearing numerous conspicuous traps.

Corollas yellow.

Leaves to 2 cm. long, simple or very sparsely branched; bracts minute, usually much less than 1 mm. long; scapes filiform, bearing 1–6 flowers; upper lip of trap with 2 long, often branching appendages (often twice as long as the trap)..... *U. gibba*.



Leaves to 15 cm. long, multiple-pinnate; bracts conspicuous, 2-4 mm. long; scapes stout (1-3 mm. broad) bearing 5-20 flowers; upper lip of trap naked or with 2 short, simple or sparsely branched appendages.

*U. foliosa*.

Corollas not yellow.

Leaves whorled; scapes commonly 5-15 cm. long; corolla pale purple to blue (in ours)..... *U. purpurea*.

Leaves alternate; scapes commonly 2-6 (8) cm. long; corolla pink, reddish, or rose (in ours)..... *U. hydrocarpa*.

Plants terrestrial or epiphytic, the stolons short, the few leaves usually borne on or near the base of the scape and appearing rosulate, the traps usually minute and inconspicuous, mostly borne on the stolons but sometimes arising from the leaves.

Calyx lips deeply fimbriate-pectinate..... *U. fimbriata*.

Calyx lips not fimbriate-pectinate.

Plants epiphytic; calyx conspicuously large in proportion to the corolla, the lips at anthesis 7-8 mm. long but in fruit often 10-12 mm. long and 8-9 mm. wide..... *U. jamesoniana*.

Plants terrestrial; calyx not as above.

Bracts of the scape lacinate-dentate..... *U. hispida*.

Bracts of the scape entire.

Bracts peltate or cupular; bracteoles absent.

Bracts cupular; flowers always solitary, more or less resupinate; corollas rose to purple..... *U. resupinata*.

Bracts peltate; flowers commonly 2-25 (rarely only one), not resupinate; corollas yellow..... *U. subulata*.

Bracts neither peltate nor cupular; bracteoles present.

Pedicels 5-20 mm. long; calyx densely and minutely glandular-pubescent; corollas white or sometimes flushed or marked with violet. *U. amethystina*.

Pedicels 1-3 mm. long; calyx glabrous; corollas yellow or orange-yellow.

Spur of corolla about 1 mm. long; filaments of stamens geniculate about the middle..... *U. guyanensis*.

Spur of corolla 4-8 mm. long; filaments not geniculate.

Scapes 10-40 cm. long; calyx prominently venose; spur of corolla 5-8 mm. long..... *U. juncea*.

Scapes 5-12 cm. long; calyx not prominently venose; spur of corolla 3-4 mm. long..... *U. adpressa*.

***Utricularia adpressa*** Salzmänn in St. Hilaire & Girard, Ann. Sci. Nat. II, 11: 159. 1839. *U. aureola* Blake, Contr. Gray Herb. 52: 88. 1917 (type from British Honduras, Manatee Lagoon, Peck 235). *U. aureolimba* Steyermark, Fieldiana: Botany 28: 535. 1953.

Wet sandy places, at or near sea level; British Honduras. Venezuela; British and French Guiana; Brazil.

Terrestrial herbs, the stolons short; leaves unknown, probably fugacious; scape erect, almost filiform, glabrous, 10-15 cm. long, bearing 2-8 flowers; bracts ovate, obtuse or subacute, 0.7-1.2 mm. long, the bracteoles lanceolate, smaller;

pedicels 0.5–3 mm. long; calyx lips ovate to oblong, 2–3.5 mm. long; corolla yellow, 6–8 (12) mm. long, the upper lip elliptic-ovate to suborbicular, entire, the lower one orbicular, entire, 3–4.5 mm. long; spur 3–4 mm. long; capsule subglobose, about 2 mm. in diameter; seeds globose.

**Utricularia amethystina** St. Hilaire & Girard, *Ann. Sci. Nat.* II. 11: 163. 1839. *U. sinuata* Benj. *Linnaea* 20: 491. 1847. *U. adenantha* Standley, *Field Mus. Bot.* 23: 179. 1944 (type from British Honduras, *Schipp S-89*). *U. williamsii* Steyermark, *Ceiba* 1: 126. 1950.

Damp, grassy flats, 1,150–2,100 m., Zacapa. British Honduras (in swampy, sandy places at sea level); Mexico; Honduras south to Argentina.

Terrestrial herbs, the stolons slender, sparsely branched, bearing a few globose traps; leaves few, petiolate, the blades obovate or spatulate, 2–4 mm. long (in ours), rounded at the apex; scape erect, almost filiform, mostly 5–15 (25) cm. tall, glabrous, bearing 2–6 flowers; bracts sessile, lanceolate or linear-lanceolate, acute, about 0.6 mm. long; bracteoles similar to bracts but smaller; pedicels 3–20 mm. long; calyx lips ovate, obtuse or subacute, minutely glandular-pubescent, often densely so; corolla often minutely glandular-pubescent, usually white, sometimes pink or mauve, quite variable in size and shape, in ours the limb 2–3 mm. broad, the spur slender, more or less acute, shorter than or twice as long as the lower lip.

**Utricularia fimbriata** HBK. *Nova Gen. & Sp.* 2: 225. 1818; *P. Taylor*, *Kew Bull.* 18: 72. 1964.

Wet, sandy soil, usually in pine forest, at or little above sea level; British Honduras. Florida; Cuba; tropical South America; tropical Africa.

Terrestrial herbs, the rhizoids and stolons few, branching; traps ovoid, appendaged, borne on rhizoids, stolons, and leaf petioles; leaves few or numerous, linear-filiform, to 15 mm. long, commonly fugacious; scape 5–25 cm. long, simple, filiform, wiry, glabrous, bearing 1–5 flowers and numerous peltate, pectinate scales; bracts broadly ovate, 1–1.5 mm. long, deeply pectinate-dentate; bracteoles almost twice as large as the bracts, deeply pectinate-dentate; pedicels about 1 mm. long (in ours); calyx lips unequal, more or less broadly ovate, 2–4 mm. long, deeply fimbriate-pectinate; corolla yellow to deep orange, mostly 5–9 mm. long, the upper lip rounded, truncate, or emarginate, the lower lip 3–5 mm. long, entire or sometimes obscurely and irregularly lobate, the spur conical, usually 2–3 mm. wide, almost parallel with and about as long as the lower lip; capsule globose, about 1.5 mm. in diameter.

Although the pedicels of all collections examined from British Honduras were about 1 mm. long, one specimen from Venezuela (*Maguire, Wurdack & Bunting 36062-A*, determined by Taylor) has pedicels 2–10 mm. long.



FIG. 70. *Utricularia foliosa*. A, habit of plant,  $\times \frac{1}{2}$ ; B, flower,  $\times 5$ ; C, stamens and pistil,  $\times 6$ ; D, flower with upper lip of corolla raised to show spur,  $\times 5$ ; E, fruit and calyx,  $\times 5$ ; F, fruiting pedicel with young capsule enclosed in calyx, and showing bract at base of pedicel,  $\times 7$ ; G, two views of stigma,  $\times 13$ ; H, section of leaf segments bearing traps,  $\times 5$ .

***Utricularia foliosa*** L. Sp. Pl. 18. 1753; P. Taylor, Kew Bull. 18: 174. 1964. *U. oligosperma* St. Hil. Voy. Distr. Diam. 2: 427. 1833. *U. mixta* Barnh. Mem. Torr. Bot. Club 16: 111. 1920.

Floating in shallow water, margins of lakes and swamps, sometimes trailing over muddy shores where water has receded, 470–1,600 m.; Chiquimula; Izabal; Jalapa; Jutiapa. Florida; Mexico; British Honduras (at or near sea level); Honduras; Costa Rica; Nicaragua; Panama; West Indies; South America (to Argentina); tropical Africa.

Aquatic herbs, all parts except the inflorescences submerged, with robust branching stolons sometimes several meters long; leaves alternate on the stolon branches, multiple-pinnate, to 15 cm. long, bearing conspicuous, broadly ovoid traps 1–2 mm. long, upper lip of trap naked or with 2 short, simple or sparsely branched appendages; scapes erect, simple, stout, 1–3(4) mm. in diameter, glabrous, bearing 5–20 flowers; bracts broadly ovate, 2–4 mm. long, truncate or short-acuminate; bracteoles absent; pedicels stout, 4–15 mm. long, usually recurved in age; calyx about 4 mm. long, the lips broadly ovate, subequal; corolla yellow, 9–15 mm. long, the upper lip entire, the lower one entire or emarginate, the spur commonly 5–6 mm. long, shorter than or about equalling and nearly parallel with the lower lip; capsule globose, indehiscent, 6–8 mm. in diameter, containing 4–12 winged seeds.

***Utricularia gibba*** L. Sp. Pl. 18. 1753; P. Taylor, Kew Bull. 18: 197. 1964. *U. obtusa* Swartz, Prodr. Veg. Ind. Occ. 14. 1788. *U. pumila* Walter, Fl. Carol. 64. 1788. *U. fibrosa* Walter, *l.c.* *U. parkeriana* A. DC. in DC. Prodr. 8: 9. 1844. *U. secunda* Benj. Linnaea 20: 308. 1847. *U. emarginata* Benj. *l.c.* 489.

Floating in shallow water, margins of lakes, pools, and swamps, or sometimes trailing in mud where water has receded, often mixed with other vegetation, near sea level to 2,000 m.; Alta Verapaz; Huehuetenango; Izabal; Jalapa; Jutiapa; Petén; Santa Rosa. Eastern United States; Mexico; British Honduras; Honduras; El Salvador; Costa Rica; West Indies; South America to Argentina; Africa (from Nigeria to Transvaal, *fide* Taylor).

Aquatic herbs with all parts submerged except the inflorescences, the stolons fasciculate at the base of the scape, filiform, branching, often forming dense mats; leaves filiform, alternate on the stolons, simple or sparsely divided or forked, bearing numerous ovoid traps 1–1.5 mm. long, the upper lip of each trap with 2 long, often branching appendages; scapes erect, filiform, glabrous, 2–15 (35) cm. tall, bearing 1–6 flowers; bracts sessile, 0.5–1 mm. long, entire or obscurely dentate; bracteoles absent; pedicels 2–15 (30) mm. long; calyx lips 1–3 mm. long, subequal, broadly ovate, rounded, entire; corolla yellow, commonly 6–12 mm. long (in ours), the lips nearly equal or the lower lip smaller, variable in contour and apices, but the lower lip (in ours) usually rounded or truncate; spur variable, conical or slender, shorter or much longer than the lower lip; capsule globose, 2–4 mm. in diameter; seeds more or less winged.

**Utricularia guyanensis** A. DC. in DC. Prodr. 8: 11. 1844. *U. peckii* Blake, Contr. Gray Herb. 52: 90. 1917 (type from British Honduras, *Peck 371*). *U. rubricaulis* Tutin, Journ. Bot. 72: 312, f. 5. 1934.

In wet, sandy soil, at or little above sea level, British Honduras. Trinidad; British Guiana; Surinam.

Terrestrial herbs; rhizoids and stolons branched, bearing globose traps; leaves linear, fugacious; scapes erect, simple, glabrous, 6–20 cm. tall, mostly 4–8 (12)-flowered; bracts ovate, rounded or acute, about 1 mm. long; bracteoles smaller, lanceolate, acute; pedicels about 1 mm. long; calyx lips subequal, 1–2 mm. long, ovate, the upper one rounded or subacute, the lower one sometimes subtruncate; corolla yellow or orange, 4–5 mm. long, both lips entire, the lower one about 3 mm. long, the spur conical, saccate, about 1 mm. long; filaments of stamens geniculate in the middle; style about as long as the ovary; capsule ovoid, 1.5–2.5 mm. long; seeds more or less globose.

**Utricularia hispida** Lamarck, Encycl. 1: 50. 1791. *U. angustifolia* Benj. Linnaea 20: 311. 1847. *U. macerrima* Blake, Contr. Gray Herb. 52: 89. 1917 (type from British Honduras, *Peck 222*).

Damp or wet savannas, 150 m.; Alta Verapaz (near Cerro Chinajá, *Steyrmark 45706*). British Honduras (near sea level, usually in pine forest); Nicaragua; Trinidad; northern South America.

Terrestrial herbs, the capillary stolons bearing ovoid traps about 1 mm. long; leaves few, fugacious, variable, the blades narrowly linear to obovate-spathulate, said to attain 20 cm. in length; scapes erect, slender, glabrous, 15–50 (70) cm. tall; bracts lance-ovate, acuminate, lacinate-dentate, 1–2 mm. long, the bracteoles narrowly linear-lanceolate, shorter; pedicels usually 2–3, ascending, 2–15 mm. long; calyx lips ovate, unequal, 2–4 mm. long; corolla purple, violet, blue, or white, 8–11 mm. long (in ours), the upper lip ovate to oblong, entire, the lower one more or less orbicular, entire; the spur slender, acute, 6–7 mm. long, slightly longer than the lower lip; capsule globose, about 2.5 mm. in diameter, the seeds numerous.

**Utricularia hydrocarpa** Vahl, Enum. Pl. 1: 200. 1827; Taylor, Mem. N. Y. Bot. Gard. 17: 226. 1967.

Floating in shallow water of swamps or pools, at or little above sea level; British Honduras (All Pines, *Schipp S-90*). Honduras; West Indies; British Guiana; Venezuela.

Aquatic herbs, all parts submerged except the inflorescences, the stolons to 30 cm. long, mostly simple; leaves alternate on the stolons, to 3 cm. long, bipinnate, the filiform segments bearing ovoid traps 1–3 mm. long; scapes 2–8 cm. long, filiform, glabrous, bearing 2–5 flowers, bracts sessile, ovate, about 2 mm. long; bracteoles absent; pedicels 2–13 mm. long, reflexed in fruit; calyx lips subequal, ovate, 2–3 mm. long; corolla pink, reddish, or deep rose (in ours), 5–8 mm. long, the lips orbicular, entire, the spur broadly conical, shorter than the lower lip; capsule globose.

**Utricularia jamesoniana** Oliver, Journ. Linn. Soc. 4: 169. 1860.

*U. verapazensis* Morong ex Donn.-Sm. Bot. Gaz. 18: 209. 1893.

*U. concinna* N. E. Browne, Trans. Linn. Soc. II. 6: 55. 1901.

Known in Guatemala only from the type of *U. verapazensis*, Alta Verapaz, near San Pedro Carchá, 900 m., *Tuerckheim 1109*. Costa Rica; South America.

Epiphytic plants growing on tree trunks among ferns, mosses, and other small plants, the filiform stolons bearing traps up to 1 mm. long; leaves persistent, slender-petiolate, the blades to 1.5 cm. long (in ours), obovate-spathulate to oblanceolate, obtuse, entire; scape slender, erect, 1-3-flowered, 3-15 cm. tall, glabrous, bearing 1-several small subulate scales; bract at the base of the pedicel linear-lanceolate, obtuse, sessile, about 5 mm. long, the 2 bracteoles narrower and slightly shorter; pedicels capillary, 5-15 mm. long; calyx deeply bilobate, the lobes subequal, herbaceous, 7-8 mm. long at anthesis, in fruit often 10-12 mm. long and 7-9 mm. wide, broadly cordate-ovate, very obtuse or rounded at the apex, entire; corolla pale greenish purple, about 1 cm. long, the upper lip broadly rounded at the apex, the lower lip much larger, trilobate, the middle lobe emarginate, the lips slightly pubescent on and near the margins; spur upcurved, acute, longer than the lower lip, minutely glandular-pubescent.

**Utricularia juncea** Vahl, Enum. Pl. 1: 202. 1804; P. Taylor, Mem. N. Y. Bot. Gard. 17: 215. 1967. *U. virgatula* Barnh. Bull. Torr. Bot. Club 34: 580. 1908. *U. juncea* f. *minima* Blake, Contr. Gray Herb. 52: 89. 1917 (type from Toledo, British Honduras, *M. E. Peck 502a*). *U. juncea* f. *virgatula* Fern. Rhodora 46: 60. 1946.

In bogs or wet margins of swamps or ponds, 1,500-1,900 m.; Jalapa. (In British Honduras, in wet, sandy or swampy places at or near sea level, often in pine forest.) Eastern United States; British Honduras; West Indies; northern South America.

Terrestrial herbs with slender, branching rhizoids and stolons; traps globose, borne on rhizoids and leaves; leaves fugacious, narrowly linear, said to attain 20 mm. in length; scapes erect, simple, glabrous, commonly 10-40 cm. tall, bearing 1-6 (12) flowers; bracts ovate, acute, 1-2 mm. long, the bracteoles narrowly lanceolate, shorter; pedicels scarcely exceeding the bracts; calyx often yellowish, 3-4 mm. long at anthesis, 5-7 mm. in fruit, the lips more or less plicate, at least the upper one prominently venose, ovate, acute or acuminate, the upper one entire, the lower one entire or bifid; corolla yellow, 10-12 (15) mm. long (in the small form only 3-8 mm.), the upper lip nearly orbicular, truncate or nearly so, the lower lip entire, the spur descending, 5-8 mm. long (2-3 mm. in the small form); capsule ovoid, 2-3 mm. long, invested in the persistent calyx.

One collection from British Honduras, *Schipp 633*, with scapes 20-40 cm. long, has small flowers, about 8 mm. long.

**Utricularia purpurea** Walter, Fl. Carol. 64. 1788.

Floating in shallow water, lakes and swamps at or little above sea level; British Honduras. Canada and eastern United States to Florida; West Indies.

Aquatic herbs, all parts submerged except the inflorescences, the stolons slender, sometimes as much as a meter long; leaves whorled on the stolons, long-petiolate, the segments filiform, decompound, bearing numerous ovoid traps 1-3 mm. long; scapes commonly 5-15 (30) cm. long, erect, slender, sometimes swollen and spongy near the base, bearing (1) 2-5 flowers near the apex; bracts suborbicular, about 1 mm. long; bracteoles absent; pedicels ascending, 6-8 mm. long or as much as 15 mm. long in fruit; calyx lips subequal, broadly ovate, usually rounded, 2-3 mm. long; corolla pale purple to bluish purple (in ours), 8-15 mm. broad, the upper lip entire or somewhat undulate-crenate, the lower one 8-12 mm. long, trilobate, with a yellow spot at the base; spur conical, shorter than the lower lip and more or less appressed to it; capsule ovoid to subglobose, 2-3 mm. in diameter.

*Utricularia resupinata* B. D. Greene in Bigelow, Fl. Bost. ed. 3: 10. 1840. *U. spruceana* Benth. in Oliver, Journ. Linn. Soc. 4: 173. 1860.

In swampy or boggy ground, at or near sea level; British Honduras (All Pines). Southeastern Canada to Florida; Venezuela and Brazil.

Plants terrestrial, or sometimes rooting in the bottoms of shallow pools, with slender horizontal, creeping stolons; leaves alternate, tri-parted, the middle lobe linear, the lateral lobes capillary, rootlike, bearing minute traps, these apparently without appendages; scape erect, almost capillary, to 20 cm. tall, bearing a single flower, the pedicel elongating, subtended by a single, cupular bract 1-2 mm. long; bracteoles absent; calyx lobes subequal, about 2 mm. long, appressed to the mature capsule; corolla rose or purplish, 8-12 mm. long, the upper lip narrowly oblong-spathulate, the lower lip spreading, entire; spur conic-cylindric, obtuse, the tip distant from the lower lip and turned upward; capsule globose, 3-4 mm. in diameter, containing numerous seeds.

*Utricularia subulata* L. Sp. Pl. 18. 1753; P. Taylor, Kew Bull. 18(1): 81. 1964. *U. subulata* var. *cleistogama* A. Gray, Syn. Fl. 2(1): 317. 1878. *U. cleistogama* Britton, Trans. N. Y. Acad. Sci. 9: 12. 1889. *U. subulata* f. *cleistogama* Fernald, Rhodora 23: 291. 1921.

Wet meadows, swamps, bogs, often in pine or pine-oak forest, near sea level to 1,500 m.; Alta Verapaz; Chiquimula; Izabal; Jalapa; Jutiapa; Zacapa. Eastern and southern North America (Nova Scotia to Florida and Texas); Mexico; British Honduras, El Salvador, Honduras to Panama; West Indies; northern South America; Africa; Asia.

Terrestrial plants with few stolons; leaves fugacious, petiolate, the blades linear, 1-2 cm. long; scape erect, filiform, wiry, usually fractiflex, mostly 5-20 cm.

tall, simple or branching; bracts peltate, entire; bracteoles absent; flowers commonly 2–25, rarely only one, the pedicels mostly 2–6(10) mm. long, axillary in the bracts; scales few, peltate; calyx lobes subequal, broadly ovate, at anthesis about 1 mm. long, somewhat longer in fruit; corolla yellow or orange-yellow (or said to be sometimes whitish in cleistogamous flowers), 6–12 mm. long (cleistogamous flowers about 2 mm.); the upper lip ovate, obtuse, the lower one trilobate; spur conic, parallel with and about equalling or longer than the lower lip (in cleistogamous flowers more or less saccate); capsule globose, 1–2 mm. in diameter; seeds numerous more or less ovoid, striate.

Small plants and the cleistogamous form of *U. subulata* are often confused with *U. pusilla* Vahl, said to be a shorter, stouter plant with fertile inflorescence bracts alternating with sterile ones, shorter pedicels, and with the spur twice as long as the lower lip. Although Taylor states that *U. pusilla* occurs throughout Central America, I have seen no material from Guatemala. Some of our plants do have spurs almost twice as long as the lip, but in every case the bracts are all fertile, the pedicel length is quite variable, and I cannot see that these forms are any stouter than *U. subulata*.

## ACANTHACEAE. Acanthus Family.

DOROTHY NASH GIBSON

*References:* G. Lindau, Acanthaceae, in Engler & Prantl, Pflanzenf. 4 (3b): 274–354. 1895. C. E. B. Bremekamp, The Delimitation of the Acanthaceae, Proc. Kon. Ned. Akad. v. Wetensch. Ser. C, 56: 533–546. 1953; Delimitation and Subdivision of the Acanthaceae, Bull. Bot. Surv. India 7: 21–30. 1965. E. C. Leonard, The Acanthaceae of the Yucatan Peninsula, Carnegie Inst. Wash. 461: 193–238. 1936; The Acanthaceae of Colombia, Contr. U. S. Nat. Herb. 31: 1–781. 1951–1958. Wm. F. Grant, A Cytogenetic Study in the Acanthaceae, Brittonia 8: 121–149. 1955. Bhoj Raj, Pollen Morphological Studies in the Acanthaceae, Grana Palynol. 3(1): 3–108. 1961. Bruno Petriella, El Polen de las Acanthaceae Argentinas, Rev. Mus. La Plata, Bot. 53 (11): 51–68. 1968. R. W. Long, The Genera of Acanthaceae in the Southeastern United States, Journ. Arn. Arb. 51(3): 257–309. 1970.

Herbaceous or suffrutescent plants, rarely shrubs or small trees, scandent only in *Mendoncia* and *Thunbergia*, glabrous or pubescent, the pubescence almost always of simple, multicellular hairs, often glandular-viscid, the leaves and other parts often with conspicuous cystoliths, these appearing as fine lines on the leaf surfaces and sometimes mistaken for strigose pubescence; leaves usually opposite, petiolate, and entire, often somewhat undulate or undulate-dentate, rarely dentate or lobate; stipules none; inflorescences axillary or terminal, often spicate, racemose,



or paniculate, sometimes cymose, the cymes sometimes fasciculate, the flowers rarely solitary; flowers usually bracteate and bibracteolate; primary bracts or bract-like floral leaves often broad and imbricate; calyx segments usually 5 or by abortion of the posterior one only 4, free or more or less connate, imbricate, valvate, or often separated long before anthesis, calyx truncate or 10-15-dentate in *Thunbergia*, annular or cupular in *Mendoncia*; corolla gamopetalous, often funnelliform, the tube usually well developed, cylindrical or ventricose or slender-tubular below and abruptly dilated into a funnelliform throat, the limb usually more or less bilabiate, sometimes the 5 lobes spreading and appearing nearly regular, but usually the posterior lip erect or suberect, entire or bifid, rarely fimbriate, the anterior lip more spreading, trifid or trilobate or rarely subentire, the lobes imbricate in bud or contorted; perfect stamens 4 and didynamous, or 2, inserted on the tube of the corolla, included or ascending below the posterior lip, rarely exerted; staminodes often present; anthers usually dorsifixed, commonly with 2 distinct thecae, sometimes only one, dehiscent by a longitudinal slit, sometimes parallel and inserted at the same height on the connective, or often unequal and affixed at different heights on the connective, frequently calcarate at the base, one sometimes abortive or vestigial; hypogynous disc various in form, often obscure; ovary superior, sessile on the disc, bilocular; style simple, usually filiform, the apex usually bilobate, but one lobe often minute or abortive; stigmas minute, terminal or short-decurrent dorsally; ovules anatropous or shortly amphitropous, placentation usually axile (parietal in *Elytraria*); fruit usually capsular, very rarely baccate or drupaceous, the capsules usually clavate, sometimes oblong or nearly linear, terete or compressed, usually contracted below into a stout stipe, elastically dehiscent from the apex to the base, the valves becoming recurved; seeds arising at maturity from the thickened hard funicles, these (called retinacula) incurved-ascending; seeds as many as the ovules or by abortion fewer, usually lenticular or discoid, sometimes nearly globose, the testa often rugose or muricate, sometimes minutely glochidiate, commonly mucilaginous when wetted; endosperm usually none; embryo compressed.

The Acanthaceae are a large pantropical, rarely temperate, family with about 200 genera, many of which are monotypic. Most species are found in dense, wet forest but a few genera are characteristic of open places and some are common weeds of waste and cultivated ground. Many have large and handsome flowers but the flowers are often produced only in small numbers and the corollas frequently fall if the plants are handled.

I agree with Bremekamp and Raj that the Mendoncioideae, Nelsonioideae, and Thunbergioideae should properly be raised to family rank, but they are included here, following traditional usage as a matter of convenience.

The taxonomy is still unsatisfactory, perhaps because classification of the family has been based primarily on the disposition of the thecae on the connective, and on pollen characters.

Plants of the genus *Acanthus*, native of the Mediterranean region, are planted in the Jardín Botánico of Guatemala and perhaps elsewhere. They differ from all Central American members of this family in having sinuate-pinnatifid leaves, the teeth of the leaves often with spinose tips.

A few other genera besides the 36 treated here have been discovered in southern Central America.

Fruits drupaceous; plants always scandent . . . . . *Mendoncia*.

Fruits capsular; plants not scandent (except in *Thunbergia*, an introduced genus).

Calyx spathe-like and bilobate at anthesis . . . . . *Spathacanthus*.

Calyx neither spathe-like nor bilobate at anthesis.

Plants often scandent; calyx truncate or 10-15-dentate . . . . . *Thunbergia*.

Plants not scandent; calyx 3-5-lobate.

Calyx segments 3; corolla oblique, gibbous-campanulate in throat.

*Louteridium*.

Calyx segments 4 or 5; corolla not as above.

Fertile stamens 4 (in ours).

Anthers monotheous.

Cystoliths absent; corollas red or yellow; filaments of stamens inserted near base of corolla tube . . . . . *Aphelandra*.

Cystoliths present; corollas purple, pink, or white; filaments of stamens inserted near or above middle of corolla tube.

*Stenandrium*.

Anthers bitheous.

Calyx segments 4; bracts of inflorescence conspicuously secund.

*Lophostachys*.

Calyx segments 5; bracts of inflorescence not secund.

Plants small trees or large shrubs; corolla tube ampliate from almost the base, or abruptly dilated shortly above the base.

*Bravaisia*.

Plants usually herbaceous, rarely suffrutescent; corolla tube not as above.

Corolla conspicuously bilabiate; capsule bilocular from base.

Inflorescence spicate, terminal or axillary; thecae discrete.

*Teliostachya*.

Inflorescence fasciculate in leaf axils; thecae parallel.

*Hygrophila*.

Corolla appearing nearly regular, the limb spreading (in ours); capsule bilocular from a point above the base, the basal portion solid for at least 2 mm., either contracted or stipiform.

Flowers in dense spikes bearing large, broad, imbricate bracts.

Leaf margins entire; placentae breaking away in mature capsule . . . . . *Blechum*.

Leaf margins crenate; placentae not breaking away in mature capsule . . . . . *Hemigraphis*.

Flowers not in dense spikes, or if spicate, not bearing large, broad bracts.

- Calyx segments connate for one-half to one-quarter their length; thecae calcarate at base. . . . . *Dyschoriste*.
- Calyx segments parted nearly to base; thecae muticous at base. . . . . *Ruellia*.
- Fertile stamens 2 (in ours).
- Anthers commonly monothealous, or if 2 thecae, one always much smaller than the other, the smaller one usually abortive, vestigial, often sterile.
- Corolla less than 5 mm. long; staminodes present. . . . . *Bucerogenia*.
- Corolla more than 5 mm. long; staminodes absent.
- Inflorescence short and dense, headlike to spikelike, with bracts, bracteoles, and calyx segments rigid, filiform or oblanceolate and cuspidate; calyx segments 4. . . . . *Chaetothylax*.
- Inflorescence not as above; calyx segments 5.
- Inflorescence an elongated, spikelike thyrses or narrow panicle; corolla tube gradually ampliate from base. . . . . *Razisea*.
- Inflorescence a broad, often lax panicle; corolla tube usually more or less saccate near base.
- Anterior corolla lip shallowly trifid and appearing almost truncate. . . . . *Hansteinia*.
- Anterior corolla lip trilobate, more or less spreading or erect. . . . . *Habracanthus*.
- Anthers bithealous, the thecae about the same size.
- Bracts subtending the flowers united almost to the apex to form an involucre.
- Involucre formed by outermost bracts, these very large, 4.5-6.5 cm. long, bluish purple, acute to acuminate; corolla 7-7.5 cm. long. . . . . *Neohallia*.
- Involucre formed by innermost bracts, these less than 1.5 cm. long, green, mucronate; corolla 1-1.5 cm. long. . . . . *Henrya*.
- Bracts subtending the flowers not united to form an involucre, or merely partially connate at base only, as in *Dicliptera*.
- Calyx cupular, the tube equalling or longer than the lobes. . . . . *Trybliocalyx*.
- Calyx not as above.
- Leaves alternate or subopposite; cystoliths absent; seeds 12-20, borne on papilliform retinacula. . . . . *Elytraria*.
- Leaves opposite; cystoliths present; seeds 8 or fewer, usually 4 or 2, borne on hook-like retinacula.
- Outer bracts of inflorescence conspicuously 4-ranked. . . . . *Tetramerium*.
- Outer bracts of inflorescence not conspicuously 4-ranked.
- Corolla appearing nearly regular, the lobes free and more or less spreading.
- Corolla lobes 5.
- Stamens included; thecae muticous or acute, one below the other on the connective; corolla tube usually straight and narrow; native plants. . . . . *Pseuderanthemum*.
- Stamens exerted; thecae conspicuously calcarate, attached at apex of the connective; corolla tube

- long-cylindric, often somewhat ventricose above; cultivated plants. . . . . *Sanchezia*.
- Corolla lobes 4.
- Bracts of inflorescence broad, foliaceous, imbricate, venose. . . . . *Averia*.
- Bracts of inflorescence very narrow, neither imbricate nor venose.
- Flowers in lax spikes or racemes, these often forming large, terminal panicles; calyx segments 5; corolla tube (in ours) shorter than the lobes. . . . . *Carlowrightia*.
- Flowers usually 1-3 in a leaf axil; calyx segments 4 (in ours); corolla tube elongated, very narrow, much longer than the lobes. . . . . *Siphonoglossa*.
- Corolla somewhat bilabiate to conspicuously ringent.
- Staminodes present.
- Bracts small, usually inconspicuous; calyx segments 5, entire, uniformly narrow. . . . . *Odontonema*.
- Bracts large and conspicuous; calyx segments 4, spinose-ciliate, the posterior and anterior segments broad, the lateral ones narrow. . . . . *Barleria*.
- Staminodes absent.
- Corolla divided nearly to the base; thecae both attached at apex of connective. . . . . *Megalostoma*.
- Corolla not divided nearly to base; thecae more or less unequally inserted on the connective.
- Stems usually 6-angled; bracts subtending the calyx partially united at base; calyx usually hyaline; placentae separating elastically from their walls in mature capsule. . . . . *Dicliptera*.
- Stems not 6-angled; bracts not united; calyx not hyaline; placentae not separating from walls in mature capsule.
- Leaves of each pair unequal (in ours), one distinctly smaller than the other; pollen multiporate, the sexine composed of densely spaced, polygonal insulae. . . . . *Poikilacanthus*.
- Leaves of each pair equal or nearly so; pollen not as above.
- Bracts and bracteoles filiform-caudate; pollen spheroidal or subspheroidal, 3-colpate, trema area lacking rows of insulae. . . . . *Streblacanthus*.
- Bracts and bracteoles not filiform-caudate; pollen ellipsoidal to prolate, usually 2-porate, sometimes 3-4-porate, trema area always provided with one or more rows of insulae. . . . . *Justicia*.

### APHELANDRA R. Brown

Erect shrubs or herbs; leaves opposite, entire or sometimes sinuate-lobate or spinose-dentate; inflorescences terminal, spicate, simple or branched, the flowers

large, solitary and sessile within green or colored, entire or dentate bracts; bracts imbricate, usually longer than the calyx, ovate to lanceolate, coriaceous, herbaceous, or membranaceous; bracteoles usually similar to the calyx segments but often smaller; calyx segments 5, usually narrow, subequal, or the posterior one larger; corolla yellow, orange, or red, the tube straight or incurved, sometimes ampliate above, the limb bilabiate, the posterior lip innermost in bud, erect, concave, subentire or shallowly bilobate and spreading, the anterior lip outermost in bud, reflexed-spreading, the lateral lobes united with the middle one to form a trilobate lip, or small and arising from the sides of the lower lip; stamens 4, the filaments inserted near the base of the corolla tube, short-exserted or shorter than the lip; anthers connivent in pairs, monothealous, dorsifixed, sometimes minutely bearded at the apex, muticous; pollen 3-colpate, prolate to perprolate; disc inconspicuous; style obtuse at the apex or shallowly bilobate; ovules 2 in each locule; capsule oblong, shortly contracted at the base; seeds 4 or by abortion fewer, compressed, suborbicular.

About 75 species have been reported, widely dispersed in tropical America, with six in Guatemala. A seventh, *A. micans* Moritz, a species ranging from Costa Rica to northern South America, was reported from Guatemala by Leonard in the *Flora of Costa Rica*, but we have seen no collection from Guatemala.

#### Bracts of the inflorescence entire.

Bracts glabrous. . . . . *A. speciosa*.

Bracts more or less pubescent.

Spikes very dense, short, mostly 2-8 cm. long; bracts pubescent with mostly appressed, eglandular, or only minutely and inconspicuously glandular hairs. . . . . *A. schiedeana*.

Spikes lax, the rachis usually visible between the lower flowers, mostly 10-30 cm. long; bracts densely viscid-pilose with more or less spreading hairs. . . . . *A. schiedeana* var. *gigantiflora*.

#### Bracts of the inflorescence dentate.

Plants herbaceous or suffrutescent, usually simple; bracts pectinate-dentate; corolla orange or orange-red.

Leaves linear or linear-lanceolate, mostly 1.5-3 cm. wide. . . . . *A. repanda*.

Leaves lance-oblong to broadly elliptic, mostly 3.5-8 cm. wide. . . . . *A. aurantiaca*.

Plants branched shrubs; bracts with 1, 2, or several, large, acute teeth; corolla usually bright red.

Inflorescences elongated, mostly 6-25 cm. long; bracts rigid, never spreading, bearing a few conspicuous glands. . . . . *A. deppeana*.

Inflorescences short, mostly 2-4 cm. long; at least the lower bracts spreading or recurved at the apex, all bracts without glands. . . . . *A. heydeana*.

***Aphelandra aurantiaca*** (Scheidw.) Lindl. Bot. Reg. 31: t. 12. 1845. *Hemisandra aurantiaca* Scheidw. Bull. Acad. Brux. 9(1): 22. 1842. *A. acutifolia* Nees in DC. Prodr. 11: 299. 1847. *Flor de rosario* (Alta Verapaz).

Damp or wet, mixed forest, sea level to 1,300 m., usually at 350 m. or less; Alta Verapaz; Baja Verapaz; Izabal; Huehuetenango;



FIG. 71. *Aphelandra aurantiaca*. A, habit,  $\frac{1}{2}$  natural size; B, calyx opened to show ovary,  $\times 3\frac{1}{2}$ ; C, flower complete with bract and bracteole,  $\times 2$ ; D, corolla opened to show stamens and pistil,  $\times 2$ ; E, connivent anthers,  $\times 4$ ; F, opened capsule,  $\times 3\frac{1}{2}$ ; G, seed,  $\times 4$ .

Petén. Southern Mexico; British Honduras, along the Atlantic coast to Panama; northern South America.

Erect herbs, sometimes suffrutescent, usually unbranched, sometimes a meter tall but usually half as high, glabrous or nearly so except in the inflorescence; leaves short-petiolate, the blades lance-oblong to elliptic, mostly 10–30 cm. long and 3.5–8 cm. wide, acute or acuminate, acute at the base, entire; inflorescences terminal, the spikes solitary, mostly 6–23 cm. long, very densely flowered; bracts green, appressed, ovate-lanceolate, acuminate, pectinate-dentate, finely puberulent or glabrate, 2–3 cm. long and to 1 cm. wide; bracteoles and calyx segments lanceolate, puberulent, ciliate, the calyx 8–12 mm. long; corolla yellow-orange to reddish-orange, puberulent outside, 5–6 cm. long, the upper lip erect, acute, entire, the lower lip trilobate, the lateral lobes half as long as the middle one; capsule 12–15 mm. long, puberulent, containing 2–4 sparsely pubescent seeds.

These plants vary greatly in size, some of them blooming when only 15 cm. tall.

**Aphelandra deppeana** Schlecht. & Cham. *Linnaea* 5: 96. 1830. *A. pectinata* Willd. ex Nees in DC. *Prodr.* 11: 298. 1847. *A. haenkeana* Nees, *l.c.* *Flor de San Julián* (Guatemala); *sic-chá* (Quecchi, Alta Verapaz); *chacanal* (Maya, British Honduras).

Wet to dry thickets or forest, often in rocky places, sometimes in pine and oak forest, sea level to 1,800 m.; Alta Verapaz; Chimaltenango; Chiquimula; Escuintla; Guatemala; Huehuetenango; Izabal; Jalapa; Jutiapa; Petén; Quezaltenango; El Quiché; Retalhuleu; Sacatepéquez; Santa Rosa; Sololá; Suchitépéquez; Zacapa. Southern Mexico; British Honduras to El Salvador and Panama; West Indies; northern South America.

Erect, branched shrubs 1–3 m. tall, the branches ochraceous, densely pilose when young; leaves short-petiolate, the blades ovate-elliptic to lance-oblong, mostly 6–15 cm. long and 3–7 cm. wide, sometimes larger, acuminate or long-acuminate, rather abruptly contracted below and long-decurrent almost to the base of the petiole, entire or nearly so, often scaberulous above, usually densely and softly pubescent beneath; spikes terminal, solitary or clustered, usually elongated; bracts green, lance-ovate, 8–15 mm. long, 4–6 mm. wide, acuminate, with 2–several slender, appressed teeth or lacinations above, densely pubescent to glabrate, ciliate, usually bearing several large glands; calyx 6–10 mm. long, pubescent; corolla usually bright red, rarely yellow, 3.5–4 cm. long, pubescent, the upper lip narrow, erect, bilobate, the lower lip spreading, entire or trilobate, the lateral lobes very small; capsule 10–15 mm. long, obtuse, glabrous, containing 4 seeds.

Very common shrubs throughout the drier lowlands of Central America, one of the most abundant plants of dry thickets. The form with yellow corollas has been collected only once (Escuintla, *Standley 64076*); it differs in no other respect from the typical form.

***Aphelandra heydeana*** Donn.-Sm. Bot. Gaz. 18: 210, *t.* 23. 1893. *Flor de San Julián* (Guatemala).

Damp or dry, mixed forest or thickets, 1,000–1,600 m.; Guatemala; Santa Rosa (type from Chupadero, *Heyde & Lux 4037*). Mexico (Chiapas).

Slender shrubs, 1.5–3 m. tall, the branches slender, pale, appressed-pilose when young; leaves on petioles 3–10 cm. long, the blades ovate to ovate-lanceolate or elliptic, mostly 8–20 cm. long and 4–7 cm. wide, acuminate or long-acuminate, abruptly contracted at the base and narrowly long-decurrent almost to the base of the petiole, glabrous or nearly so, paler beneath, the margins entire; inflorescences terminal, the spikes usually solitary, mostly 2–4 cm. long; bracts green, foliaceous, mostly 15–18 mm. long, obovate-oblong or lanceolate, long-attenuate, venose, thinly pilose, at least the lower ones spreading or recurved at the apex, the margins with 1–2 large, acute teeth; sepals 10–14 mm. long, narrowly lanceolate-acuminate; corolla usually bright red, rarely yellow and red, 5.5–7 cm. long, glandular-pubescent, the posterior lip erect, oblong, about 2 cm. long, entire, the anterior lip trilobate, the middle lobe broadly obovate-oblong, about 12 mm. wide, much larger than the lateral lobes; anthers about 6 mm. long; capsule about 1.5 cm. long, glabrous or nearly so.

***Aphelandra repanda*** Nees in DC. Prodr. 11: 728. 1847. *A. aurantiaca* var. *stenophylla* Standl. Field Mus. Bot. 4: 324. 1929 (type from Lancetilla Valley, Honduras).

Wet, mixed lowland forest, at or little above sea level; Izabal. British Honduras; Honduras; Costa Rica; western South America.

Herbaceous or suffrutescent plants, simple, to 60 cm. tall, glabrous or nearly so except for the inflorescence; leaves short-petiolate, the blades linear-lanceolate, mostly 10–25 cm. long and 1.5–3 cm. wide, long-acuminate, attenuate to the base, slightly paler beneath, often lustrous above, the margins more or less undulate; inflorescences terminal, the spikes solitary, sessile, very densely flowered, 3–15 cm. long; bracts ovate-oblong, 2–3 cm. long, acuminate, pectinate-dentate, green, minutely puberulent, usually ciliolate; calyx segments 8–12 mm. long, minutely puberulent; corolla orange-red, 3.5–5 cm. long, the upper lip erect, entire, the lower lip trilobate, the lobes subequal, the middle lobe oval, the lateral ones oblong-lanceolate; capsule about 1 cm. long, minutely puberulent.

Although these plants are usually found in wet, lowland forest, they have been collected at 1,300 m. in Costa Rica.

***Aphelandra schiedeana*** Schlecht. & Cham. Linnaea 5: 95. 1830.

Damp, mixed mountain forest or thickets, 1,000–2,800 m.; Chimaltenango; Escuintla; Quezaltenango; El Quiché; Sacatepéquez; San Marcos. Southern Mexico; El Salvador.

Rather slender shrubs, 1–3.5 m. tall, sometimes weak and reclining, the branches appressed-pilose or glabrate; leaves on slender petioles, the blades



narrowly lanceolate to oblong-lanceolate, mostly 8–20 cm. long, narrowly long-acuminate, long-attenuate to the base, sparsely short-pilose above or glabrate, more or less short-pilose beneath, chiefly along the costa, or almost wholly glabrous; inflorescences terminal, the spikes short and densely flowered, 2–8 cm. long; bracts ovate to broadly elliptical, 2–3 cm. long, obtuse or acute, rarely acuminate, or the lowermost ones rarely more or less cuspidate, usually sparsely or densely appressed-pilose with glandular and eglandular hairs, rarely almost glabrous, usually red in part or throughout, thin, entire; calyx segments linear-lanceolate, pale, 10–15 mm. long, pilosulous or sometimes glandular-pubescent near the apex; corolla usually bright red, rarely yellow, pubescent outside, 5–7 cm. long, the posterior lip about 2 cm. long, acute, the lower lip deeply trilobate, the segments lanceolate or the middle one cuneate-oblongate to obovate; anthers about 4 mm. long; capsule about 2 cm. long, oblong-ellipsoid, obtuse or subacute, lustrous, puberulent.

**A. schiedeana** var. **gigantiflora** (Lindau) D. Gibson, *Fieldiana: Botany* 34: 57. 1973. *A. gigantiflora* Lindau, *Bull. Herb. Boiss.* 3: 369. 1895 (type collected by Warszewicz in Costa Rica or Guatemala, probably the latter). *A. padillana* Standley, *Journ. Wash. Acad. Sci.* 14: 244. 1924 (type from El Salvador). *A. gigantiflora* f. *lutea* Standl. & Steyerl. *Field Mus. Bot.* 23: 237. 1947 (type from Escuintla, *Standley 89560*).

Damp forest and thickets, 700–1,200 m.; Escuintla; Sacatepéquez; Chimaltenango. El Salvador; Costa Rica (?).

Differs from *A. schiedeana* only in its elongated inflorescences (10–30 cm. long), more laxly flowered on lower portion, and the more conspicuously glandular pubescence of rachis and bracts.

**Aphelandra speciosa** Brandegee, *Univ. Calif. Publ. Bot.* 6: 196. 1915. *Flor de mayo* (San Marcos); *flor de la Santa Cruz de Mayo* (Quezaltenango).

Dense, wet, mixed mountain forest, 900–2,000 m.; Quezaltenango; San Marcos; Suchitupéquez. Mexico (Chiapas).

Shrubs 1–4.5 m. tall, usually sparsely branched, glabrous throughout or nearly so; leaves on petioles 2–15 cm. long, the blades ovate to elliptic-oblong, mostly 15–30 cm. long and 5–12 cm. wide, acuminate or abruptly long-acuminate, acute or attenuate to the base, paler beneath; inflorescences terminal, the spikes usually solitary, mostly 10–25 cm. long; bracts deep red, ovate or oblong-ovate, commonly 3–4 cm. long, sometimes to 5 cm. long, 1.5–2.8 cm. wide, obtuse and often cuspidate, entire; calyx segments lanceolate, 7–14 mm. long; corolla 4–6 cm. long, bright red, the tube 2.5–3.5 cm. long, the posterior lip entire, the anterior one trilobate to the base, the lateral lobes much smaller than the middle one; capsule about 2 cm. long; seeds ovate, minutely tuberculate.

This beautiful plant is certainly the showiest of all the local species.

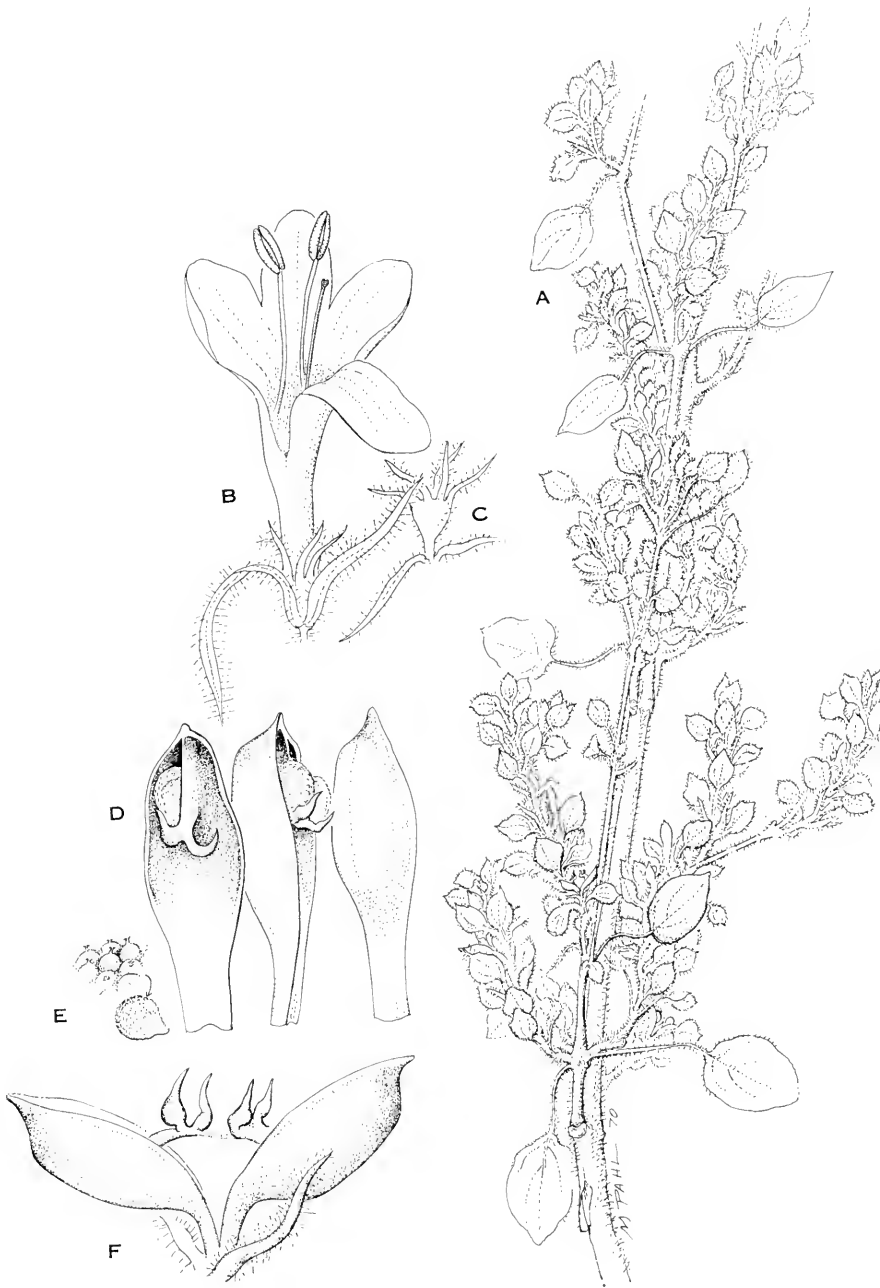


FIG. 72. *Averia longipes*. A, habit,  $\times \frac{1}{2}$ ; B, flower with bracteoles,  $\times 6$ ; C, calyx and bracteoles,  $\times 6$ ; D, opened capsule,  $\times 9$ ; E, papillate surface of seed, greatly enlarged; F, capsule opened to show retinacula,  $\times 9$ .

## AVERIA Leonard

Erect or ascending, perennial herbs or low shrubs with pale stems, branching, viscid-pubescent; leaves often deciduous, petiolate, the blades broad, entire; inflorescences terminal or lateral, spicate; the bracts broad, foliaceous, trinerved to venose, imbricate when young, later spreading and becoming more lax; bracteoles narrowly lanceolate; calyx deeply cleft, the 5 segments subulate; corolla tube slender, shorter than or about equalling the lobes, scarcely ampliate above, the limb appearing almost regular, the 4 lobes rounded at the apex, spreading; stamens 2, anthers bitheous, thecae parallel, subequal, muticous at the base; pollen 3-colporate, prolate; capsule broad, stipitate, containing 2-4 muriculate or papillate seeds.

The genus consists of a single, variable species. It was named for Mr. Sewell Avery of Chicago, who contributed funds for one of the Field Museum botanical expeditions to Guatemala.

*Averia longipes* (Standley) Leonard, Journ. Wash. Acad. Sci. 30: 503. 1940. *Drejerella longipes* Standley, Field Mus. Bot. 8: 47. 1930 (type from Chichen Itzá, Yucatan). *A. serrata* Leonard, Journ. Wash. Acad. Sci. 30: 502. f. 1. 1940. *A. melanosperma* Leonard, Ceiba 1: 110. 1950.

Dry thickets or brushy, rocky slopes, sea level to 1,300 m.; El Progreso; Zacapa; Retalhuleu. Mexico (Chiapas and Yucatan); Honduras; El Salvador.

Erect or ascending perennials, 20-60 cm. tall, rather densely branched, herbaceous or suffrutescent, the branches pale, glandular-pilose or in age glabrate; leaves petiolate, the blades lance-ovate, ovate, or broadly ovate, mostly 0.8-4 cm. long, 0.4-2 cm. wide, obtuse or subacute, truncate or subcordate at the base, remotely repand-dentate or entire, densely glandular-pubescent on both surfaces; inflorescences numerous, the spikes mostly 1-3 cm. long; bracts subtending the inflorescences foliaceous, petiolate, the blades rhombic or broadly ovate, commonly 4-15 mm. long, 3-10 mm. wide, sometimes larger, acute or obtuse, usually apiculate, entire or with 1-3 inconspicuous teeth on each side; floral bracts similar but smaller, nearly sessile or abruptly narrowed at the base into a short petiole, glandular-pilose; bracteoles linear-lanceolate, 6-7 mm. long, densely glandular-pilose; calyx segments subulate, 3-4 mm. long, glandular-pilose; corolla cream-colored, 8-14 mm. long, glabrous outside; anthers purplish; capsule 3-4 mm. long, glabrous; seeds first white, usually becoming brown or black in age.

The uppermost, younger floral bracts are often lanceolate, the lower ones broadly ovate; a plant may have all bracts entire, nearly all dentate, or some bracts entire and a few dentate.

## BARLERIA L.

Herbs or shrubs, glabrous or pubescent; leaves entire; flowers often large and showy, variously arranged but often in terminal, bracteate, densely-flowered

spikes, the bracts entire or serrate, the bracteoles linear; calyx deeply 4-lobate, the posterior and anterior segments largest, the lateral ones innermost, narrow; corolla tube usually slender, more or less ampliate above, straight or incurved, the limb spreading, the 5 lobes imbricate, rounded or ovate, about equal or the anterior, inner one shorter; fertile stamens 2 (in ours), the 2 posterior ones reduced to staminodes, the filaments inserted near or a little above the base of the corolla tube, the anthers oblong-sagittate, dorsifixed, the thecae equal, parallel, mucous; pollen 3-porate, spheroidal; disc inconspicuous; style somewhat thickened at the apex, obtuse, entire, or slightly complanate; ovules 2 in each locule; capsule ovoid or oblong, little contracted at the base, subterete, sometimes contracted above into a beak, seminiferous below the middle; seeds 4 or by abortion 2, flat, ovate or orbicular, supported on usually acute retinacula.

Species 60 or more, mostly in Asia and Africa, only a few American. Only one is known from North America.

**Barleria micans** Nees in Benth. Bot. Voy. Sulph. 146. 1844.  
*B. discolor* Nees, l.c. *Barleriopsis glandulosa* Oerst. Vid. Medd. Kjoebenhavn 1854: 134. 1855.

Damp or dry thickets or lowland forest, often in rocky places, 135-1,300 m.; Escuintla; Huehuetenango; Santa Rosa. Western and southern Mexico; British Honduras to El Salvador and Panama; Colombia.

Suffruticose herbs or shrubs, erect, stout, to 1.5 m. tall, simple or branching, the stems strigose; leaves short-petiolate, the blades ovate or lanceolate, mostly 8-25 cm. long, 2-8 cm. wide, attenuate-acuminate, attenuate to the base and decurrent on the petiole almost to the base, sparsely strigose or hirsute; inflorescences terminal, the spikes very densely flowered, sessile or nearly so, 3-10 cm. long, 2-3 cm. broad; bracts lance-ovate or broadly ovate, 1-2.5 cm. long, 0.5-0.8 cm. wide, acute to acuminate, entire or nearly so, strigose, prominently hirsute-ciliate, green, often turning purplish when dried; bracteoles linear, mostly 1.5-2 cm. long; calyx segments very unequal, the margins of the anterior and posterior ones more or less dentate, especially from the middle to the apex, spinose-ciliate, the spines sometimes to 4 mm. long, the anterior segment broadly lanceolate to ovate-oblong, mostly 1.5-2.5 (3) cm. long, 1-1.4 cm. wide, bidentate at the apex, the posterior one slightly longer and more narrow, acuminate, cuspidate, the lateral segments narrowly lanceolate or linear-acuminate, cuspidate, shorter than the other two; corolla bright yellow when fresh, turning bluish-purple when dried, 4-6 cm. long, the tube slender, the lobes oblanceolate, spreading; fertile stamens 2, exserted, the anthers 4.5-6.5 (8) mm. long; capsule glabrous, about 1.5 cm. long, containing 2-4 seeds, 4-5 mm. in diameter, minutely apiculate.

Corollas of the Guatemalan plants, as well as those of most specimens from other countries, are 4-5 cm. long with anthers 4.5-6.5 mm. long. One collection from Jalisco, Mexico (*Pringle 4587*) has corollas 6 cm. long, with anthers to 8 mm. long.



FIG. 73. *Barleria micans*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and staminodes (pistil removed),  $\times 2$ ; C, corolla lobes in bud,  $\times 2$ ; D, flower with bracts and bracteoles,  $\times 1$ ; E, capsule,  $\times 2$ ; F, seed  $\times 3$ ; G, bracts and bracteoles,  $\times 2$ .

## BLECHUM P. Browne

Perennial herbs, erect or most often decumbent or procumbent, pilose or glabrate; leaves petiolate, the blades thin, entire; inflorescences densely spicate, terminal or axillary, the flowers commonly sessile or short-pedicellate in the axils of foliaceous bracts; bracts green, imbricate, usually ovate to suborbicular, acute to short-acuminate, ciliate; bracteoles narrowly lanceolate to elliptic; calyx segments 5, linear-acuminate, subequal, ciliate; corolla usually lavender, purple, or white, the tube slender, straight or curved, little ampliate above, the limb spreading, the 5 lobes rounded, contorted in bud, subequal; stamens 4, didynamous, inserted above the middle of the corolla tube, the filaments connate at the base by a membrane, the anthers oblong, dorsifixed, the thecae parallel, equal, mucous; pollen 3-colporate, syncolpate, spheroidal; style subulate at the apex, the posterior lobe usually minute; ovules few to 6 in each locule; capsule contracted at the base, nearly ovate or suborbicular, compressed parallel to the septum; seeds flat, suborbicular, the retinacula acute; placentae breaking away in the mature capsule.

Perhaps six or eight species, in tropical America, one sometimes naturalized in the Old World tropics. Two occur in Guatemala and three others have been reported from southern Central America.

The plant from British Honduras, *H. H. Bartlett 11355*, which Leonard named *Blechum cordatum* (Carnegie Inst. Wash. Publ. 461: 200, f. 2. 1936), is *Hemigraphis alternata* (Burm. f.) T. Anders, a native of Malesia and no doubt an escape. It is occasionally planted in gardens in Mexico and in Honduras.

Bracts densely puberulent or strigillose; corolla 1–2 cm. long, the throat 2–3 mm. broad. . . . . *B. brownei*.

Bracts essentially glabrous; corolla 3–3.5 cm. long, the throat about 1 cm. broad. . . . . *B. grandiflorum*.

**Blechum brownei** Juss. Ann. Mus. Hist. Nat. Paris 9: 270. 1807. *Ruellia blechum* L. Syst. ed. 10: 1120. 1759. *Barleria pyramidata* Lam. Encycl. 1: 380. 1785. *Blechum pyramidatum* Urban, Repert. Sp. Nov. 15: 323. 1918. *B. brownei* f. *puberulum* Leonard, Journ. Wash. Acad. Sci. 32: 184. 1942. *Corrimiento* (Petén).

Damp or wet thickets or mixed forest, pastures, waste ground, sometimes in sand along streams, sometimes in pine forest, sea level to 1,400 m.; Alta Verapaz; Escuintla; Izabal; Petén; Quezaltenango; Retalhuleu; Santa Rosa; Suchitupéquez. Florida; Mexico; British Honduras to El Salvador and Panama; West Indies; South America; naturalized in the Old World tropics.

Perennial plants, usually decumbent or procumbent and rooting at the lower nodes, sometimes suberect, usually less than a meter tall, the stems puberulent or glabrate; leaves slender-petiolate, the blades ovate or lance-ovate, mostly 2–7



FIG. 74. *Blechum brownei*. A, habit,  $\times \frac{1}{2}$ ; B, flower, showing calyx and bracts,  $\times 3$ ; C, corolla opened to show stamens,  $\times 4$ ; D, calyx opened to show ovary with style,  $\times 5$ ; E, capsule,  $\times 2\frac{1}{2}$ ; F, placenta with retinacula and seeds,  $\times 2\frac{1}{2}$ ; G, leaf,  $\times 5$ .

cm. long, acute or obtuse, obtuse at the base or contracted and short-decurrent on the petiole, glabrate or sparsely pilose; inflorescences 3-6 cm. long, the bracts ovate, mostly 1-2 cm. long, obtuse or subacute, venose, densely puberulent or strigillose, ciliate; calyx 4-6 mm. long, the segments linear-acuminate, long-ciliate; corolla lavender or white, 1-2 cm. long, pubescent outside, the slender tube little dilated in the throat, the lobes short, rounded; capsule broadly oblong, 6-7 mm. long, puberulent.

The Maya name of Yucatan is recorded as "acabxiu."

These are unattractive plants, one of the most abundant weeds of waste ground throughout the Central American lowlands.

**Blechum grandiflorum** Oerst. Vid. Medd. Kjoebenhavn 1854: 168. 1855.

Damp or wet, often rocky thickets or in mixed forest, 600-1,300 m.; Alta Verapaz; Baja Verapaz. Mexico (Chiapas); Nicaragua.

Erect plants to about a meter tall, branching, the branches bifariously puberulent or almost glabrous; leaves slender-petiolate, the blades ovate-lanceolate, lanceolate, or lance-oblong, mostly 6-13 cm. long, long-acuminate, acute or obtuse at the base and abruptly contracted, short-decurrent on the petiole, almost glabrous, with dense, minute cystoliths on both surfaces, the margins entire or somewhat undulate; inflorescences terminal and axillary, the spikes densely flowered, mostly 3-6 cm. long and as much as 4 cm. broad; bracts broadly ovate to suborbicular, 1.3-2.5 cm. long, acute or shortly cuspidate-acuminate, venose, usually glabrous, ciliate; bracteoles oblong-lanceolate, usually acuminate; calyx 4-7 mm. long, the segments linear-acuminate, ciliate; corolla lavender to rose-purple, 3-3.5 cm. long, puberulent outside, the tube much inflated in the throat and about 1 cm. broad, the lobes very short, rounded or subretuse; capsule about 1 cm. long, puberulent.

## BRAVAISIA DeCandolle

Trees or shrubs, glabrous or pubescent; leaves opposite, sometimes anisophyllous, petiolate, the blades ovate, oblong-lanceolate, or elliptic, the margins entire; inflorescences terminal, cymose, sometimes branching and often appearing thyrsiform, paniculate, or corymbose; bracts foliaceous; bracteoles ovate, oblong, or obovate-spathulate to narrowly pandurate, shorter than or exceeding the calyx; calyx lobes 5, separated almost to the base, the segments oblong; corolla tube abruptly dilated into a campanulate throat, the limb erect-spreading, the 5 lobes rounded or emarginate, contorted, subequal; stamens 4, didynamous, inserted near the base of the corolla tube, included or exerted, the filaments distinct or more or less united by a membrane at the base, the anthers dorsifixed, the thecae parallel, nearly equal, calcarate at the base; pollen 2-porate, bilateral, prominently banded; disc annular; style linear at the apex, revolute, the posterior lobe obsolete or minute and dentiform; ovules 2-4 in each locule; capsule oblong, obovoid-oblong, or ovoid, coriaceous, not compressed, little contracted at the base; seeds 2-8, lenticular, the retinacula often bidentate at the apex.



Three species, in tropical America. All three are found in Central America with two in Guatemala. *Bravaisia integerrima* (Spreng.) Standley is found in Mexico, El Salvador, and in southern Central America, but we have seen no specimens from Guatemala; British Honduras, or Honduras. It is a large tree, often 15–20 m. tall, with broad leaves commonly 4–14 cm. wide, and the corollas are ampliate from almost the base of the tube, the narrow portion of the tube usually less than 1 mm. long.

Bracteoles longer than the calyx; corolla 1.5–2 cm. long.....*B. tubiflora*.

Bracteoles much shorter than the calyx; corolla 3.5–4.5 cm. long...*B. grandiflora*.

***Bravaisia grandiflora*** Donn.-Sm. Bot. Gaz. 33: 255. 1902. *B. proxima* Blake, Contr. Gray Herb. 52: 96. 1917 (type from upper Moho River, British Honduras, *M. E. Peck 730*). *Boc-ché* (Quecchí, Alta Verapaz).

Damp or wet, mixed forest near sea level to 1,000 m.; Alta Verapaz (type from Sachichá, *Tuerckheim 7924*); Petén. British Honduras.

Shrubs or trees, sometimes to 9 m. tall; leaves short-petiolate, the blades rather thick, elliptic or oblong-elliptic, mostly 6–18 cm. long, 3–6.5 cm. wide, acuminate or caudate-acuminate, usually abruptly contracted at the base and long-decurrent on the petiole, somewhat paler beneath, glabrous or sometimes pilosulous on the petioles and costae; panicles of inflorescences sometimes about as long as or longer than the leaves, usually many-flowered; bracts leaflike but smaller, bracteoles ovate, oblong-ovate, or orbicular, 2–5 mm. long, mucronate at the apex, ciliate, puberulent or almost glabrous; calyx often 3 times as long as the bracteoles, the segments oblong, apiculate, 6–9 mm. long, puberulent and often pilose; corolla pale lavender or pink, or the tube white and the limb with pale lavender lobes, 3.5–4.5 cm. long, deeply lobate, the tube cylindric below, the limb ampliate, the lobes oblong-obovate, pilose outside; filaments dilated and barbate at the base, those of each pair distinct at base, the anthers 3.5–4 mm. long; ovary oblong-ovoid; capsule unknown.

***Bravaisia tubiflora*** Hemsl. in Hook. Icon. 16: *t. 1516*. 1886. *Hulaba* and *hulup* (Maya, British Honduras).

Damp or wet forest, at or a little above sea level; British Honduras. Mexico.

Shrubs or trees sometimes to 8 m. tall, the branches whitish, the young branchlets pilosulous; leaves thick, petiolate, the petioles often more or less pilose, the blades ovate, oblong-lanceolate, or elliptic, 3–16 cm. long, 1.5–6.5 cm. wide, short-acuminate to obtuse, acute at the base or abruptly contracted and more or less decurrent on the petiole, glabrous or sometimes pilose on costae and veins beneath, the short cystoliths numerous and usually conspicuous; cymes of inflores-



FIG. 75. *Bravaisia grandiflora*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and style,  $\times 1\frac{3}{4}$ ; C, anthers,  $\times 5$ ; D, detail of bracteoles and calyces,  $\times 2\frac{1}{4}$ .

cences usually not more than 2 or 3 cm. long but sometimes occurring in great numbers in the uppermost branches and appearing corymbose or paniculate; bracteoles obovate-spathulate to narrowly pandurate, acute, at least the lower portion ciliate, usually exceeding the calyx, mostly 8-12 mm. long; calyx lobes oblong, 5-7 mm. long, obtuse or acute, not mucronate, subequal, more or less puberulent or nearly glabrous, ciliate; corolla white or pale purplish, 1.5-2 cm. long, the narrow portion of the tube 4-5 mm. long, pubescent outside, the lobes rounded, 5-8 mm. long, often puberulent, ciliate; stamens equalling or a little longer than the corolla tube, the filaments of each pair connected at base by a membrane, somewhat dilated and barbate at base, the anthers 2.5-3 mm. long; capsule ovoid, acute, 8-10 mm. long, glabrous, containing 4 shining, brown seeds.

### BUCERAGENIA Greenman

Weak, soft-stemmed, erect herbs, the stems simple or sparsely branched; leaves petiolate, the blades very thin, ovate to elliptic, entire; inflorescences spicate, simple or branching and paniculate, the flowers solitary or fasciculate; bracts and bracteoles minute; calyx segments 5, subequal, linear-subulate; corolla white or purplish, small, the tube slender, scarcely dilated above, the limb shallowly bilabiate, the posterior lip incurved, emarginate or bilobate, the anterior lip erect or slightly spreading, trilobate; stamens 2, inserted at the middle of the corolla tube, included; anthers usually monothealous, the lower theca usually aborted or vestigial and sterile, if fertile, always considerably smaller, one or both very minutely calcarate at the base; pollen spheroidal, 3-colporate; staminodes 2; capsule clavate, narrowed below into a slender, solid stipe; seeds 4, flat, lenticular, verrucose.

Three other species, all Mexican, have been reported.

**Bucерagenia glandulosa** Leonard, Field Mus. Bot. 18: 1205. 1938.

Wooded swamps, 1,200-1,500 m.; Alta Verapaz. Mexico (Chiapas); Nicaragua; Costa Rica.

Slender, erect herbs about a meter tall, the stems glabrous or sparsely and bifariously pilosulous; leaves on long, slender petioles, or the uppermost subsessile, the blades ovate or oblong-ovate, mostly 7-15 cm. long and 3-7 cm. wide, acuminate, acute to rounded at the base and abruptly and narrowly long-decurrent on the petiole, glabrous, with numerous cystoliths; flowers sessile or nearly so, densely fasciculate at the nodes of the spikes, the rachis glandular-pilosulous, the spikes forming a large, open, terminal panicle; bracts lanceolate to triangular, about 2 mm. long, the bracteoles similar but smaller; calyx lobes lanceolate, acuminate, 2.5-3.5 mm. long, glabrous or nearly so; corolla 2-3 mm. long, glabrous, the tube straight, the lobes rounded, about 0.5 mm. long; capsule 12-16 mm. long, glabrous; seeds flat, verruculose, especially on the margins.

As stated by Leonard, this plant in general appearance resembles *Pseuderanthemum cuspidatum* (Nees) Radlk. but may be distinguished



FIG. 76. *Buceragenia glandulosa*. A, habit,  $\times \frac{1}{2}$ ; B, corolla with calyx,  $\times 8\frac{1}{2}$ ; C, corolla opened to show stamens and staminodes,  $\times 11\frac{1}{2}$ ; D, staminode greatly enlarged; E, two anthers greatly enlarged, one theca aborted; F, calyx (with bracts) partially opened to show pistil,  $\times 11\frac{1}{2}$ ; G, fasciated inflorescences,  $\times 5$ ; H, capsules,  $\times 2$ ; I, seed,  $\times 3\frac{1}{2}$ .

by its minute flowers which are densely fasciculate rather than solitary.

### CARLOWRIGHTIA Gray

Plants usually erect, herbaceous or somewhat woody, pubescent or glabrous; leaves entire, broad or narrow; flowers small, in lax spikes or racemes, these often forming large terminal panicles, the bracts and bracteoles small; calyx small, the sepals 5, narrow; corolla tube short (in ours), slender, scarcely ampliate above, the 4 lobes almost equal, one shallowly bifid; stamens 2, the filaments inserted at or above the middle of the corolla tube; anthers bitheous, nearly equal, muticous; staminodes none; pollen 3-colporate, prolate to perprolate; stigma capitate, very shallowly bilobate; capsule acute, contracted below into a short, solid stipe; seeds 4, flat, roughened; the retinacula long and thin.

Fifteen species have been reported, ranging from southwestern United States to Central America. Only one species has been found in Central America.

**Carlowrightia costaricana** Leonard, Field Mus. Bot. 18: 1206. 1938.

Damp or dry, often rocky thickets, 180–600 m.; Chiquimula; Zacapa. Costa Rica, the type from Guanacaste.

Plants slender, erect, branched, to 75 cm. tall, the stems terete, the older ones whitish, the young ones finely puberulent, soon glabrate; leaves membranaceous, the lower ones on slender petioles to 1.5 cm. long, the upper ones subsessile, the blades oblong-ovate, 2–10 cm. long and 1.5–4 cm. wide, long-acuminate to obtuse, rounded to acute at the base, puberulent or glabrate; flowers borne in long, slender, interrupted spikes, these usually forming an open panicle 10–20 cm. long, the slender branches minutely puberulent or almost glabrous; bracts and bracteoles subulate, to 3 mm. long; calyx about 1.5 mm. long, the sepals triangular, minutely puberulent; corolla purple, about 7 mm. long, pubescent, the tube shorter than the lobes; capsule 10–11 mm. long, acute, glabrous; seeds whitish, minutely roughened.

### CHAETOTHYLAX Nees

Perennial herbs, sometimes suffrutescent below, pubescent or glabrous; leaves petiolate, the blades entire; flowers sessile, usually in very dense, short, axillary and terminal, subcapitate or spikelike inflorescences, sometimes solitary in the upper leaf axils, the bracts and bracteoles usually narrow, rigid and filiform, or the bracts sometimes broadly oblanceolate or elliptic and cuspidate; calyx segments 4, linear to subulate, acute or acuminate, subequal; corolla tube slender, straight or incurved, the limb bilabiate, the posterior lip innermost in bud, erect, narrow, entire, the anterior lip spreading, trifid, the lobes subequal, the middle one outermost; stamens 2, anterior, the filaments inserted in or just below the throat of the corolla, about equalling or slightly shorter than the posterior lip; anthers bitheous,



FIG. 77. *Carlwrightia costaricana*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens,  $\times 4\frac{1}{2}$ ; C, calyx and pistil,  $\times 4\frac{1}{2}$ ; D, fruiting branch,  $\times 2\frac{1}{2}$ ; E, capsule with seeds,  $\times 4\frac{1}{2}$ .



FIG. 78. *Chaetothylax rothschukii*. A, habit,  $\times \frac{1}{2}$ ; B, inflorescences,  $\times 1\frac{1}{2}$ ; C, capsule,  $\times 6$ ; D, corolla with calyx,  $\times 6$ ; E, corolla dissected to show one stamen and the style,  $\times 6$ ; F, limb of corolla prior to anthesis,  $\times 6$ .

one theca much smaller than the other, the smaller one usually inserted much lower on the connective, calcarate, often sterile, sometimes reduced to a small tooth; pollen 2-porate, bilateral; staminodes none; disc annular or short-cupular; style filiform, incurved at the apex, entire or minutely bidentate; ovules 2 in each locule; capsule oblong, more or less contracted at the base; seeds 4 or by abortion fewer, flat, minutely glochidiate, the retinacula acute or subobtusate.

Less than 10 species, ranging from southern Mexico into South America. In addition to the two in Guatemala, two others have been described from Nicaragua and Costa Rica.

Bracts filiform, pubescent. . . . . *C. rothschuhii*.

Bracts oblanceolate, cuspidate, long-ciliate. . . . . *C. cuspidatus*.

**Chaetothylax cuspidatus** D. Gibson, Fieldiana:Botany 34: 58. 1973.

Alta Verapaz, 650 m., valley of Santa Lucía, on road from Gualán to Cobán (type, *Pittier 1792*). Honduras.

Herbaceous, erect or ascending plants 30–40 cm. tall, the stems bifariously pubescent with white hairs; leaves short-petiolate, the blades lanceolate to ovate-lanceolate, acuminate, entire, 2–6 cm. long, 1–2.5 cm. wide, glabrous or with scattered pubescence mostly on costae and veins; inflorescences appearing subcapitate, 2–4 cm. long; bracts oblanceolate, 10–15 mm. long, cuspidate, long-ciliate, the bracteoles linear-acuminate, rigid, 6–8 mm. long, ciliate; calyx segments 4, 7–9 mm. long, narrowly linear-acuminate, ciliate; corolla 2.5–3 cm. long, pubescent outside, the tube 1.5–1.8 cm. long, the upper lip entire, the lower one trilobate; stamens included, the filaments attached just below the throat of the corolla, the anthers 1–1.5 mm. long, thecae superposed on a broad connective, the lower one considerably smaller and calcarate; pollen 2-porate, bilateral; style filiform, the stigma apparently entire; capsule unknown.

**Chaetothylax rothschuhii** Lindau, Bull. Herb. Boiss. 3: 492. 1895.

Dry or damp thickets, 250–500 m.; Escuintla. Another collection of this plant was made in Guatemala by Standley or Steyermark, probably in the Oriente. The label, according to Dr. Standley's notes, was lost by a careless mounter; therefore there is no data concerning the local station. The species was described from Mazmaz, Matagalpa, Nicaragua, and several collections have been made in Honduras.

Erect or ascending herbs, the stems sometimes as much as 40 cm. long, simple or sparsely branched, terete, hirsutulous above; leaves on very short petioles, the blades rather thick and firm, lance-oblong or ovate-oblong, mostly 3–9 cm. long, 1–3 cm. wide, usually long-acuminate, sometimes acute, acute at the base, strigose above along the costae, appressed-pilose beneath, the cystoliths obscure; inflorescences short and dense, many-flowered, headlike to spikelike, axillary and terminal,



sessile or nearly so, crowded at the ends of the branches; bracts and bracteoles 5-9 mm. long, filiform, usually rigid, pubescent; calyx segments filiform, 10-15 mm. long; corolla white, puberulent above, the tube 9-11 mm. long, 1-1.5 mm. in diameter, the posterior lip entire, 3-4 mm. long; capsule 6-7 mm. long, 2 mm. broad, acute, minutely puberulent; seeds scarcely 1 mm. in diameter, very minutely glochidiate.

### DICLIPTERA Jussieu

Plants perennial, herbaceous or suffruticose, erect or ascending, the stems hexagonal, pubescent or almost glabrous; leaves usually petiolate, the blades entire; inflorescences cymose, bracteate, axillary or terminal, pedunculate, sessile or subsessile, often crowded in the leaf axils, sometimes appearing spikelike; flowers subtended by 2 or more pairs of bracts, the outer pair larger than the inner ones; calyx usually dry or hyaline, the 5 segments linear or setaceous, subequal; corolla commonly red or purple, the tube slender or ampliate above, the limb deeply bilabiate, the lips narrow or ovate, the posterior one innermost in bud, erect, entire or emarginate, the anterior lip usually broader, entire or very shallowly trilobate; stamens 2, the filaments inserted on the corolla tube below the throat, almost equalling the corolla in length, anthers bithecous, one theca attached lower than the other on the connective, both mucicous or the lower one rarely short-calcarate at the base; pollen grains 3-colporate, perprolate to prolate; staminodes none; disc cupular, truncate, oblique, or sinuate-dentate; style filiform, entire at the apex or minutely bifid; ovules 2 in each locule of the ovary; capsule ovoid or suborbicular, more or less compressed, subsessile or contracted and appearing stipiform, the placentae separating elastically from their walls in the mature capsule; seeds 4 or by abortion fewer, flat, suborbicular, smooth, muriculate or glochidiate, the retinacula rather broad, acute.

There are about 80 species in the tropics or warm-temperate regions of America, Africa, and Asia, with eight in Guatemala. Various species have been misidentified as *D. acuminata* (Ruiz & Pavón) Juss., but I have seen no Central American material that matches either the original description and illustration (Fl. Peruv. 1: 10, t. 16, f. b, 1798, as *Dianthera acuminata*) or the Ruiz collection from Peru. It would appear that the typical variety of this plant is confined to South America and that the Mexican *D. acuminata* var. *spicata* Nees may be incorrectly named.

Inflorescences on peduncles more than 2 cm. long (commonly 4-10 cm.), these sometimes branching . . . . . *D. sciadephora*.

Inflorescences not as above.

Corolla red or pale red.

Bracts subtending the cymes subulate; outermost pair of floral bracts 1-2.5 mm. wide; thecae nearly opposite . . . . . *D. assurgens*.

Bracts subtending the cymes ovate to cylindric, obtuse and abruptly long-acuminate; outermost pair of floral bracts 4-7 mm. wide; one theca well below the other . . . . . *D. debilis*.

Corolla purple, pink, or white flushed with pink.

Outermost pair of floral bracts abruptly spinose-aristate, the awns 2-3 mm. long; usually enclosing only one flower.....*D. unguiculata*.

Outermost pair of floral bracts not spinose-aristate, but may be apiculate; usually enclosing 3 or more flowers.

Outermost floral bracts oblong-spathulate, 4-4.5 mm. wide; corolla pink or white with pink.....*D. sumichrasti*.

Outermost floral bracts ovate, obovate, or cuneate-obovate, 6-15 mm. wide; corolla purple.

Outermost floral bracts densely pilose, usually spotted with magenta-brown.....*D. guttata*.

Outermost floral bracts not as above.

Bracts cuneate-obovate, 8-12(15) mm. long, 4-7 mm. wide, ciliate with long, mostly spreading hairs.....*D. membranacea*.

Bracts ovate to broadly ovate, 10-20 mm. long, 8-15 mm. wide, ciliate with minute, closely appressed hairs.....*D. inutilis*.

***Dicliptera assurgens* (L.) Juss.** Ann. Mus. Paris 9: 269. 1807. *Justicia assurgens* L. Syst. Nat. ed. 10. 2: 850. 1759. *Dicliptera sexangularis* Juss. Ann. Mus. Paris 9: 269. 1807. *Solenochasma assurgens* Jacq. Eclog. Pl. 2: 1. 1844. *D. vahliana* Nees in DC. Prodr. 11: 489. 1847. *D. mollis* Nees, *op. cit.* 490. *Yerba fluxión* (Petén); *amor seco*.

Damp thickets or forest, frequently along stream beds in sandy or rocky places, sometimes in waste places, sea level to 900 m.; Alta Verapaz; Petén; El Progreso; Retalhuleu; Sololá; Suchitépéquez. Southern United States; Mexico; British Honduras to Panama; West Indies; northern South America.

Erect, usually much branched herbs to 1.5 m. tall, the stems nearly glabrous or thinly puberulous to pubescent; leaves petiolate, the blades ovate to lanceolate, the upper ones 2-5 cm. long, 1-3 cm. wide, the lowermost ones to 9 cm. long, 3-4.5 cm. wide, usually acute or acuminate, sometimes obtuse and apiculate, rounded to acute at the base, often abruptly decurrent on the petiole, glabrate or sparingly hirtellous to pilose, especially on costae and veins; inflorescences lax and spikelike, usually forming large, often leafy panicles, the flowers solitary or several in a sessile or subsessile cymule subtended by a pair of subulate bracts 1.5-3 mm. long, the floral bracts 6, the 2 outer ones linear-lanceolate or linear-oblong to oblong-spathulate, unequal, 4-15 mm. long, 1-2.5 mm. wide, usually abruptly acute or obtuse and apiculate, rarely acuminate to subulate, often somewhat scaberulous and glandular-puberulent, the 4 inner bracts lanceolate, 2.5-5 mm. long, acuminate, densely puberulent; calyx subhyaline, the subulate segments 2-4 mm. long; corolla red, finely pubescent outside, to 3 cm. long, the narrow, subequal lips about 1.2 cm. long; filaments of stamens sparsely villous; anthers 2-2.5 mm. long, the thecae nearly opposite; ovary and style glabrous; capsule 5-6 mm. long, pubescent, containing 2 lenticular, minutely glochidiate seeds.

Only a few collections with the outer pair of floral bracts truly subulate (matching the original description) were seen. Although



FIG. 79. *Dicliptera assurgens*. A, habit,  $\times \frac{1}{2}$ ; B, flower,  $\times 2$ ; C, corolla opened to show stamens and pistil,  $\times 5$ ; D, calyx with bracteoles and bracts,  $\times 5$ ; E, section of fruiting branch showing mature capsule,  $\times 2\frac{1}{2}$ ; F, mature capsule opened to show separation of placenta,  $\times 2\frac{1}{2}$ ; G, seed,  $\times 5$ .

this form does occur throughout the range, the dominant form appears to be that with the larger, more or less spatulate bracts (*D. vahliana*). There is considerable intergradation of this character, and both kinds of bracts may occur on the same plant (i.e. *Pelly 24*, British Honduras).

***Dicliptera debilis*** Leonard, Journ. Wash. Acad. Sci. 31: 99, f. 4. 1941.

Known only from the type locality, dry, rocky brushy hills north of Santa Rosa, Baja Verapaz, 1,500 m., the type being *Standley 69823*.

Weak, much-branched herbs to about 1 m. tall, the stems hexagonal, pilosulous with short, recurved hairs; leaves petiolate, the blades ovate or lanceolate, 2-5 cm. long, 1-2 cm. wide, acute or acuminate, acute and decurrent at the base, sparsely pilose with subappressed white hairs beneath along the costae and veins, elsewhere glabrous or nearly so; inflorescences cymose, sessile or subsessile, axillary, 3 or 4 flowers in each cyme; the pair of bracts subtending the cymes ovate to cylindrical, obtuse to truncate at the apex and abruptly long-acuminate, 3.5-5 mm. long, about 2 mm. wide at base; outer pair of floral bracts oblanceolate or cuneate-obovate, one much larger than the other, as much as 12-15 mm. long and 4-7 mm. wide, obtuse or rounded at the apex and apiculate, pilosulous or puberulent, many of the hairs gland-tipped; inner bracts lanceolate, 5-7 mm. long, pubescent and somewhat viscid; calyx 4-8 mm. long, puberulent, the segments subulate; corolla pale red, 2.5-3 cm. long, minutely pubescent outside, the tube slender; filaments of stamens pubescent near base; anthers 1-1.3 mm. long; ovary and style pubescent; capsule compressed-ovoid, 6-9 mm. long, glandular-puberulent.

***Dicliptera guttata*** Standl. & Leonard, Field Mus. Bot. 23: 239, f. 2. 1947.

Known only from the type, Zacapa, Sierra de las Minas, along Rillito del Volcán de Monos, Volcán de Monos, 1,150-2,100 m., *Steyermark 42396*.

Plants suffrutescent, as much as a meter tall, the stems more or less hexagonal, villosulous with short, weak, white hairs; leaves on slender petioles 1.5-5 cm. long, the blades ovate or oblong-ovate, mostly 3-10 cm. long and 1-4 cm. wide, obtuse-acuminate, narrowed at the base and decurrent on the petiole, hirsutulous on the upper surface with appressed or subappressed hairs, rather coarsely hirsutulous beneath, especially along the costae and veins; flowers arranged in crowded, compound, terminal or axillary cymes as much as 2.5 cm. long and 3 cm. broad, these subsessile or on pubescent peduncles to 1 cm. long; bracts subtending the cymes 5-6 mm. long, narrowly lanceolate and acuminate; the pair of larger floral bracts obovate, 14-16 mm. long, 9-11 mm. wide, subobtuse, apiculate, densely pilose and ciliate, usually conspicuously spotted with magenta-brown; inner bracts subtending the flowers linear, acuminate, ciliate, 10-11 mm. long; calyx 8 mm.

long, the segments subulate, ciliate; corolla rose-purple, finely pubescent outside, 2.5 cm. long, the subequal lips 6–8 mm. long; filaments of stamens sparsely pubescent; style glabrous or nearly so; capsule oval, compressed, 6 mm. long, 3 mm. broad, obtuse and mucronate at the apex, sparsely hirtellous.

**Dicliptera inutilis** Leonard, Journ. Wash. Acad. Sci. 31: 101. f. 5. 1941.

Damp thickets, 1,200 m. or less; Jutiapa (type from Los Llanitos, near San José Acatempa, *Standley 60579*); Retalhuleu (plains near Champerico).

Erect branching herbs to about a meter tall, the branches hexagonal, sparsely and minutely pubescent with more or less appressed hairs; leaves petiolate, the blades ovate, 2–4 cm. long and 1–3 cm. wide, acuminate, obtuse or acute at the base, appressed-pilous on the costae and veins, at least on the lower surface; inflorescences cymose, terminal and axillary, sessile or very short-pedunculate (usually less than 0.5 cm. long), each cyme composed of 3 cymules; a pair of subulate bracts, 2–4 mm. long, subtending each cyme, each cymule subtended by a pair of large, ovate to broadly ovate bracts, one larger than the other, as much as 2 cm. long and 1.5 cm. wide, obtuse or narrowly rounded at the apex, often apiculate, contracted at the subtruncate base into a short petiole, bright green, minutely appressed-pubescent on the margins and sometimes so on the faces; 3 or 4 flowers within each of these large pairs of bracts, subtended by linear, acuminate bracteoles 4–5 mm. long, puberulent; calyx segments subulate, 5–6 mm. long, ciliate; corolla pale purple, to 2 cm. long, puberulent outside; filaments of the stamens sparsely pubescent; ovary pubescent; capsule suborbicular to broadly ovate, pubescent.

**Dicliptera membranacea** Leonard, Journ. Wash. Acad. Sci. 31: 102, f. 6. 1941.

Wet thickets or forest, 500–725 m.; Alta Verapaz; Escuintla (type collected between Río Jute and Río Pantaleón, on the road between Escuintla and Santa Lucía Cotz, *Standley 63524*); San Marcos. Mexico.

Erect, branching herbs to 1 m. tall, the branches hexagonal, glabrous or puberulent at the nodes; leaves on petioles 1–6 cm. long, the blades ovate or oblong-ovate, mostly 4–10 cm. long, 1.5–6 cm. wide, acute or acuminate, obtuse or acute and abruptly decurrent at the base, essentially glabrous or sometimes more or less pubescent beneath; inflorescences axillary or terminal, the flowers in sessile or subsessile, dense, usually 4-flowered cymes, the cymes often crowded together and appearing spikelike; bracts subtending the cymes ovate, foliaceous, to 12 mm. long and 6 mm. wide, glabrous or minutely pubescent beneath; the outer pair of floral bracts unequal, cuneate-obovate, 8–12 (15) mm. long and 3.5–6 (7) mm. wide, costate, usually rounded and minutely apiculate or sometimes acute, ciliate; inner bracts linear, acuminate, 7–12 mm. long, whitish, ciliate, the costae hirtellous; calyx segments subulate, 4–6 mm. long, ciliate; corolla pale purple, puberulent

outside, to 2 cm. long; filaments of stamens villous near base, anthers to 1 mm. long; ovary pubescent; capsule pubescent near apex.

**Dicliptera sciadephora** Donn.-Sm. Bot. Gaz. 23: 13. 1897. *D. vulcanica* Leonard, Journ. Wash. Acad. Sci. 33: 71. 1943 (type collected near Tajumulco, Volcán de Tajumulco, *Steyermark 36861*).

Damp thickets or forest, often along streams, sometimes in oak forest, 1,350–2,400 m.; Alta Verapaz; Chimaltenango; Huehuetenango (type from Jacaltenango, *E. W. Nelson 3584*); Petén; San Marcos. Mexico (Chiapas); Nicaragua; Costa Rica.

Erect to subscent, branching herbs, the stems more or less hexagonal, sparsely pubescent to almost glabrous, the hairs somewhat appressed, spreading, or retrorse; leaves of inflorescence subsessile to short-petiolate, those of lower stems on petioles 1–3 cm. long, the blades ovate or oblong-ovate, mostly 2–10 cm. long, 1–5 cm. wide, usually acuminate, sometimes acute, obtuse or acute at the base and abruptly decurrent, sparsely pilose or pilosulous, especially on the costae and veins; inflorescences cymose, axillary, pedunculate, the peduncles mostly 4–10 cm. long, sometimes shorter, each bearing mostly 3–5 pedicellate flowers, the pedicels mostly 1–4 cm. long; each cyme subtended by a pair of subulate bracts 3–6 mm. long; the outer pair of floral bracts linear or oblanceolate, acute to acuminate, usually 8–15 mm. long, 2–4 mm. wide, puberulent, often pilose, sometimes with gland-tipped hairs; the inner bracts lanceolate or subulate, 5–9 mm. long; calyx 7–10 mm. long, the segments lance-subulate, pubescent; corolla about 3 cm. long, pale or dull red or reddish-purple, finely pubescent outside, the tube slender; filaments of stamens more or less pubescent, especially near the base; ovary and style pubescent; capsule 9–12 mm. long, about 5 mm. broad, puberulent, appearing somewhat apiculate.

The inflorescences of a Chiapas collection, *Breedlove 9049*, are more densely flowered and the indument is more glandular than any Guatemalan collections I have seen. One Guatemalan collection, *Tuerckheim 2106*, Alta Verapaz, is also atypical; its uniformly shorter pedicels (0.5–1.5 cm. long) and some outer floral bracts as much as 18 mm. long and 6 mm. broad resemble those of the Costa Rican plant, *D. trifurca* Oerst. However, the bracts of *D. trifurca* are essentially glabrous and are rounded and apiculate at the apex.

**Dicliptera sumichrasti** Lindau, Bull. Herb. Boiss. 5: 665. 1897. *D. antidysenterica* A. Molina, Ceiba 11: 65. 1965.

Wet forest, 350–1,000 m.; Alta Verapaz. Mexico; British Honduras; Honduras.

Erect or ascending herbaceous or suffruticose plants to 1.5 m. tall, the stems often branched, pilose or almost glabrous; leaves on petioles 1–8 cm. long, the blades thin, mostly 3–14 cm. long, 2–7 cm. wide, ovate to lanceolate, acuminate to long-acuminate, acute or obtuse at the base, pilose beneath, especially along

the costae and veins, or almost wholly glabrous; inflorescences pedunculate, the peduncles usually 0.5–2 cm. long, cymose, sometimes appearing paniculate, the flowers in dense clusters, 3–5 flowers subtended by a pair of lance-subulate bracts 4–8 mm. long, each flower subtended by 3–4 pairs of bracts, the outer pair oblong-spathulate, long-ciliate, apiculate, the larger one 10–14 mm. long, 4–4.5 mm. wide, the inner bracts lanceolate, pilose, 7–8 mm. long; calyx 3–4 mm. long, the segments subequal, subulate; corolla pink or white flushed with pink, pubescent outside; filaments of stamens pilose, the anthers about 1 mm. long; ovary and style pubescent; capsule pubescent.

These plants have been confused with the South American *D. acuminata* (Ruiz & Pavón) Juss. which also has ciliate bracts. However, the inflorescences of *D. acuminata* are sessile, the outer involucrel pair of bracts are lanceolate to lance-oblong, acuminate, only 2–3 mm. wide, and with a conspicuous apicula 1 mm. long or more. The inner bracts are only 3–4 mm. long, and the calyx segments 2–2.5 mm. long.

A species of Costa Rica and Panama, *D. imbricata* Leonard, closely resembles *D. sumichrasti*, but differs in its smaller flowers and shorter bracts. Its corollas are only 15–16 mm. long and the two outer floral bracts are 7–9 mm. long.

**Dicliptera unguiculata** Nees in Benth. Bot. Voy. Sulphur 149. 1844. *Hierba de cáncer, panalitos* (Guatemala).

Wet or dry thickets and fields, sometimes in rocky places or in oak forest, common weeds in waste and cultivated ground, 900–1,800 m.; Chimaltenango; Guatemala; Jalapa; Quezaltenango; Sacatepéquez. Southern Mexico; Honduras and El Salvador to Costa Rica; northwestern South America.

Erect or decumbent herbs, usually 30–60 cm. tall, branched, the stems pubescent above; leaves slender-petiolate, the blades ovate, mostly 2–5 cm. long, 1–3 cm. wide, sometimes to 8 cm. long and 5 cm. wide, acute or obtuse, obtuse or acute at the base, densely pilosulous when young, sometimes glabrate in age; flowers crowded in dense clusters, these forming dense, terminal or lateral spikelike inflorescences 2–10 cm. long and about 2 cm. in diameter, each cymule usually with only one flower and subtended by a pair of subulate bracts 4–7 mm. long; the 2 outer floral bracts venose, usually suborbicular or ovate, sometimes spathulate, one larger than the other, usually 10–15 mm. long, 4–6 mm. wide, obtuse and abruptly spinose-aristate at the apex, with an awn 2–3 mm. long, usually densely hirsute with long slender hairs and long-ciliate, pale or bright green; inner bracts linear-lanceolate, 4 mm. long, ciliate; calyx 3 mm. long, the segments narrowly lanceolate, minutely ciliate; corolla rose-purple, to 1.5 cm. long, pubescent outside, the tube slender, the lips subequal, 6–7 mm. long; filaments of stamens pubescent or nearly glabrous; capsule clavate, 4 mm. long, hirsutulous; seeds flat, suborbicular, brownish, 1–1.5 mm. in diameter, minutely glochidiate.

In Costa Rica, where it is called "sornia," this plant has been much used in treating amoebic dysentery.

### DYSCHORISTE Nees

*References:* C. E. Kobuski, A monograph of the American species of *Dyschoriste*, Ann. Mo. Bot. Gard. 15: 9-90. 1928. R. W. Long, Genera of Acanthaceae, Journ. Arn. Arb. 51: 292-296. 1970.

Perennial herbs, sometimes suffruticose at base, prostrate to erect, usually pubescent; leaves opposite, sessile or petiolate, entire or repand-crenate; inflorescences usually cymose, often appearing capitate, rarely racemose, axillary, the flowers subtended by foliaceous bracts and bracteoles; calyx segments 5, usually subulate-setaceous and ciliate, connate at anthesis for one-half to one-quarter their length, rupturing easily in some species and often splitting to the base in fruit; corolla tube incurved or straight, usually somewhat dilated at base, more or less ampliate above, the limb spreading, oblique, 5-lobate, obscurely or distinctly bilabiate; stamens 4, didynamous, the filaments attached below the throat of the corolla; anthers bithecous, the thecae oblong, calcarate at the base, parallel or slightly divergent; pollen 3-colporate, prolate, banded; ovary glabrous, with usually 2 ovules in each locule; style filiform, pubescent; capsule ellipsoidal, containing 2-4 flat, suborbicular seeds.

About 100 species have been reported from tropical and subtropical America, Africa, and Asia, with three in Guatemala. Although Kobuski recognized 40 American species, many are poorly marked and the true number is probably fewer. *Dyschoriste crinita* (Nees) Kuntze, a Brazilian species, was reported from Huehuetenango and Quezaltenango by Loesner, but those plants are probably referable to *D. quadrangularis* (Oerst.) Kuntze.

Corolla 2-2.8 cm. long. . . . . *D. ovata*.

Corolla 1-1.5 cm. long.

Leaves mostly 3-10 cm. long, the blades ovate to oblong, usually acute to acuminate at the apex; calyx segments at anthesis connate for about one-half their length. . . . . *D. quadrangularis*.

Leaves mostly 0.8-2 cm. long, the blades obovate to spatulate, obtuse or rounded at the apex; calyx segments at anthesis connate for one-third or one-fourth their length. . . . . *D. skutchii*.

*Dyschoriste ovata* (Cav.) Kuntze, Rev. Gen. 2: 486. 1891. *Ruellia ovata* Cav. Icon. 3: 28. t. 254. 1794. *Calophanes ovatus* Benth. in DC. Prodr. 11: 108. 1847. *Clarencillo* (Huehuetenango).

Damp or rather dry, open, grassy places, often in pine forest, 1,800-2,100 m.; Chimaltenango; Huehuetenango; reported by Loesner from Quezaltenango. Southern Mexico.

Erect plants to 75 cm. tall, the stems simple or sparsely branched, obtusely quadrangular or subterete, pilose, at least on the angles, with very short, spreading





FIG. 80. *Dyschoriste ovata*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens (flower in background with unopened corolla),  $\times 3$ ; C, anthers,  $\times 7\frac{1}{2}$ ; D, calyx opened to show pistil,  $\times 3$ ; E, calyces with immature capsules,  $\times 2\frac{1}{2}$ ; F, two capsules, one opened to show seeds,  $\times 2\frac{1}{2}$ ; G, seed,  $\times 10$ .

hairs; leaves short-petiolate, the blades narrowly ovate to obovate or oblong-elliptic, mostly 3–4 cm. long, obtuse at apex, cuneate or attenuate to the base, with scattered short spreading hairs on both surfaces along the costae and veins; flowers glomerate in the leaf axils; bracts resembling the leaves but smaller and narrower, about equalling or shorter than the calyces; calyx glabrous or sparsely strigillose, densely covered with cystoliths, the segments 12–15 mm. long, subulate-setaceous, ciliate, connate, at least at anthesis and usually in fruit, for one-quarter to one-third their length; corolla lavender, 2–2.8 cm. long, puberulent outside, the tube less than 1 cm. long, slender; capsule 10–12 mm. long, brown, containing 2–4 seeds.

**Dyschoriste quadrangularis** (Oerst.) Kuntze, Rev. Gen. 2: 486. 1891. *Calophanes quadrangularis* Oerst. Vid. Medd. Kjoebenhavn 1854: 120. 1855. *Tucuquita de agua* (Jutiapa).

Open grassy fields and hillsides, damp or dry, often rocky thickets, pine-oak forest, or sometimes a weed in waste ground, 800–1,800 m.; Chimaltenango; Guatemala; Jalapa; Jutiapa; Sacatepéquez; Santa Rosa. Southern Mexico; El Salvador; Honduras; Nicaragua; Costa Rica.

Plants decumbent, ascending, or erect, to 60 cm. tall, the stems simple or sparsely branched, quadrangular and with very narrowly wing-margined angles, densely short-pilose, at least on the angles; leaves short-petiolate, the blades ovate to oblong, mostly 3–10 cm. long, usually acute or even acuminate, sometimes with an obtuse tip, rather densely short-pilose or villosulous, or sometimes glabrate except on the veins, nearly entire or more or less repand-crenate; flowers densely cymose-glomerate in the leaf axils, numerous; bracts foliaceous, equalling or shorter than the calyx; calyx 9–14 mm. long, densely covered with cystoliths and appearing strigillose, the segments connate for about one-half their length, at least at anthesis and sometimes in fruit, subulate setaceous, puberulent, ciliate; corolla commonly pale purple or pinkish, rarely white, 7–12 (15) mm. long, pubescent outside; capsule glabrous, 8–11 mm. long, containing 4 whitish-pubescent seeds.

**Dyschoriste skutchii** Leonard, Journ. Wash. Acad. Sci. 33: 70. 1943.

Open, rather dry, grassy places, often in pine forest, sometimes in gravel along streams, 1,500–2,800 m.; Chimaltenango (type collected near Tecpám, *A. F. Skutch 474*); Huehuetenango; Jalapa; El Quiché. Mexico (Chiapas); Nicaragua.

Stems several, prostrate or ascending, to 35 cm. long, slender, simple or much branched, subterete, more or less puberulent with often recurved hairs; leaves short-petiolate, the blades obovate or spatulate, mostly 0.8–2 cm. long, obtuse or rounded at the apex, cuneate at the base, glabrous or sparsely hispidulous beneath on the costae, often ciliate toward the base; flowers glomerate in the upper leaf axils; bracts resembling the leaves but smaller; calyx 8–13 mm. long, glabrous or

sparsely hirtellous, the segments setaceous, hispidulous, ciliate, connate at anthesis for about one-fourth their length; corolla lavender or purple, 11–14 mm. long, puberulent outside, the narrow portion of the tube 4–5 mm. long, the limb 7–8 mm. broad, the short lobes rounded; capsule brown, glabrous, about 10 mm. long, containing 2–4 seeds.

These plants might be referred to any of several species described from Mexico, but we hesitate to make such a reduction at this time because the status of the Mexican species is so uncertain.

### ELYTRARIA Michaux

Low perennial herbs, acaulescent or with short, slender, simple or sparsely branched stems, the stems usually with clusters or rosettes of leaves at the apex; leaves alternate or subopposite, petiolate, the blades membranaceous, attenuate to the base, entire, often undulate; inflorescences spicate, the small flowers solitary and sessile in the axils of small imbricate bracts; spikes slender, cylindric, simple or branching; bracts rigid, oblong, elliptic, or lanceolate, imbricate, about equalling the flowers; bracteoles narrow, scarious, about equalling the calyx; calyx lobes 4, unequal in width, lanceolate or linear, acute to acuminate, scarious, the anterior one sometimes bidentate at the apex; corolla white, blue, pink, lavender, or white with purple, the tube slender, cylindric, the limb bilabiate, the lips narrow, the posterior one outermost in bud, emarginate or bilobate, the anterior lip trilobate, hoodlike at first; stamens 2, the short filaments inserted below the throat of the corolla, scarcely exerted; anthers dorsifixed near the base, the thecae equal, parallel, muticous or calcarate at the base; staminodes very minute or none; pollen 3-colpate, prolate; disc inconspicuous; style very shallowly bilobate at the apex; ovules 6–12 in each locule; capsule oblong-linear, more or less contracted and acute or rostrate at the apex; seeds minute, ovoid or globose, minutely tuberculate-rugose, borne on papilliform retinacula.

Species three or four, native in tropical America, one of them introduced into the Old World tropics.

Considerable disagreement exists as to whether or not *Elytraria*, together with other members of the Nelsonioidae, should be retained in the Acanthaceae, as they differ from typical members of the family principally in their well-developed endosperm, their minute seeds, as many as 12 in each locule, absence of retinacula, absence of cystoliths, and in their pollen morphology.

Bremekamp (Proc. Acad. Sci. Netherlands, Ser. C, 56: 533–546. 1953) transferred the Nelsonioidae to the Scrophulariaceae "in the vicinity of the Rhinanthae as a tribe Nelsonieae." Johri and Singh (Bot. Notiser 112: 225. 1959) concluded that the Nelsonioidae, although separated from the rest of the Acanthaceae, are not truly oriented toward the Scrophulariaceae. On the basis of pollen morphology, Raj (Grana Palynologica 3: 89, 92–93, 101. 1961)

thought that the transfer of the tribe to the Scrophulariaceae was justified. Burt (Bull. Bot. Surv. India 7: 77-78. 1965) rejected Bremekamp's transfer.

Perhaps creation of a separate family, first proposed by Lindley in 1847, would be the best solution, despite the recurving capsule valves that appear to have identified this group as acanthaceous; certainly other families in the Tubiflorae share more than one type of fruiting structure.

Plants acaulescent; bracts of inflorescence entire.....*E. bromoides*.

Plants usually caulescent; bracts of inflorescence each with a small tooth at apex and with 2 hyaline teeth or wings on upper margin.....*E. imbricata*.

**Elytraria bromoides** Oerst. Nat. For. Kjoebenhavn Medd. 115. 1854.

Open grasslands, 200 m. or lower; Petén. Western Texas; Mexico.

Plants small, acaulescent; leaves rosulate, short-petiolate, the blades spathulate, 3-15 cm. long and 1-2.5 cm. wide, obtuse or rounded at the apex, attenuate to the base, undulate, sparsely pilose with long slender hairs or almost wholly glabrous; peduncles very slender and wiry, 2-10 cm. long, solitary or several, densely bracteate, the bracts lance-subulate, 4-6 mm. long, ciliate; flowering spikes mostly 1-3 cm. long, the floral bracts closely imbricate, lanceolate, long-attenuate to subulate, as much as 10 mm. long and 2 mm. wide, glabrous outside, ciliate; calyx lobes lanceolate, the anterior one bilobate at the apex; corolla pale pink to lavender, 5-7 mm. long; capsule glabrous, 4-5 mm. long; seeds 8 or more.

**Elytraria imbricata** (Vahl) Pers. Syn. Pl. 1: 23. 1805. *Justicia imbricata* Vahl, Ecol. Amer. 1. 1796. *Verbena squamosa* Jacq. Pl. Hort. Schoenbr. 1: 3, t. 5. 1797. *Elytraria tridentata* Vahl, Enum. Pl. 1: 107. 1804. *E. frondosa* HBK. Nova Gen. & Sp. 2: 234. 1817. *E. scorpioides* Roem. & Schult. Syst. Veg. Mant. 1: 128. 1822. *Tubiflora squamosa* Kuntze, Rev. Gen. 2: 500. 1891. *Elytraria squamosa* Lindau, Anal. Inst. Fisco-Geogr. Costa Rica 8: 299. 1895. *Flor de mosquito* (Jutiapa).

Damp or dry thickets, open or shaded banks, ravines, roadsides, waste places, 75-1,800 m.; Alta Verapaz; Baja Verapaz; Chimaltenango; Escuintla; Guatemala; Huehuetenango; Jutiapa; Petén; El Quiché; Retalhuleu; Sacatepéquez; Santa Rosa; Suchitupéquez; Zacapa. Texas; Mexico; British Honduras to El Salvador and Panama; West Indies; South America; introduced into Old World tropics.



FIG. 81. *Elytraria imbricata*. A, habit,  $\times \frac{1}{2}$ ; B, flowering spike, showing cauline bracts and bracts of inflorescence,  $\times 4$ ; C, bract,  $\times 8$ ; D, calyx,  $\times 10$ ; E, corolla opened to show stamens and pistil,  $\times 10$ ; F, capsules,  $\times 5$ ; G, seeds,  $\times 15$ .

Perennials, usually with a slender stem 2–10 cm. long (rarely 15 or 20 cm. long), naked, leaves and flowering spikes usually borne at the apex; leaves petiolate, ovate to oblong or obovate, mostly 3–15 cm. long, commonly acute or acuminate, long-attenuate to the base and narrowly long-decurrent on the petiole, sparsely appressed-pilose or almost glabrous, the margins often undulate; peduncles few or numerous, 2–15 cm. long, slender, wiry, covered with imbricate, closely appressed, coriaceous, ovate to subulate bracts; spikes of inflorescence mostly 2–6 cm. long; bracts oblong or elliptic, sometimes lanceolate, 3–6 mm. long, mucronate, and bearing near the apex 2 hyaline teeth or wings, these narrow or broad; bracteoles subulate, about 3 mm. long, costate, the costae long-ciliate; corolla light blue to pale purple, 3–6 mm. long; capsule oblong, glabrous, about 3 mm. long, containing 8, 12, or more seeds.

This is one of the most common weeds of waste ground in the Central American lowlands. Dr. Standley has noted, in manuscript, that such names as *coquito*, *guacoco*, *cacahuillo*, and *culantrillo*, used in different regions, are given because the little plants topped with clusters of spreading leaves are somewhat suggestive of coconut palms.

### HABRACANTHUS Nees

Plants erect or ascending, herbaceous or suffrutescent, usually glabrous or nearly so; leaves petiolate, the blades entire, thin; inflorescences cymose, lax, the cymes arranged in many-flowered, usually terminal thyrses; bracts small, linear, the bracteoles minute or none; calyx segments 5, linear, subequal, acute; corolla tube cylindrical, straight or arcuate, the lower portion narrow, a little ampliate above or abruptly enlarged above, the limb deeply bilabiate, the lips subequal, the posterior lip innermost in bud, erect or incurved, narrow, entire, the anterior one usually more or less spreading, shallowly trilobate at the apex; stamens 2, anterior, exerted or equalling the corolla; anthers normally monotheous, oblong-linear, dorsifixed at or below the middle, mucous; staminodes none; pollen 2-porate, bilateral, subspheroidal, the sexine granular to verrucose; disc thickened but inconspicuous; style filiform, obtuse and minutely bilobate at the apex; ovules 2 in each locule; capsule oblong, contracted and stipiform at the base; seeds 4 or by abortion fewer, suborbicular, flat, more or less rugose.

Four species are found in Central America; three are in Guatemala and a fourth, *H. silvaticus* Nees, may be expected there and is therefore included here. Thirty-four species have been reported from northern South America.

Corollas red, 2.5–3 cm. long.....*H. ruberrimus*.

Corollas white, blue, or lavender, 1–2 cm. long.

Posterior corolla lip narrowly linear, 8–10 mm. long.

Leaves sparsely pubescent, the margins ciliate; anterior corolla lip 5–7 mm. wide; anthers 3 mm. long.....*H. latilabris*.

Leaves essentially glabrous, the margins not ciliate; anterior corolla lip 2-4 mm. wide; anthers 1.5-2 mm. long.....*H. silvaticus*.

Posterior corolla lip narrowly ovate, 5-6 mm. long.....*H. azureus*.

**Habracanthus azureus** D. Gibson, *Fieldiana: Botany* 34: 59. 1973.

Wet mountain forest, 1,500-2,400 m.; Alta Verapaz; San Marcos (type from west facing slopes of the Sierra Madre mountains near Aldea Fraternidad, *Williams, Molina and Williams 25808*).

Herbaceous plants to 2 m. tall, simple or branching, the stems bifuriously pubescent to pilose; leaves on pubescent petioles, the blades thin, lance-oblong, ovate-oblong, or elliptic, mostly 6-15 cm. long, 2.5-8 cm. wide, acuminate, usually contracted at the base and more or less decurrent on the petioles, more or less pubescent on both surfaces with segmented hairs, usually more densely so on costae and veins, the margins ciliate; inflorescences usually terminal, paniculate, 5-25 cm. long, much branched, the rachis glabrous, the flowers sessile or borne on short, usually glabrous pedicels about 1 mm. long; bracts subulate, 1-2 mm. long; calyx segments linear, 6-10 mm. long at anthesis, to 15 mm. in fruit, usually glabrous, rarely glandular-pubescent; corolla about 2 cm. long, blue, blue-purple, or white, glabrous, the narrow portion of the tube 3-4 mm. long, the expanded throat about 6 mm. wide, the lips subequal, the posterior lip 5-6 mm. long, the lobes of the anterior lip 1-1.5 mm. long; stamens long-exserted, the anthers about 3 mm. long; capsule 12-15 mm. long, glabrous, containing 4 verrucose seeds.

Both glabrous and glandular-pubescent calyces are sometimes borne on the same inflorescence; when a calyx is pubescent, the pedicel is usually pubescent as well. Aborted (or cleistogamous?) flowers are present on all specimens examined.

**Habracanthus latilabris** D. Gibson, *Fieldiana: Botany* 34: 60. 1973.

Mixed forest, 1,640 m., El Quiché, Cerro Putul (*Skutch 1836*, type).

Suffruticose, branching plants, about 1 m. tall, the stems more or less pubescent; leaves short-petiolate, the blades entire, oblong-ovate or lanceolate, acuminate, rounded and abruptly attenuate to the petiole or somewhat auriculate at the base, mostly 6-8 cm. long, 2-4 cm. wide, sparsely pubescent with scattered hairs on both surfaces, the cystoliths inconspicuous, margins ciliate; inflorescences axillary and terminal, thyrsiform-paniculate, 7-15 cm. long, 3-6 cm. wide, glabrous, the branches purplish, the pedicels commonly 5-7 mm. long; bracts and bracteoles subulate, 0.5-1 mm. long; calyx 4-6 mm. long, the lobes linear-acuminate; corolla white, 13-15 mm. long, the tube 1-2 mm. in diameter, about 4 mm. long, the posterior lip narrowly linear, 8-9 mm. long, the anterior one 5-7 mm. wide, shallowly trilobate at the apex; stamens exserted, the anthers about 3 mm. long; style filiform, exserted; capsule unknown.

**Habracanthus ruberrimus** D. Gibson, *Fieldiana: Botany* 34: 62. 1973.

Mixed forest between Chamá and Cobán, 460 m., Alta Verapaz (*Harry Johnson 491*, type).

Suffruticose, branching plants to 1.5 m. tall, the stems glabrous or bifariously pubescent; leaves short-petiolate, the blades lanceolate to elliptic, acuminate, acute or attenuate to the base, mostly 5–12 cm. long, 1.5–5 cm. wide, glabrous, or the younger leaves sometimes with appressed pubescence on costae and veins; inflorescences terminal, glabrous, commonly 5–10 cm. long, 1.5–5 cm. wide; bracts and bracteoles subulate, 1–2 mm. long; calyx 3.5–5 mm. long, the lobes narrowly linear-acuminate; corolla bright red, 2.5–3 cm. long, the tube about 1.5 mm. in diameter below, 2–3 mm. above, lips 1.5–2 cm. long, the upper one narrowly linear to oblong, the lower one 3–4 mm. wide, shallowly trilobate at the apex; stamens exserted, anthers about 3 mm. long; style filiform, exserted; capsule unknown.

Although most anthers are monothealous, a few are bithealous. When this occurs, the lower theca is always much smaller, but not always sterile.

**Habracanthus silvaticus** Nees in DC. *Prodr.* 11: 312. 1847.

Not in Guatemala but may be expected there. Mexico (Oaxaca and Chiapas); Costa Rica, 1,000–1,800 m.

Erect but weak herbs, sometimes suffrutescent below, usually not more than a meter tall, branched, the stems glabrous or puberulent; leaves on slender petioles, the blades oblong-ovate to lanceolate, mostly 5–12 cm. long, 1.5–6 cm. wide, acuminate with an obtuse tip, acute or attenuate to the base, glabrous, or sometimes pubescent beneath with small curved hairs on the costae and veins, both surfaces usually with minute cystoliths; inflorescences mostly 5–10 cm. long and 4–5 cm. broad, lax, many-flowered, glabrous or nearly so, the branches whitish or purplish; bracts subulate, the lowest 3–4 mm. long, the pedicels commonly 3–5 mm. long; calyx lobes usually pale, 3–5 mm. long; corolla 10–15 mm. long, white, bluish, or lavender, the tube about 1 mm. in diameter below, 1.5 mm. broad in the throat, the lips about 10 mm. long, the upper one narrowly linear to oblong, the lower one 2–4 mm. wide, rounded at the apex and shallowly trilobate; stamens exserted, the anthers 1.5–2 mm. long; capsule 10–15 mm. long; seeds whitish, tuberculate-rugose.

## HANSTEINIA Oersted

Herbaceous or sometimes suffrutescent plants, erect or ascending, often weak and brittle, glandular-pubescent or essentially glabrous; lower leaves petiolate, the upper ones subtending the inflorescences usually sessile, the blades thin and flaccid, entire; inflorescences usually terminal, lax, paniculate, the panicles pyramidal or thyriform; bracts small, the bracteoles minute or none; calyx accrescent, the 5 segments linear or nearly so; corolla more or less saccate, the tube narrow





FIG. 82. *Habracanthus ruberrimus*. A, habit,  $\times \frac{1}{2}$ ; B, flower with calyx, style, and stamens,  $\times 2\frac{1}{2}$ ; C, corolla tube opened to show ovary and filament attachment,  $\times 2\frac{1}{2}$ ; D, apex of style enlarged to show stigma,  $\times 5$ ; E, anthers,  $\times 6$ .

at the base, abruptly expanded into an oblong or barrel-shaped throat, slightly contracted below the limb, the lips short, the posterior one innermost in bud, erect, entire or minutely fimbriate, the anterior lip very shallowly trifid and appearing almost truncate; stamens 2, exserted, the filaments inserted near the base of the corolla throat; anthers commonly monotheous (very rarely bitheous but then the lower one always much smaller), linear, dorsifixed near the middle; staminodes none; pollen 2-porate, bilateral, spheroidal, the sexine verrucose; disc short, thick; style filiform, the stigma appearing entire but actually minutely bifid; ovules 2 in each locule; capsule oblong, contracted and stipiform at the base; seeds 4 or by abortion fewer, lenticular, compressed, foveolate-rugose, on long retinacula.

Five species, three in Mexico and Central America and two others in South America; only two are known in Guatemala.

Peduncles and rachis of inflorescence usually densely glandular-pilose (rarely only viscid); mature corollas 4-5 (6) mm. wide in throat. . . . . *H. monolopha*.

Peduncles and rachis of inflorescence glabrous; mature corollas 7-10 mm. wide in throat. . . . . *H. glabra*.

**Hansteinia glabra** (Leonard) D. Gibson, *Fieldiana: Botany* 34: 62. 1973. *Glockeria glabra* Leonard ex Lundell, *Contr. Univ. Mich. Herb.* 6: 60, f. 4. 1941.

Quezaltenango, 2,666 m. (*Vaght 301*). Mexico (Chiapas, *Matuda S-212*, type).

Herbaceous plants, the stems glabrous; leaves petiolate, the blades thin, ovate to elliptic, mostly 6-12 cm. long, 3.5-6 cm. wide, acuminate, narrowed at the base and decurrent on the petiole, glabrous or sparsely pubescent; inflorescences usually terminal, thyriform, commonly 10-15 cm. long, the rachis glabrous; bracts subulate, 1.5-3 mm. long; calyx 5-8 mm. long, glabrous, the segments linear; corolla red and yellow, 2-2.5 mm. long, glabrous or nearly so; the narrow lower part of the tube 3-4 mm. long, the expanded portion above 7-10 mm. wide, the posterior lip erect, ovate, about 3.5 mm. long, the anterior one shallowly trilobate; stamens exserted, the anthers 3-3.5 mm. long; ovary glabrous; capsule unknown.

**Hansteinia monolopha** (Donn.-Sm.) D. Gibson, *Fieldiana: Botany* 34: 62. 1973. *Glockeria monolopha* Donn.-Sm. *Bot. Gaz.* 27: 439. 1899. *G. moralesii* Standley, *Field Mus. Bot.* 8: 47. 1930 (type from San Martin Jilotepeque, Chimaltenango, *J. Morales R. 1235*).

Damp or wet, mixed forest or thickets, 1,500-2,700 m.; Alta Verapaz; Chimaltenango; Escuintla; Quezaltenango; Sacatepéquez; San Marcos. Mexico (Chiapas); Costa Rica.

Erect or ascending, weak, usually brittle herbs, 1-2.5 m. tall, usually densely glandular-pilose on the stems, petioles, and inflorescences, viscid; lower leaves on slender petioles, the blades thin, ovate or oblong-ovate, mostly 10-20 cm. long, 5-12 cm. wide, acuminate, usually abruptly contracted and decurrent at the base, sparsely villous on both surfaces or glabrate; inflorescences paniculate, often as much as 30 cm. long, much branched, the peduncles, rachis, and pedicels usually



FIG. 83. *Hansteinia monolopha*. A, habit,  $\times \frac{1}{2}$ ; B, detail of inflorescence showing flower,  $\times 4$ , with inset (greatly enlarged) of glandular hairs of calyx; C, corolla dissected to show stamens and pistil,  $\times 4$ ; D, calyx with capsule beginning to open,  $\times 3$ ; E, calyx with opened capsule showing retinacula,  $\times 3$ ; F, seed,  $\times 10$ .

densely glandular-pilose (rarely only viscid); the flowers on slender pedicels; bracts subulate, 2-3 mm. long; calyx usually densely glandular-pilose, the segments linear, 5-7 mm. long at anthesis, often to 10 mm. long in fruit; corolla red and yellow, glabrous outside, the narrow portion of the tube about 1.5 mm. broad, 3-5 mm. long, the throat 4-5 (6) mm. broad, 10-15 mm. long, the posterior lip about 3 mm. long; stamens exserted, often far beyond the lips, the anthers about 3 mm. long; capsule 10-13 mm. long, glabrous.

### HEMIGRAPHIS Nees

Erect or ascending, rarely creeping perennial herbs, more or less pubescent; leaves opposite, the blades usually undulate or crenate, sometimes entire; inflorescences terminal or axillary, spicate, with flowers in the axils of opposite, imbricate bracts; calyx segments 5, subequal; corolla tube straight or slightly curved, the limb spreading, the 5 lobes contorted in bud; stamens 4, didynamous, the filaments connected at the base, inserted at or below the corolla throat, the anthers bithecos, muticous; staminodes none; ovules 4-6 in each locule; stigma bilobate, the lower lobe often inconspicuous; capsule fusiform, seminiferous from the base, containing 6-12 flat, pubescent seeds.

The genus is Asiatic, occasionally planted in gardens in Mexico and in Honduras, sometimes escaping.

**Hemigraphis alternata** (Burm. f.) T. Anders, Journ. Linn. Soc. 7: 114. 1864. *Ruellia alternata* Burm. f., Fl. Indica 135. 1768. *Ruellia colorata* Blume, Bijdr. Fl. Nederl. Ind. 795. 1826. *Hemigraphis colorata* Hallier, Nova Acta Leopoldina, Abh. Deutsche Akad. Naturforscher 70: 204. 1898. *Blechum cordatum* Leonard, Carnegie Inst. Wash. Publ. 461: 200. 1936 (type from British Honduras, *Bartlett 11355*).

Ascending or creeping herbs, the stems pilosulous, rooting at the lower nodes; leaves on petioles 1-5 cm. long, the blades mostly 3-6 cm. long, 2-5 cm. wide, broadly ovate to ovate-oblong, acute or obtuse, cordate at base, densely puberulent, sparingly pilosulous or glabrate, the margins crenate; inflorescences terminal, spicate, 2-3 (10) cm. long, dense or lax; bracts ovate-lanceolate, obtuse, 0.8-1.5 cm. long; bracteoles minute or absent; calyx 7-10 mm. long, the segments subulate, ciliate; corolla white, about 1.5 cm. long; capsule not seen.

Native of Malaysia, and no doubt an escape in British Honduras, the type locality of *Blechum cordatum* Leonard.

### HENRYA Nees

*Reference*: George B. Happ, *Henrya*, Ann. Mo. Bot. Gard. 24: 541-568. 1937.

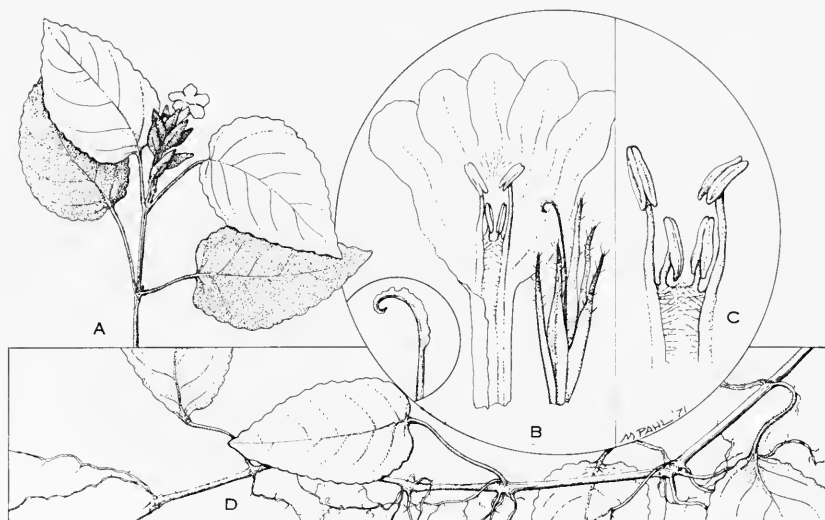


FIG. 84. *Hemigraphis alternata*. A, habit,  $\times 1$ ; B, flower with corolla separated from calyx and opened to show stamens,  $\times 6$  (inset shows part of style and stigma, greatly enlarged); C, stamens,  $\times 12$ ; D, section of lower stem, rooting at the nodes,  $\times 1$ .

Herbaceous or sometimes suffrutescent perennials, more or less pubescent, often with gland-tipped hairs, the stems tetragonous or subterete, with pale, often exfoliating epidermis; leaves opposite, entire, petiolate, often deciduous; inflorescences terminal and axillary, spicate, usually dense; cauline bracts solitary, usually lance-ovate to linear, sometimes ovate or oblanceolate; flowers sessile or short-pedicellate, subtended by involucrel bracts, the bracts coalescent on the posterior side from the base almost to the apex and closely investing the capsule, green, mucronate; calyx lobes 5, lance-ovate to filiform, pubescent or glabrous; corolla tubular-funnelform, bilabiate, the tube straight or slightly curved, the anterior lip trilobate, the posterior lip shallowly bilobate or entire; stamens 2, equalling the corolla or slightly exserted; anthers bitheous, almost parallel, one theca longer than the other, oblong, mucous; pollen 4-porate, ellipsoidal; style filiform; ovary narrowly obovate, containing 2 ovules; capsule obovate or oblong, apiculate, constricted from base to about one-half its total length and appearing stipitate, glabrous or pubescent; seeds 2, disciform, tuberculate, hispid to hispidulous on one surface, glabrous on the other.

The position of the mucro on the involucrel bracts was considered by Happ to be an important character in determining specific differences. He recognized 20 species, 12 of which he described as new. All Central American species of this genus are very closely related; it seems probable that the true number of recognizable species is considerably smaller and that some of those described are only growth forms of *H. scorpioides* Nees.

Involucral bracts glabrous to minutely puberulent. . . . . *H. puberula*.

Involucral bracts densely glandular-pilosulous.

Cauline bracts of the inflorescence mostly longer and wider than the involucral bracts. . . . . *H. gualanensis*.

Cauline bracts of the inflorescence conspicuously shorter than the involucral bracts.

Involucral bracts 9–11 mm. long; cauline bracts mostly 5–8 mm. long.  
*H. imbricans*.

Involucral bracts 7–8 (9) mm. long; cauline bracts 2–3 (4) mm. long.  
*H. scorpioides*.

**Henrya gualanensis** (Robins. & Bartl.) Happ, Ann. Mo. Bot. Gard. 24: 553. 1937. *Tetramerium gualanense* Robins & Bartl. Proc. Amer. Acad. 43: 58. 1907.

Known only from the type, Zacapa, Gualán, 130 m., *C. C. Deam 397*.

Plants about a meter tall, branched, the young stems glandular-pilose; leaves petiolate, the blades broadly ovate to elliptic, to 9 cm. long and 4 cm. wide, abruptly acuminate, obtuse or rounded and abruptly decurrent at the base, glandular-pilosulous at first, becoming glabrate or inconspicuously appressed-pilose; inflorescences 1.5–5 cm. long, terminal and axillary; cauline bracts ovate to oblanceolate, 8–12 mm. long, 3–7 mm. wide, usually equalling or exceeding the involucral bracts, venose, mucronulate; involucral bracts oblanceolate, 9–10 mm. long, glandular-pilosulous; calyx segments lance-linear, 1.5 mm. long; corolla white, 13 mm. long; capsule 6 mm. long; seeds 2.5 mm. in diameter.

**Henrya imbricans** Donn.-Sm. Bot. Gaz. 16: 198. 1891. *H. longipes* Happ, Ann. Mo. Bot. Gard. 24: 549. 1937.

Dry thickets and open, rocky slopes, 1,100–1,300 m.; Chimaltenango; Guatemala (type from Lago de Amatitlán, *Donn.-Sm. 1923*); Sololá. Mexico (Chiapas); El Salvador.

Herbaceous or somewhat suffrutescent plants, often brittle, 0.3–1 m. tall, usually much branched, the young stems pilosulous with gland-tipped and eglandular hairs; leaves petiolate, the blades 2–8 cm. long, ovate to ovate-lanceolate, acuminate to long-acuminate, rounded or acute at the base, sometimes decurrent on the petiole, pubescent on both surfaces, often densely so beneath; inflorescences 2–10 (12) cm. long, very densely-flowered or interrupted, terminal or lateral; cauline bracts oblanceolate, 5–8 mm. long, the mucro 0.2–0.3 mm. long, often divergent; involucral bracts oblanceolate, 9–11 mm. long, densely glandular-pilosulous or glandular-puberulent; calyx lobes lanceolate, 1–2 mm. long, hispidulous; corolla cream-colored, 11–13 mm. long; capsule 6–7 mm. long, glabrous.

The single collection from Chimaltenango, *J. R. Johnston 1160*, is atypical, as some cauline bracts of the inflorescence are only 3 mm. long, as in *H. scorpioides*, while others are 6 mm. long. Perhaps this is an indication that *H. imbricans* is only a form of *H. scorpioides*.



FIG. 85. *Henrya imbricans*. A, habit,  $\times \frac{1}{2}$ ; B, involucre bracts opened to show calyx and ovary,  $\times 4$ ; C, involucre bracts subtended by cauline bract,  $\times 4$ ; D, corolla with stamens,  $\times 4$ ; E, detail of inflorescence showing bracts investing opened capsule,  $\times 2\frac{1}{2}$ ; F, opened capsule showing retinacula and seeds,  $\times 3$ ; G, two views of seed showing hispid and papillate surfaces,  $\times 3\frac{1}{2}$ .

**Henrya puberula** Happ, Ann. Mo. Bot. Gard. 24: 559. 1937. *Tiramachete* (Guatemala).

Dry, brushy slopes, 120–1,200 m., Guatemala (type from Amatitlán, *Morales R. 911*); Retalhuleu. Mexico (Chiapas).

Herbaceous or suffrutescent perennials to 1 m. tall, with pale branches, the young stems finely glandular-puberulent; leaves petiolate, the blades ovate or lanceolate, 2–7.5 cm. long, 0.8–3.5 cm. wide, acuminate at apex, usually acute at base, often oblique, sometimes rounded, puberulent or glabrate; spikes of inflorescence terminal and axillary, 2–9 cm. long, dense or interrupted; cauline bracts linear-lanceolate, 3–5 mm. long, minutely glandular-puberulent; involucre bracts oblanceolate, 6–10 mm. long, very minutely puberulent or almost glabrous; calyx segments lance-linear, 1.5 mm. long; corolla 9–10 mm. long, cream-colored; capsule 5–6 mm. long, glabrous; seeds 2–2.3 mm. long.

Perhaps only a form or variety of *H. scorpioides* Nees.

**Henrya scorpioides** Nees in DC. Prodr. 11: 491. 1847. *Tetramerium scorpioides* Hemsl. Biol. Centr. Amer. Bot. 2: 526. 1882. *H. scorpioides* var. *latifolia* Happ, *op. cit.* 556. *H. donnell-smithii* Happ, *op. cit.* 563 (type from Santa Rosa, *Heyde & Lux 4559*).

At 700–1,200 m., Guatemala; Santa Rosa. Mexico; Honduras; El Salvador; Nicaragua.

Erect, herbaceous to suffrutescent plants, 0.3–1 m. tall, branching, the young branches glandular-pilosulous; leaves petiolate, the blades ovate to nearly lanceolate, 1.5–7 cm. long, 1–4 cm. wide, acuminate or acute, obtuse or acute at the base, often oblique and sometimes decurrent, more or less pilosulous at first with gland-tipped and eglandular hairs, in age often glabrate; inflorescences 2–10 cm. long; cauline bracts lanceolate to linear-lanceolate, 2–3 (4) mm. long; involucre bracts oblanceolate, 7–9 mm. long, glandular-pilosulous, the mucro slightly back of the apical margin, sometimes divergent; calyx segments usually less than 1 mm. long; corolla pale yellow to cream-colored, 10–15 mm. long; capsule 4.5–7 mm. long, about 2 mm. broad, glabrous or puberulent near the apex; seeds about 2 mm. in diameter.

Plants of this species occasionally produce very broad leaves, but as this broad-leaved form also occurs in some specimens of *H. imbricans* Donn.-Sm., it probably does not deserve varietal status.

## HYGROPHILA R. Brown

*Reference*: G. Lindau, *Hygrophila*, in Urban, Symb. Ant. 2: 182–185. 1900; C. G. Nees ab Esenbeck in DC. Prodr. 11: 85–92. 1847.

Erect or diffuse herbs, growing in wet soil, glabrous or villous; leaves opposite, entire; inflorescences axillary, sessile, fasciculate, usually many-flowered; bracts



narrow, foliaceous but considerably smaller than the leaves, the bracteoles small, linear-subulate; calyx accrescent, the 5 lobes narrowly linear-acuminate, subequal, more or less connate below the middle; corolla tube little ampliate, the limb bilabiate, the posterior lip erect, concave, bidentate or shallowly bilobate, the anterior lip erect-spreading, trilobate at the apex; stamens 4, didynamous, or 2 fertile stamens and 2 staminodes, the filaments somewhat dilated at the base and connate by pairs; anthers oblong, bitheous, the thecae parallel, equal, mucous or minutely calcarate at the base; pollen 3-4 colpate, prolate spheroidal or subprolate spheroidal; disc inconspicuous; style linear at the apex, recurved, the posterior lobe reduced to a minute tooth; ovules usually 4-8 in each locule, rarely 2, sometimes 18; capsule oblong-linear, not stipitate, bilocular from the base; seeds 4-36, compressed, oblique-ovate or orbicular; the retinacula short, acute.

Perhaps 80 species in the tropics of America, Africa, and Asia. Only the following are known from Central America.

Leaves ovate-lanceolate, mostly 3-5 cm. wide, often rather abruptly contracted at the base and narrowly long-decurrent on the petiole; lateral veins ascending at an angle of 45-60 degrees; calyx 6-8 mm. long at anthesis, 9-13 mm. long in fruit. . . . . *H. costata*.

Leaves narrowly lanceolate or linear-lanceolate, mostly 0.5-1.5 cm. wide, gradually attenuate to the short petiole; lateral veins ascending at an angle of about 30 degrees; calyx 4-5 mm. long at anthesis, 7-10 mm. long in fruit.

*H. guianensis*.

***Hygrophila costata*** Nees, Pl. Hort. Med. Bonn. 2: 7, t. 3, 1824 and in DC. Prodr. 11: 88. 1847. *Ruellia brasiliensis* Spreng. Syst. Veg. 2: 822. 1825. *H. brasiliensis* Lindau in Urban, Symb. Ant. 2: 183. 1900.

Wet thickets or swamps, 75-1,000 m.; Escuintla; Izabal; Retalhuleu; Suchitupéquez. Southern Mexico; Nicaragua; Costa Rica; Cuba; South America.

Plants usually erect, branched, to about a meter tall, or the stems sometimes decumbent and rooting at the lower nodes, tetragonal, more or less pubescent when young but soon glabrate; leaves short-petiolate or the smaller, upper ones sessile or nearly so, the blades thin, ovate-lanceolate or oblong-lanceolate, as much as 20 cm. long and 7 cm. wide, but usually little more than half as large, acuminate or long-acuminate, usually abruptly contracted at the base and long-decurrent on the petiole, glabrous above, pubescent on the veins beneath, the cystoliths rather conspicuous on both surfaces; flowers crowded and sessile in the leaf axils, the bracts foliaceous, linear-lanceolate to lanceolate, commonly 5-10 mm. long, the bracteoles small, subulate, pilosulous or glabrate; calyx 6-8 mm. long at anthesis, in fruit as much as 13 mm. long, about 1 mm. wide, pilosulous or glabrate; corolla white, sometimes spotted with purple, puberulent outside, 7-8 mm. long, the lips 2-3 mm. long; anthers about 1 mm. long; capsule sessile, acute, glabrous, 9-14 mm. long, about 2 mm. broad, usually containing 14-18 seeds.



FIG. 86. *Hygrophila costata*. A, habit,  $\times \frac{1}{2}$ ; B, detail of inflorescence with bracts, calyces, and capsules,  $\times 1\frac{1}{2}$ ; C, flower,  $\times 4$ ; D, bracts, calyx, and pistil,  $\times 4$ ; E, corolla opened to show stamens,  $\times 7\frac{1}{2}$ ; F, detail of stamens,  $\times 15$ ; G, fruiting calyx with opened capsule,  $\times 3$ ; H, seed, greatly enlarged.

**Hygrophila guianensis** Nees, Lond. Journ. Bot. 4: 634. 1845.

*H. conferta* Nees in Mart. Fl. Bras. 9: 21. 1847.

Wet soil along the margins of streams, in marshes, mixed forest or rarely on open wet hillsides, 120–1,400 m.; Alta Verapaz; El Quiché; Quezaltenango; Retalhuleu; Suchitepéquez. Southern Mexico; British Honduras to Panama; South America.

Plants erect or decumbent, to 80 cm. tall, the stems simple or branched, pubescent when young but soon glabrate; leaves short-petiolate or sessile, the blades lanceolate, oblong-lanceolate, or linear-lanceolate, mostly 4–12 cm. long, 0.5–1.5 cm. wide, acute or acuminate, attenuate to the base, glabrous above, the cystoliths numerous, hispidulous on the veins beneath or almost glabrous; flowers sessile and densely crowded in the leaf axils, the bracts linear, commonly 5–8 mm. long, the bracteoles much smaller, variable in length but shorter than the calyx, pilosulous; calyx 4–5 mm. long at anthesis, 7–10 mm. long in fruit, usually pilosulous; corolla usually white, rarely pink, puberulent outside, 5–7 mm. long, the lips 2–3 mm. long; anthers about 0.5 mm. long; capsule 7–11 (12) mm. long, about 2 mm. broad, sessile, acute, glabrous, containing 14–18 seeds.

## JUSTICIA L.

Usually erect herbs or shrubs, sometimes procumbent or ascending, pubescent or glabrous; leaves opposite, usually entire, rarely crenate or crenulate; inflorescences terminal or axillary, various, the flowers sessile or pedicellate, solitary, fasciculate, or cymose in the axils of bracts, often disposed in spikes, these sometimes becoming headlike, thyriform, or narrowly paniculate; bracts and bracteoles various; calyx deeply lobate, the 4–5 segments usually narrow and subequal; corolla often red, purple, lavender, or white, sometimes yellow or orange, the tube often narrow and elongating, straight or incurved, sometimes ampliate, the limb bilabiate, the posterior lip innermost in bud, usually narrow, erect or incurved, sometimes concave, entire, bifid, or shallowly bilobate, the anterior lip broader, more or less spreading or recurved, shallowly or deeply trilobate; stamens 2, the filaments usually inserted near or above the middle of the tube, filiform or slightly dilated at the base; anthers bithecous, thecae usually oblong or linear, sometimes curved or reniform, discrete, superposed, or nearly parallel on the connective, mucous, acute, or one or both calcarate at the base; staminodes none; pollen grains usually 2-porate, isopolar and bilateral, ellipsoidal to prolate, sometimes 3-porate and trigonous, rarely 4-porate, the trema area provided with one or more rows of insulae; disc annular, cupular, or cyathiform, entire or sinuately lobate; style filiform, usually minutely bilobate at the apex, sometimes appearing entire and obtuse; ovules 2 in each locule; capsule oblong, ovoid, or obovoid, thick or compressed, contracted and solid below, appearing stipiform; seeds 4 or by abortion fewer, usually compressed and lenticular, sometimes subglobose or ovate, smooth or variously rugose, the retinacula acute or truncate.

More than 300 species, widely distributed in both hemispheres, mostly in the tropics.

The problems of generic synonymy of *Justicia*, as they apply to those species of the North American tropics, are discussed in my paper, "Studies in American Plants III," in *Fieldiana: Botany* 34: 64. 1973.

The following seven species previously reported from Guatemala or British Honduras have been omitted:

*Justicia albibracteata* Leonard, Carn. Inst. Wash. Publ. 461: 230. 1936. Type from British Honduras, *Schipp* 1277. As this plant is known only from the type collection, a fruiting specimen with no flowers, the material is insufficient to allow correct interpretation or description.

*Justicia alsophila* Standley & Leonard, Field Mus. Bot. 23: 242, f. 3. 1947. Known only from the type, *Steyermark* 48884, and paratype, *Steyermark* 48705, from Huehuetenango, 1,500 m. As both collections are sterile, the material is insufficient for correct interpretation or description. In general appearance the plants resemble *J. multicaulis* Donn.-Sm.

*Justicia sessilis* Jacq. Enum. Pl. Carib. 11. 1760. Type from the West Indies; collected in Yucatan and in Jutiapa, Guatemala=*Siphonoglossa ramosa* Oerst.

The following names were published from Guatemala in this genus by Bertoloni. Probably all the plants were collected along the old road between Escuintla and Antigua where most of Velásquez' plants seem to have been obtained, the most natural route for a collecting excursion for one living in Escuintla. Bertoloni's descriptions are ample and doubtless accurate, but it is unsafe to place the names without examination of the type specimens which were preserved in Italy. Unfortunately, the Bertoloni herbarium in Bologna is not available for study. While Nees, in DeCandolle's *Prodromus*, did attempt to place the species, he had not seen the specimens and his treatment of them is not satisfactory.

*Justicia barbata* Bertol. Fl. Guat. 405. 1840. *Rhytiglossa barbata* Nees in DC. Prodr. 11: 355. 1847. Type from Antigua, Velásquez. This may well be a true *Justicia*; the description suggests *J. breviflora*.

*Justicia corymbulosa* Bertol. Fl. Guat. 404. 1840. *Rhytiglossa corymbulosa* Nees in DC. Prodr. 11: 355. 1847. Type from Escuintla, Velásquez=*Odontonema callistachyum* (Schlecht. & Cham.) Kuntze. Rev. Gen. 2: 494. 1891.

*Justicia rostrata* Bertol. Fl. Guat. 406. 1840. *Sarotheca rostrata* Nees in DC. Prodr. 11: 383. 1847. Type from Escuintla, *Velásquez*. [= *Ruellia*?]

*Justicia velasquezii* ("Vellasquezii") Bertol. Fl. Guat. 406. 1840. *Adhatoda velasquezii* Nees in DC. Prodr. 11: 409. 1847. Type from Guatemala, the locality not indicated, *Velásquez*. Local name, "flor amarilla." Possibly synonymous with *J. aurea* Schlecht.

Inflorescences composed of one, two, or several long-pedicellate flowers in an umbelliform arrangement, the axis of the inflorescence parallel to the petioles of the subtending leaves. . . . . *J. pedicellata*.

Inflorescences not as above.

Leaves linear to lance-linear, never more than 4 mm. wide. . . . . *J. lindeniana*.

Leaves not as above.

Calyx segments 4.

Corollas yellow, densely long-pilose outside. . . . . *J. sulfurea*.

Corollas never yellow, glabrous or pubescent but not pilose outside.

Bracts of inflorescence long-hirsute and glandular-pilose, 10-15 mm. long. . . . . *J. clinopodium*.

Bracts of inflorescence neither long-hirsute nor glandular-pilose, 3-8 mm. long.

Calyx segments commonly 13-14 mm. long (rarely only 10 mm.).

*J. inaequalis*.

Calyx segments 3-10 mm. long.

Leaves glabrous or nearly so.

Spikes of inflorescence forming panicles 2-6 cm. long; corollas about 3 cm. long; the lower theca calcarate. . . . . *J. eburnea*.

Spikes of inflorescence elongating, 5-25 cm. long, never forming panicles; corollas less than 2.5 cm. long; thecae mucicous.

*J. breviflora*.

Leaves pilose or pubescent.

Plants herbaceous; leaves mostly 3-5 cm. long; corollas red; capsules densely pilosulous. . . . . *J. pringlei*.

Plants shrubby; leaves mostly 6-12 cm. long; corollas white; capsules glabrous. . . . . *J. pilifera*.

Calyx segments 5.

Inflorescences on peduncles 12-16 cm. long; anthers 4-5 mm. long.

*J. ensiflora*.

Inflorescences not as above (if pedunculate, these always less than 12 cm. long); anthers not more than 3 mm. long.

Corollas 1.5 cm. long or shorter.

Corollas only about 2 mm. long. . . . . *J. reptans*.

Corollas 4-15 mm. long.

Flowering spikes mostly simple, the flowers never appearing fasciculate; if spikes branching, never verticillate nor paniculate.

Inflorescences mostly terminal; calyces 2-4 mm. long.

Bracts of inflorescence 4-8 mm. long, laxly imbricate.

*J. tuerckheimiana*.

- Bracts of inflorescence 2.5–4 mm. long, not imbricate, sometimes as much as 1 cm. apart on the rachis. . . . . *J. chiapensis*.
- Inflorescences mostly axillary; calyces 5–7 mm. long. *J. campechiana*.
- Flowering spikes arranged in verticillate and/or paniculate inflorescences, or the flowers fasciculate or in very short spikes of 2–4 flowers in the leaf axils.
- Plants commonly 10–30 cm. tall; flowers usually fasciculate or disposed in very short spikes in leaf axils; calyx segments linear-acuminate to setaceous; corollas 1–1.5 cm. long. *J. multicaulis*.
- Plants to 1.5 m. tall; flowers disposed in spikes arranged in verticillate and/or paniculate inflorescences; corollas less than 1 cm. long.
- Spikes usually numerous and verticillate-paniculate; corollas 4–6 mm. long; pollen grains 3-porate. . . . . *J. comata*.
- Spikes few, in lax panicles, never verticillate; corollas 7–9 mm. long; pollen grains 2-porate. . . . . *J. pectoralis*.
- Corollas 2–6 cm. long.
- Inflorescences appearing subcapitate or fasciculate.
- Bracts clavate to spatulate; corollas to 2.5 cm. long.
- Stems pubescent with yellowish-brown hairs; bracts 5–6 mm. long, long-ciliate. . . . . *J. steyermarkii*.
- Stems glabrous; bracts 7–13 mm. long, glabrous or short-pubescent, not ciliate.
- Leaf blades narrowly oblong to elliptic, mostly 1–2.5 cm. wide; capsules puberulent; seeds subglobose. . . . *J. corynimorpha*.
- Leaf blades broadly elliptic to elliptic-ovate, mostly 2.5–4 cm. wide; capsules glabrous; seeds compressed. . . . . *J. silvicola*.
- Bracts obovate, strap-shaped, or linear; corollas 3–4 cm. long.
- Stems and branches densely pubescent with golden-yellow hairs; bracts obovate, gland-dotted. . . . . *J. flava*.
- Stems and branches glabrous or bifariously pubescent with white hairs; bracts strap-shaped or narrowly linear, not gland-dotted.
- Bracts strap-shaped, 3–4 mm. broad; calyx 10–15 mm. long; anthers about 3 mm. long. . . . . *J. carthagenensis*.
- Bracts narrowly linear, only 1–2 mm. broad; calyx 8–9 (11) mm. long; anthers about 2 mm. long. . . . . *J. caudata*.
- Inflorescences spicate, the spikes sometimes branching and the inflorescences than appearing cymiform, thyriform, or paniculate.
- Flowers densely disposed in elongating, narrow, spicate, thyriform, or paniculate inflorescences 5–45 cm. long, never appearing cymose.
- Corollas 4.5–6 cm. long, yellow (except in *J. aurea* f. *erythrina*).
- Leaf margins more or less crenulate; bracts 7–8 mm. long, lanceolate to oblong-ovate. . . . . *J. magniflora*.
- Leaf margins entire; bracts 12–23 mm. long, linear, linear-oblong, linear-lanceolate, or elliptic.
- Leaves sessile, the blades 3 times longer than broad, attenuate to the base; calyces 10–12 mm. long; thecae superposed on the connective, the lower one calcarate. *J. grandifolia*.

Leaves on petioles 1-10 cm. long, the blades about twice as long as broad, rounded or acute at the base and abruptly decurrent on the petiole; calyces 5-8 mm. long; thecae nearly parallel, both muticous or nearly so.

Corollas yellow.....*J. aurea*.

Corollas red.....*J. aurea* f. *erythrina*.

Corollas 1.5-3.5 cm. long, white, lavender, red, or purple.

Plants decumbent to erect herbs; bracts spatulate to broadly ovate; capsules hirtellous or puberulent.

Bracts spatulate to oblong-spatulate.

Leaf blades elliptic-ovate to broadly ovate; bracts pilose; seeds compressed.....*J. montana*.

Leaf blades narrowly oblong to lance-oblong; bracts short-pubescent or glabrate; seeds subglobose.

*J. corynimorpha*.

Bracts ovate to broadly ovate, becoming wine-red in age.

*J. fulvicoma*.

Plants erect, shrubby or suffruticose; bracts linear to linear-oblongeolate; capsules glabrous.....*J. soliana*.

Flowers laxly arranged in cymes, or in simple or branched spikes 2-10 cm. long, appearing neither thyriform nor paniculate.

Calyces 7-12 mm. long; corollas pale yellow or buff...*J. bartlettii*.

Calyces 1.5-5 mm. long; corollas orange or red.

Corollas 3-3.5 cm. long, fusiform when unopened...*J. spicigera*.

Corollas 4-5.5 cm. long, not fusiform when unopened.

Calyces 3.5-5 mm. long; thecae conspicuously curved, converging at the tips and diverging at the base, the connective often 2 mm. broad.

Leaves, stems, and inflorescences glabrous; leaves 3-4 times longer than broad; inflorescences on peduncles 1.5-5 cm. long.....*J. macrantha*.

Leaves, stems, and inflorescences pilose or pubescent; leaves about twice as long as broad; inflorescences sessile or the peduncles less than 1 cm. long.

*J. macrantha* var. *piliformis*.

Calyces 1.5-3 mm. long; thecae and connective not as above.

*J. tinctoria*.

**Justicia aurea** Schlecht. *Linnaea* 7: 393. 1832, non *Justicia aurea* (Rose) Lindau, *Bull. Herb. Boiss.* 5: 675. 1897. *Justicia umbrosa* Benth. *Pl. Hartweg.* 79. 1841. *Adhatoda umbrosa* Nees in DC. *Prodr.* 11: 406. 1847. *Jacobinia aurea* Hemsl. *Diag. Pl. Mex.* 35. 1879, non Hiern, 1877-78. *Ecbolium umbrosum* O. Kuntze, *Rev. Gen.* 2: 981. 1891. *Jacobinia umbrosa* Blake, *Contr. Gray Herb.* 52: 103. 1917. *Pinchie* (Petén, Quecchí); *jiquilite*, *plumero*, *pompóm* (Guatemala).

Damp or wet thickets and mixed forest, 50-2,400 m.; Alta Verapaz; Chimaltenango; Chiquimula; Escuintla; Guatemala; Izabal; Petén; Quezaltenango (type from Chiupaché, *Hartweg 552*); El

Quiché, Retalhuleu; Sacatepéquez; San Marcos; Santa Rosa; Sololá; Suchitepéquez. Southern Mexico; British Honduras to El Salvador and Panama.

Stout, coarse, erect, herbaceous or suffrutescent plants to 3 m. tall, usually branched, the branches obtusely tetragonous or subterete, puberulent or glabrous; leaves on petioles 1–10 cm. long, the blades lance-oblong to broadly ovate, 6–40 cm. long, 3–21 cm. wide, acute to long-acuminate, rounded to acute and abruptly long-decurrent at the base, thin, glabrous on both surfaces or puberulent beneath; inflorescences many-flowered, dense, usually forming a narrow, terminal panicle 5–45 cm. long, the branches puberulent; bracts linear or linear-lanceolate, acute, 1–2.3 cm. long, green, puberulent; bracteoles linear, acuminate, equalling or shorter than the bracts; calyx lobes 5, lanceolate or linear-lanceolate, 5–8 mm. long, puberulent, pilosulous, or almost glabrous; corolla 4.5–6 cm. long, pale to bright yellow, puberulent or pilosulous outside, the lips about 2.5 cm. long, the upper one narrow, erect, entire, incurved and galeiform above, the lower lip with 3 short lobes about 2 mm. long; thecae 2–3 mm. long, very minutely calcarate; pollen 2-porate, bilateral, isopolar, with 2–3 rows of unevenly spaced insulae on either side of each aperture; capsule 1.5–2 cm. long, puberulent.

Frequently cultivated in Guatemalan gardens, showy and handsome when first coming into flower, but in age becoming ragged and unsightly. It has long been known in cultivation in Europe and the United States but is not particularly well adapted to greenhouse growth.

***Justicia aurea* f. *erythrina*** (Standl. & Steyererm.) D. Gibson, *Fieldiana: Botany* 34: 66. 1973. *Jacobinia umbrosa* f. *erythrina* Standl. & Steyererm. *Field Mus. Bot.* 23: 241. 1947.

This is a form in which the corollas are bright, deep red rather than yellow. It has been collected only at Calderas, on the lower slopes of Volcán de Acatenango, Chimaltenango (type, *Standley 60082*), and in Chiapas, Mexico (*Laughlin 2565*).

***Justicia bartlettii*** (Leonard) D. Gibson, *Fieldiana: Botany* 34: 66. 1973. *Beloperone bartlettii* Leonard, *Carn. Inst. Wash. Publ.* 461: 232, f. 18. 1936.

Wet forest near sea level, Izabal. British Honduras (type from river bluffs at El Cayo, *Bartlett 11477*).

Sprawling or erect shrubs to 3 m. tall, the branches more or less pilosulous; leaves on petioles 0.5–1.5 cm. long, the blades oblong-elliptic or oblong-ovate, mostly 6–16 cm. long, 3–7 cm. wide, acuminate or acute, cuneate at the base, thin, entire, usually sparsely pilosulous, at least on costae and veins; inflorescences usually terminal, short, spicate, mostly 2–4 cm. long, the stems pilosulous; bracts linear-lanceolate, pilosulous, 5–6 mm. long; calyx segments 5, linear-lanceolate, acuminate, pilosulous, 7–10 mm. long; corolla about 3 cm. long, finely pubescent,



pale yellow or white, the posterior lip minutely bifid, the anterior one trilobate; stamens almost as long as the corolla, the thecae superposed, one considerably lower than the other on the connective, calcarate; pollen 2-porate, isopolar, bilateral, with a row of insulae on either side of each aperture; capsule unknown.

These plants superficially resemble *J. eburnea* D. Gibson, which may be distinguished by its minute bracts, glabrous calyces with four sepals only 3–4 mm. long, glabrous corollas, and thecae that are almost parallel, one only slightly lower than the other on the connective.

***Justicia breviflora*** (Nees) Rusby, Bull. Torr. Bot. Club 27: 78. 1900; Gibson, Fieldiana: Botany 34: 66. 1973. *Rhytiglossa breviflora* Nees in DC. Prodr. 11: 352. 1847. *R. ovatifolia* Oersted, Vid. Medd. Kjoebenhavn 156. 1855. *Dianthera breviflora* Hemsl. Biol. Cent. Am Bot. 2: 517. 1882. *D. peckii* Blake, Contr. Gray Herb. 52: 97. 1917 (type from British Honduras, Peck 722). *D. riparia* Blake, Contr. U. S. Nat. Herb. 24: 25. 1922 (type from Izabal, Blake 7800). *Justicia peckii* Standley, Field Mus. Bot. 12: 369. 1936. *Yerba fluxión* (Petén).

Damp or wet thickets and forest, near sea level to 1,400 m.; Alta Verapaz; Baja Verapaz; Chimaltenango; Huehuetenango; Izabal; Petén; San Marcos. Southern Mexico; British Honduras; Honduras.

Herbaceous to suffrutescent, branching perennials, 1–2 m. tall, the branches bifariously pubescent or glabrous; leaves subsessile or on petioles to 1.5 cm. long, the blades lanceolate, lance-oblong, ovate-oblong, or oblong-elliptic, mostly 5–14 cm. long, with 5–10 pairs of lateral veins, acuminate to long-acuminate at the apex, attenuate, acute, or rounded at the base, essentially glabrous but sometimes appressed-pilosulous on the costae and veins; inflorescences of usually interrupted spikes, slender, simple or branched, the rachis pilosulous or glabrate, 5–25 cm. long, the flowers opposite; bracts subulate, 4–6 mm. long, the bracteoles similar but smaller; calyx 4–7 (8) mm. long, the 4 sepals subulate, erect, sometimes ciliolate; corolla commonly 10–15 mm. long, sometimes to 22 mm. long, lavender, blue, pink, white, or white with purple, glabrous or somewhat pubescent outside, the lower lip about equalling the tube; thecae divergent, mucicous, 0.5–1 mm. long; pollen 2-porate, isopolar, bilateral, with a row of rather large insulae on either side of each aperture; capsule oblong, glabrous, 10–12 mm. long; seeds ovate, flat, papillose.

***Justicia campechiana*** Standl. Carn. Inst. Wash. Publ. 461: 88. 1935; Leonard, *op. cit.* 226. f. 15. *Wild pepper* and *white chilar* (British Honduras).

Wet, mixed forest or thickets, near sea level to 500 m.; Alta Verapaz; Petén. Mexico (Campeche), *Lundell 1126*, type; British Honduras.

Erect, suffrutescent herbs or shrubs to 2.5 m. tall, the branches slender, glabrous or puberulent; leaves on petioles 0.5–2 cm. long, the blades lanceolate or oblong-lanceolate, mostly 4–10 cm. long, 1.5–4 cm. wide, acuminate, cuneate-attenuate to the base, glabrous or more or less pilose beneath, the cystoliths conspicuous; inflorescences axillary, spicate, simple, or with 1–2 branches, short-pedunculate, the rachis pubescent, 1–6 cm. long; bracts subulate, 2–2.5 mm. long, ciliate; calyx lobes 5, linear-lanceolate, acuminate, 5–7 mm. long, 1–1.5 mm. broad at base, glabrous or pubescent; corolla 9–11 mm. long, white striped with lilac, more or less pilosulous outside, the lips 5–6 mm. long; filaments of stamens inserted below throat of corolla, thecae about 1 mm. long, separated by 1–1.5 mm. on the malleiform connective, the lower one conspicuously calcarate; pollen 3-porate, prolate, with rows of insulae surrounding the apertures; capsule oblong, 6–7 mm. long, puberulent or glabrate.

**Justicia carthagenensis** Jacq. Enum. Pl. Carib. 11. 1760; Stirp. Am. Icones, t. 5. 1763; Linnaeus, Sp. Pl. ed. 2, 2: 1663. 1763; Sel. Stirp. Am. Hist. 5. 1788; Edwards' Bot. Reg. 2: 797. 1824. *Adhatoda carthagenensis* Nees in DC. Prodr. 11: 403. 1847. *Beloperone violacea* Planch. Journ. Hort. Prat. Belg. n. ser. 2: t. 23. 1858; Hooker in Curt. Bot. Mag. 87: t. 5244. 1861; Benth. & Hook. Gen. Pl. II: 1111. 1876. *Ecbolium carthagenense* O. Ktze. Rev. Gen. 2: 980. 1891. *Capote azul* and *hierba de tinta* (Guatemala).

Usually in damp ravines, wet thickets, along rivers in forest, rarely on dry hills, 1,000–2,200 m.; Baja Verapaz; Chimaltenango; Guatemala; Sacatepéquez; Sololá. Mexico; Nicaragua; West Indies; western South America.

Erect, branching, herbaceous or suffrutescent plants, the stems and branches terete, bifariously pilosulous or glabrous; leaves petiolate, the blades thin, ovate or elliptic-ovate, mostly 4–16 cm. long, acuminate, rounded or acute at the base, often decurrent on the petiole, thinly short-pilose on both surfaces or nearly glabrous; inflorescences usually terminal, appearing subcapitate, the flowers sessile or subsessile in dense clusters; bracts more or less strap-shaped, linear-oblong to obovate-oblong, acute or subacute, 14–20 mm. long, 3–4 mm. broad; bracteoles linear, usually ciliolate, 12–17 mm. long, obtuse or acute; calyx lobes 5, linear-lanceolate, acuminate, pale marginate, 10–15 mm. long, strigose or glabrate, ciliolate near apex; corolla 3–4 cm. long, pubescent outside, rose-purple, the lower lip often with transverse white bands, the tube elongating, the upper lip shallowly bifid, the lower lip spreading, deeply trilobate; stamens about equalling the upper lip, the thecae about 3 mm. long, the lower one calcarate; pollen 2-porate, bilateral, isopolar, with 2–3 rows of insulae on either side of each aperture; capsule about 2 cm. long, puberulent, containing 4 smooth, subglobose seeds.

This species has served as a repository for various divergent elements, including *J. corynimorpha* D. Gibson, with clavate bracts and shorter corollas (1.5–2.5 cm. long) and some specimens of *J. caudata* A. Gray, with narrowly linear bracts. Both of the last-

named species have shorter calyces (usually 5–9 mm. long), shorter capsules (1–1.5 cm. long), and are usually found at lower elevations (200–900 m.) than *J. carthagenensis*.

There are also a number of collections from the low, humid areas (sea level to 900 m.) of the Yucatan, West Indies, Nicaragua, and Costa Rica that have obovate-cuneate to clavate bracts, as in *J. corynimorpha*, but they also have ovate to elliptic-ovate leaves, longer corollas, and longer anthers, as in *J. carthagenensis*. The phototype of *Beloperone surinamensis* Miq. (F. M. Neg. No. 22158) appears much like these specimens.

***Justicia caudata*** A. Gray, Proc. Am. Acad. 21: 405. 1886.

Damp thickets, 200–700 m.; Jalapa; El Progreso; Retalhuleu; Zacapa. Mexico.

Erect, branching, herbaceous or suffrutescent plants, the stems and branches terete, bifariously pubescent or glabrous; leaves petiolate, the blades usually ovate but may be lance-ovate or lanceolate, abruptly long-acuminate or merely acuminate, or rarely even acute, rounded or acute at the base, often abruptly decurrent on the petiole, essentially glabrous or with some scattered pubescence on both surfaces; inflorescences terminal or axillary, appearing subcapitate, the flowers sessile or subsessile in dense clusters; bracts narrowly linear or linear-oblong, 12–16 mm. long, 1–2 mm. broad, the bracteoles similar but smaller, both glabrous or with some minute pubescence, often ciliate, at least near the apex; calyx lobes 5, linear-acuminate, margins pale near apex, 8–9 (11) mm. long, strigose or glabrous; corolla purple, 3–3.5 cm. long, more or less pubescent outside, the tube somewhat incurved, ampliate above; stamens about equalling the upper lip, the thecae about 2 mm. long, one well below the other on the connective, at least the lower one calcarate; pollen 2-porate, isopolar, bilateral, with 2 or more rows of widely spaced insulae on either wide of each aperture; capsule 1–1.5 cm. long, puberulent, containing 4 smooth, subglobose seeds.

The leaf apices of most Guatemalan material, although more or less acuminate, are not abruptly long-acuminate as in the Mexican material; however, the bracts, calyces, and corollas are essentially the same.

***Justicia chiapensis*** Brandegee, Univ. Calif. Publ. Bot. 6: 194. 1914.

Dense, wet thickets or mixed forest, 750–2,400 m.; Quezaltenango; San Marcos; Suchitepéquez. Mexico (the type from Chiapas, Cerro del Boquerón, *Purpus* 7285).

Plants slender, herbaceous, erect to decumbent or procumbent and rooting at the nodes, 12–75 cm. tall, the stems minutely puberulent, rarely with a few scattered, spreading hairs; leaves on slender petioles 2–15 mm. long, the blades oblong-

lanceolate or oblong-ovate, 2-8 cm. long and 1-2.5 cm. wide, glabrous or with a few short hairs above, paler beneath and glabrous or nearly so, the cystoliths usually conspicuous; inflorescences spicate, slender, mostly terminal and solitary, 2-8 cm. long, slender-pedunculate, the flowers sometimes as much as 1 cm. apart; rachis viscid-puberulent; bracts oblong-elliptic, 2.5-4 mm. long, obtuse or rounded at the apex, contracted and short-petiolate at the base, ciliate, minutely glandular-puberulent or almost glabrous, venose; bracteoles lanceolate, 2-3 mm. long; calyx lobes 5, puberulent, lance-attenuate, 2-3 mm. long, the fifth one filiform, about 1 mm. long; corolla lilac, purple, or white tinged with lilac, puberulent, about 6 mm. long, the lips about 2 mm. long; stamens included, the thecae about 0.5 mm. long, remote on the connective, the lower one minutely calcarate; pollen 2-porate, isopolar, bilateral, with a row of insulae on either side of each aperture; capsule oblong-clavate, about 6 mm. long, puberulent.

This species and *J. tuerckheimiana* Donn.-Sm. are very similar and additional collections may show more intergradation than is evident on the material I have examined. One or both may prove to be synonymous with species described earlier from Costa Rica.

***Justicia clinopodium*** Gray ex Greenm. Proc. Am. Acad. 32: 304. 1897.

Open places in the mountains, 1,300-2,100 m.; Huehuetenango (Sierra de los Cuchumatanes). Southern Mexico.

Erect or ascending perennials, 20-50 cm. tall, simple or branched, the stems densely hirsute with very long, spreading, white, stiff hairs; leaves on very short petioles, or the upper leaves sessile, the blades ovate or oblong-ovate, 2-5 cm. long, 1-2.5 cm. wide, narrowed to an obtuse apex, subcordate or rounded at the base, abundantly hirsute on both surfaces with long, stiff, spreading white hairs; inflorescences terminal, headlike or spikelike, 1.5-8 cm. long, dense, or sometimes interrupted below; bracts narrowly lanceolate, 10-15 mm. long, bracteoles linear, 10-12 mm. long, both long-hirsute and glandular-pilose; calyx lobes 4, subequal, linear, 10-12 mm. long, hirsute; corolla purple, about 1.5 cm. long, glabrous outside, the upper lip shallowly bifid, the lower one deeply trilobate; stamens included, the thecae about 1 mm. long, broadly divergent, the lower one minutely calcarate; pollen 2-porate, isopolar, bilateral, with rows of insulae bordering the apertures; style glabrous; capsule glabrous, 10-13 mm. long; seeds compressed, densely covered with barbate hairs.

***Justicia comata*** (L.) Lam. Encycl. 1: 632. 1783. *Dianthera comata* L. Syst. ed. 10. 850. 1759.

Usually in bogs or marshes or along streams and lakes or in ditches, sometimes in damp forest or thickets, sea level to 370 m.; Alta Verapaz; Escuintla; Izabal; Petén; Retalhuleu; San Marcos; Santa Rosa. Southern Mexico; British Honduras to El Salvador and Panama; West Indies; South America.

Herbaceous plants, erect or decumbent, sometimes as much as 1.5 m. tall but usually much lower, often forming dense colonies, the stems usually branched, often rooting at the lowest nodes, glabrous or sparsely pubescent; leaves sessile, subsessile, or short-petiolate, the blades linear-lanceolate to ovate-oblong, 5–15 cm. long, long-acuminate to acute, usually acute at base but sometimes rounded, glabrous or nearly so; inflorescences terminal and axillary, usually verticillate-paniculate, composed of numerous filiform spikes 2–7 cm. long, these glandular-puberulent; bracts and bracteoles subulate, 0.5–1 mm. long; calyx lobes 5, narrowly lanceolate, acuminate, 1.5–2.5 mm. long, nearly glabrous; corolla purple, lilac, or white with purple markings, 4–6 mm. long, the lips about equalling the tube; stamens included, the thecae acute at base or very minutely calcarate, 0.3–0.5 mm. long, broadly divergent, one smaller; pollen 3-porate, subprolate, with one row of fused insulae on either side of each aperture; capsule 3–4 mm. long, usually puberulent, sometimes glabrate.

**Justicia corynimorpha** D. Gibson, *Fieldiana: Botany* 34: 67. 1973. *Tinta cimarrona* (Retalhuleu).

Damp thickets, sometimes in rocks along stream beds, 200–900 m.; Chiquimula; Escuintla; Jutiapa (type, *Standley 75969*); Retalhuleu; Santa Rosa; Suchitépéquez; Zacapa. Mexico; Honduras; Nicaragua.

Erect or decumbent, sparsely branched herbs to 60 cm. tall, the stems glabrous; leaves short-petiolate, the blades narrowly oblong, lance-oblong, or elliptic, mostly 4–12 cm. long, 1–2.5 cm. wide (rarely linear and only 0.3 mm. wide), acuminate, attenuate to the base, glabrous, the cystoliths conspicuous; inflorescences terminal or axillary, appearing subcapitate or spicate; bracts clavate to spatulate, 7–13 mm. long, short-pubescent or glabrate, sometimes glandular, rarely ciliate, bracteoles similar but smaller; calyx lobes 5, narrowly linear-lanceolate, acuminate, 5–8 mm. long, usually glabrous, sometimes ciliate; corolla lavender or purple, 2–2.5 cm. long, somewhat pubescent or glabrate outside, the tube more or less ampliate; stamens about equalling the lips of the corolla, the thecae about 2 mm. long, one below the other on the connective, at least the lower one minutely calcarate; pollen 2-porate, isopolar, bilateral, with 2 rows of insulae on either side of each aperture; capsule puberulent, 1–1.5 cm. long, the seeds subglobose, minutely puberulent.

**Justicia eburnea** D. Gibson, *Fieldiana: Botany* 34: 68. 1973.

In forest, usually along streams, sea level to 700 m.; Alta Verapaz; Izabal (type, *Steyermark 39535*); Petén. Mexico (Chiapas).

Shrubs 2–6 m. tall, glabrous throughout; leaves on petioles 0.3–2.5 cm. long, the blades oblong-elliptic to oblong-ovate, acuminate, acute to cuneate at the base, mostly 6–16 cm. long, 2–7 cm. wide, glabrous or nearly so, often blackening when dry; inflorescences short, terminal or axillary panicles 2–6 cm. long, composed of few-flowered spikes; bracts subulate, minute; calyx lobes 4, narrowly lanceolate-acuminate, 3–4 mm. long, glabrous; corolla creamy-white, sometimes greenish near base of tube, 2.5–3 cm. long, the lips nearly half as long as the tube, the posterior

one entire, the anterior trilobate, the tube about 3 mm. wide; stamens about as long as the corolla, thecae about 2 mm. long, one only slightly lower than the other on the connective, calcarate; pollen 2-porate, isopolar, bilateral, with 2 rows of insulae on either side of each aperture; capsule about 1 cm. long, glabrous, containing 4 compressed, suborbicular, verrucose seeds.

**Justicia ensiflora** (Standley) D. Gibson, *Fieldiana: Botany* 34: 69. 1973. *Jacobinia ensiflora* Standley, *Field Mus. Bot.* 8: 45. 1930.

Damp or wet forest, at or a little above sea level; British Honduras (type from Middlesex, *W. A. Schipp 354*). Honduras.

Slender shrubs about one meter tall, the stems glabrous or nearly so; leaves short-petiolate, the blades oblong-lanceolate, mostly 15–25 cm. long and 4–11 cm. wide, long-acuminate, cuneate-attenuate to the base, glabrous, with 5–7 pairs of lateral veins; inflorescences cymose, rather dense and many-flowered, borne on slender peduncles 12–16 cm. long, these densely pubescent, the branches of the cymes densely pilosulous; bracts ovate, lance-ovate, or oblong-ovate, 2–4 mm. long; bracteoles linear-lanceolate, 3–4 mm. long; calyx lobes 5, linear, acuminate, 8 mm. long, glandular-pubescent; corolla bright orange to orange-yellow, 6–6.5 cm. long, glandular-villosulous, very slender, straight, the lips about 3 cm. long, the upper lip minutely bilobate at the apex, the lower lip trilobate with linear lobes 4 mm. long; anthers 4–5 mm. long, thecae nearly parallel, one longer than the other, mucicous; pollen 4-porate, the surface marked by rows of large, densely arranged insulae; capsule unknown.

**Justicia flava** D. Gibson, *Fieldiana: Botany* 34: 69. 1973. *Beloperone aurea* Leonard, *Carn. Inst. Wash. Publ.* 461: 233, *f. 19*. 1936, non *Justicia aurea* (Rose) Lindau, *Bull. Herb. Boiss.* 5: 675. 1897, nec *J. aurea* Schlecht, *Linnaea* 7: 393. 1832.

In thickets or forest, 100–500 m., Petén (*Lundell 2189*, type). Mexico (Chiapas).

Shrubs to 3 m. tall, the stems and branches densely pubescent with appressed or ascending, golden-yellow hairs; leaves on slender petioles, the blades oblong-elliptic, 8–16 cm. long, 3–6 cm. wide, acuminate, attenuate to the base, entire, somewhat pilosulous or glabrate, the indument mostly confined to costae and veins; inflorescences short-pedunculate, axillary and terminal, subcapitate, spikelike, 1–1.5 cm. long, the peduncles pubescent; bracts obovate, 7–8 mm. long, obtuse or acute, closely imbricate, rather sparsely puberulent, gland-dotted; bracteoles oblanceolate, 6–7 mm. long, acute, puberulent; calyx lobes narrowly lanceolate, 5–6 mm. long; corolla pale purple, about 3 cm. long, finely puberulent, the lips 1–1.3 cm. long, narrow, the posterior one obscurely bilobate, the anterior trilobate, the lobes 2 mm. long; stamens equalling or exceeding the corolla, thecae 1–2 mm. long, one much lower than the other on the connective and conspicuously appendaged; pollen 2-porate, bilateral, isopolar, with a row of evenly spaced insulae on either side of each aperture; ovary pubescent; capsule unknown.

**Justicia fulvicoma** Schlecht. *Linnaea* 6: 369. 1831. *Beloperone comosa* Nees in DC. *Prodr.* 11: 416. 1847. *B. pringlei* S. Watson, *Proc. Am. Acad.* 25: 160. 1890, non *Justicia pringlei* Robins. *l.c.* 173. 1891. *Drejerella fulvicoma* Lindau, *Urb. Symb. Ant.* 2: 225. 1900. *Beloperone guttata* Brandegee, *Univ. Calif. Publ. Bot.* 4: 278. 1912, non *Justicia guttata* Wall: 1830. *B. fulvicoma* A. W. Hill, *Curtis' Bot. Mag.* 163, *t.* 9633. 1941. *B. blechioides* Leonard, *Journ. Wash. Acad. Sci.* 32: 186. 1942 (type from Chiquimula, *Steyermark 31740*), non *Drejerella blechioides* Lindau, *Urb. Symb. Ant.* 6: 43. 1909. *Calliaspidia guttata* Bremekamp, *Verh. Kon. Nederl. Akad. Wetensch. Afd. Natuurk. Sect. 2*, 45(2): 54. 1948. *Drejerella guttata* Bremekamp, *Phil. Journ. Sci.* 80 (1): 14. 1951. *Justicia brandegeana* Wassh. & Smith in Reitz, *Fl. Illustr. Catar.* 1, Fasc. Acan.: 102. 1969.

Damp, shaded slopes, in thickets or forest, 600–1,800 m., Chiquimula. Mexico; Honduras. Cultivated in Brazil.

Herbaceous or suffruticose plants, branching, the stems 40 cm. long or more, pilose with spreading hairs; leaves on slender petioles usually 1–3 cm. long, the blades ovate or lance-ovate, mostly 4–9 cm. long, 2–5 cm. wide, acute or acuminate, acute or rounded at the base, entire, sparsely or densely pilose; inflorescences terminal or axillary, spicate, mostly 2–10 cm. long; bracts closely imbricate, broadly ovate, obtuse or acute, first green, becoming wine red in age, 1–2 cm. long, 0.7–1.5 cm. wide, pilose and densely ciliate; bracteoles oblong-lanceolate, lance-ovate, or ovate, about 1 cm. long, ciliate; calyx segments 5, narrowly lanceolate, about 6 mm. long, green, ciliate; corollas 3–3.5 cm. long, pubescent outside, white or pale lilac, the anterior lip spotted with purple, the lips 1–1.5 cm. long, ciliate, the posterior lip entire or minutely bifid, the anterior one shallowly trilobate; stamens about equalling the upper lip, thecae 1.5–2 mm. long, hirsute or glabrate, superposed, calcarate; pollen 3 porate, trigonous, with one row of insulae on either side of each aperture; style pubescent, stigma minutely bifid; capsule 10–12 mm. long, puberulent, containing 2–4 compressed, ovate, smooth seeds.

The original description of the floral parts of *Beloperone blechioides* Leonard was based upon one immature corolla, which probably accounts for its length of only 2 cm. The bracts of the type specimen from Guatemala are more densely ciliate with longer hairs (about 1 mm. long) than those of the Mexican material, but there are no other differences. The original description of *B. pringlei* Wats. reads in part, "corolla yellow(?). . ." but agrees in other respects.

Superficially these plants resemble *Blechnum brownei* Juss.

**Justicia grandifolia** D. Gibson, *Fieldiana: Botany* 34: 69. 1973.

Known only from the type collection, *Steyermark 42001*, damp forested slopes, 300–900 m., Izabal.

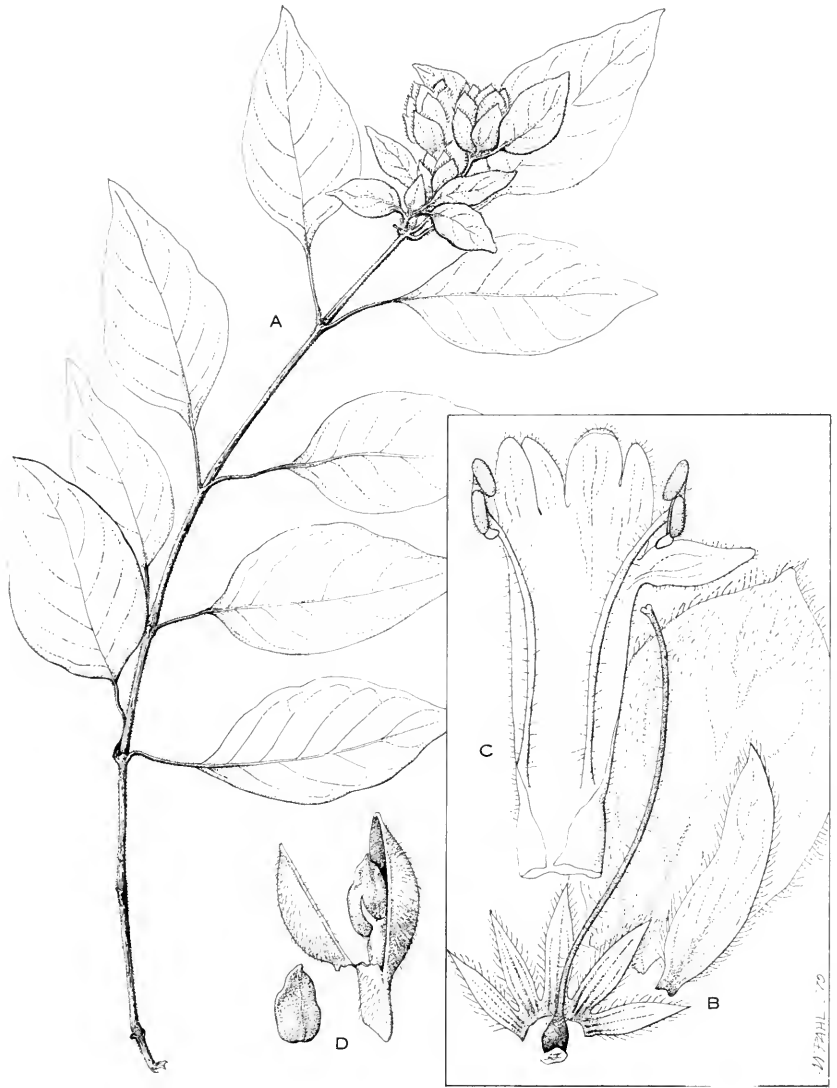


FIG. 87. *Justicia fulvicoma*. A, habit,  $\times \frac{1}{2}$ ; B, pistil, opened calyx, bracteole, and bract,  $\times 4\frac{1}{2}$ ; C, corolla opened to show stamens,  $\times 4\frac{1}{2}$ ; D, capsule opened, with seeds, greatly enlarged.



Suffruticose plants to 1.75 m. tall, the stems bifariously pubescent or almost wholly glabrous; leaves subsessile or on petioles only 0.5 cm. long, the blades elliptic to lance-oblong, short-acuminate, attenuate to the base, 20–35 cm. long, 7–9 cm. wide, glabrous on both surfaces, the margins entire, the cystoliths small but numerous and conspicuous; inflorescences terminal, pedunculate, spicate, appearing narrowly thyriform, 24–28 cm. long; bracts linear-oblong to elliptic, obtuse, 12–13 mm. long, minutely puberulent or glabrate, ciliate; bracteoles similar but smaller; calyx lobes 5, linear to linear-lanceolate, acuminate, 10–12 mm. long, ciliate; corolla pale yellow, about 5 cm. long, bilabiate, the lips tinged with green, the upper one minutely bifid, the lower one minutely trilobate; stamens about equalling the corolla, thecae about 3 mm. long, calcarate, one below the other on the connective; pollen 3-porate, trigonous, with one row of insulae on either side of each aperture; capsule unknown.

**Justicia inaequalis** Benth. Pl. Hartweg. 80. 1841 (type from Rancho Palo Hueco, Guatemala, probably in Quezaltenango, *Hartweg 553*). *Rhytiglossa inaequalis* Nees in DC. Prodr. 11: 349. 1847. *Dianthera inaequalis* Benth. & Hook. ex Hemsl. Biol. Cent. Am. Bot. 2: 518. 1882.

Damp forest and thickets, 500–2,700 m.; Alta Verapaz; Chimaltenango; Escuintla; Guatemala; Quezaltenango; Retalhuleu; San Marcos. Mexico (Chiapas).

Erect or subscandent, suffrutescens perennials, slender, branched, the stems glabrous; leaves on petioles mostly 0.5–2(3) cm. long, the blades lanceolate, ovate-oblong, or ovate, acuminate, acute or attenuate to the base, mostly 6–16 cm. long, 2–6 cm. wide, glabrous except for appressed hairs above along the costae; inflorescences spicate, slender, simple or furcate, 5–20 cm. long, the flowers remote, solitary, secund; bracts lanceolate-acuminate, glabrous or puberulent, about 4 mm. long, ciliate; bracteoles similar and about as long as the bracts; calyx lobes 4, commonly 13–14 mm. long, rarely only 10 mm., lance-linear, acuminate, subequal; corolla rose-purple, red, or maroon, 3.5–4.5 cm. long, pubescent or almost glabrous, the lips shorter than the tube, the upper lip entire, the lower one shallowly trilobate; stamens rising to a point a little below the end of the corolla lips, thecae about 2 mm. long, acute at base and divergent; pollen 2-porate, isopolar, bilateral, with 2 or more rows of insulae on either side of each aperture; capsule 15–18 mm. long, glabrous, containing 4 flattened, oval, papillate seeds.

**Justicia lindeniana** (Nees) Macbride, Candollea 6: 18. 1934. *Rhytiglossa lindeniana* Nees in DC. Prodr. 11: 349. 1847. *Dianthera lindeniana* Hemsl. Biol. Cent. Am. Bot. 2: 518. 1882.

On rocks in the edges of streams, at or a little above sea level; Izabal (Río Frío; Río Dulce). Mexico (the type from Teapa, Tabasco).

Erect, herbaceous or suffrutescens plants, rather stiff and hard, to 50 cm. tall, with suberect branches, glabrous or bifariously puberulent; leaves short-petiolate,

the blades linear or lance-linear, mostly 2.5–8 cm. long and only 2–4 mm. wide, attenuate to each end, glabrous; inflorescences terminal, spicate, very slender and interrupted, simple or with 1 or 2 branches, 3–7 cm. long; flowers opposite, the bracts and bracteoles green, subulate, to 3 mm. long; calyx lobes usually 4, lance-attenuate, slightly longer than the bracts, or a fifth lobe present but much shorter than the others; corolla about 7 mm. long, purple, glabrous; stamens about equaling the corolla, thecae 0.5–1 mm. long, broadly divergent, muticous; pollen 2-porate; capsule 6–7 mm. long, glabrous.

These plants belong to that small flora whose species are nearly or quite confined to large boulders in the edges of swift streams.

**Justicia macrantha** Benth. Pl. Hartweg. 78. 1841. *Cyrtanthera macrantha* Nees in DC. Prodr. 11: 330. 1847. *Jacobinia macrantha* Benth. & Hook. ex Hemsl. Biol. Cent. Am. Bot. 2: 521. 1882, non *Beloperone macrantha* Benth. & Hook. Gen. Pl. 2: 1111. 1876. *Cua-jatinta* (Guatemala); *jiquilete*, *jiquelita* (Alta Verapaz).

Damp thickets or mixed forest, 900–1,400 m.; Alta Verapaz; Guatemala; Quezaltenango (type from Rancho del Palo Hueco, below Quezaltenango on road to Retalhuleu, *Hartweg 551*). Costa Rica and Panama.

Slender, branching shrubs 1–4 m. tall, the stems and branches glabrous or nearly so, or when young thinly pilose; leaves on petioles 0.5–2 cm. long, the blades thin, glabrous, lanceolate-oblong, acuminate to long-acuminate, acute or attenuate to the base, mostly 8–20 cm. long, 3–5.5 cm. wide; inflorescences axillary, cymose; peduncles glabrous, 1.5–5 cm. long; pedicels glabrous, 0.5–1 cm. long; bracts and bracteoles triangular-subulate, about 2 mm. long, glabrous; calyx lobes 5, acuminate, 3.5–5 mm. long, glabrous but usually ciliolate; corollas pale red to light orange-red, yellow inside tube, glabrous, 4.5–5.5 cm. long, the lips 2–2.5 cm. long, the posterior lip bidentate, the anterior one trilobate, spreading, often to 1 cm. wide, the lobes rounded, 2–3 mm. long; stamens about equaling the posterior lip, thecae about 2 mm. long, muticous, curved, converging at the tip and diverging at the base, the connective 1.5–2 mm. wide; pollen 2-porate, isopolar, bilateral, with 2 uneven rows of insulae on either side of each aperture; capsule about 2 cm. long, glabrous.

The flowers are said to resemble the open mouth of a serpent.

**Justicia macrantha** var. **piliformis** D. Gibson, Fieldiana: Botany 34: 70. 1973.

Known only from the type, mixed forest above Lake Atitlán, about 3–5 km. west of Panajachel, Sololá, 2,100 m., *Williams, Molina and Williams 25314*.

Differs from *J. macrantha* in its pilose stems and branches (sometimes glabrate in age); shorter, broader leaves mostly 5–13 cm. long,

3-6 cm. wide, densely pilose beneath when young, usually sparsely so in age, with conspicuously ciliate margins; shorter inflorescences, these subsessile or on peduncles less than 1 cm. long; pilose peduncles and pedicels; pubescent bracts; calyx lobes that are lanceolate, acute, and pubescent; and corolla lobes that are pubescent outside.

**Justicia magniflora** (Blake) D. Gibson, *Fieldiana: Botany* 34: 70. 1973. *Dicliptera magniflora* Blake, *Contr. Gray Herb.* 52: 98. 1917. *Beloperone crenata* Standley, *Carn. Inst. Wash. Publ.* 461: 88. 1935 (type from British Honduras, *Schipp* 8-694), non *Jacobinia crenata* Leonard, *Field Mus. Bot.* 18: 1223. 1938. *Beloperone magniflora* Leonard, *Carn. Inst. Wash. Publ.* 461: 234. 1936.

Dense, wet forest, often along rivers, near sea level to 200 m.; Baja Verapaz; Huehuetenango; Izabal; Petén; San Marcos. Mexico; British Honduras (type, *Peck 622-a*); Costa Rica.

Shrubs to 2 m. tall, the stems and branches puberulent or glabrate; leaves on petioles 1-3 cm. long, the blades elliptic to lance-oblong or oblong-ovate with 9-12 pairs of lateral veins, mostly 12-25 cm. long and 3-9 cm. wide, acute or acuminate, attenuate to the base, the margins usually crenulate, somewhat pubescent on costae and veins or almost wholly glabrous; inflorescences spicate, sometimes forming narrow panicles 5-15 cm. long, the rachis pubescent; bracts green, closely imbricate, lanceolate to lance-elliptic or oblong-ovate, obtuse or acute, 7-8 mm. long, about 3 mm. wide, pubescent, very densely ciliolate (the hairs about 0.3 mm. long and so crowded that the margins appear wooly); bracteoles similar but smaller; calyx lobes 5, lanceolate, acute to acuminate, 5-6 mm. long, densely ciliolate; corolla yellow, 5-6 cm. long, pubescent outside, the lips narrow, about 2 cm. long, the upper one minutely bifid, the lower one minutely trilobate; stamens about equalling the corolla, thecae 2-2.5 mm. long, one lower on the connective than the other, both calcarate; pollen 2-porate, bilateral, isopolar, ellipsoidal, with one row of large, evenly spaced insulae on either side of each aperture; capsule unknown.

**Justicia montana** (Standl. & Leonard) D. Gibson, *Fieldiana: Botany* 34: 70. 1973. *Beloperone montana* Standl. & Leonard, *Field Mus. Bot.* 23: 239. 1947.

Known only from the type collection, Izabal, Cerro San Gil, on the uppermost slopes, about 1,200 m., *Steiermark 41939*.

Plants decumbent, the stems ascending, as much as 25 cm. long, often rooting at the lower nodes, bifariously villous with light yellowish brown, spreading hairs as much as 2 mm. long; leaves short-petiolate, the blades elliptic-ovate to broadly ovate, 4-11 cm. long and 3.5-6.5 cm. wide, obtuse or acute, narrowed at the base and decurrent on the petiole, membranaceous, entire, the upper surface rather densely pilosulous with brownish hairs and with rather conspicuous cystoliths, the lower surface purplish, appressed-pilosulous, the lateral veins 5-6 pairs; inflorescences terminal, pedunculate, narrow panicles to 15 cm. long and 2-3 cm.

broad, composed of short erect spikes about 3 cm. long and 1 cm. broad, the rachis densely long-villous; bracts ternate, oblong-spathulate, the middle one about 13 mm. long and 4 mm. wide, the lateral ones slightly smaller, rounded at the apex, rather prominently venose, pilose; calyx lobes 5, 6–8 mm. long, linear-subulate, rather densely pilose; corolla purple, 2 cm. long; stamens almost as long as the corolla, thecae 1.5–2 mm. long, hirsute, one lower than the other on the connective, the lower one calcarate; pollen 4-porate, subprolate, with rows of more or less fusing insulae bordering the apertures; capsule about 1 cm. long, abruptly pointed, narrowed from the middle to a compressed stipelike solid base, hirtellous; immature seeds light brown, compressed.

Apparently related to *J. brenesii* (Leonard) D. Gibson of Costa Rica, but differing in its much larger leaf blades, relatively shorter petioles, and much larger inflorescences.

***Justicia multicaulis* Donn.-Sm. Bot. Gaz. 47: 259. 1909.**

Wet, mixed forest, sometimes along wooded stream banks, 1,250–1,600 m.; Alta Verapaz (type from Pansamalá, *Tuerckheim* 741).

Suffrutescent plants, 10–30 cm. tall, the stems numerous, the branches tetragonous, bifariously pubescent; leaves on petioles 3–6 mm. long, the blades oblanceolate, mostly 1.5–4 (5) cm. long, 0.5–2 cm. wide, acute at each end, glabrous or sometimes puberulent beneath on the veins; inflorescences axillary, the flowers sessile, solitary or fasciculate or in very short spikes of 2–4 flowers; bracts spathulate, 7–8 mm. long, glabrous, herbaceous, the bracteoles linear-spathulate, 5–7 mm. long; calyx segments 5, linear-acuminate to setaceous, 7–10 mm. long; corolla 1–1.5 cm. long, white, pubescent outside, at least on the lobes, the lips shorter than the tube, the posterior lip purplish; stamens exerted, thecae remote on a long malleiform connective, the lower one calcarate; pollen 4-porate, with one row of fused insulae on either side of each aperture; capsule oblong, acuminate, 6–7 mm. long, glabrous, the retinacula acute; seeds by abortion 2, compressed, rugose, wing-margined.

***Justicia pectoralis* Jacq. Enum. Pl. Carib. 11. 1760. *Dianthera pectoralis* Gmel. Syst. Nat. 2: 36. 1791.**

Damp or wet thickets, often along streams, sea level to 1,100 m.; Alta Verapaz; Chiquimula; Escuintla; Guatemala; Izabal; Petén; Retalhuleu. Southern Mexico; British Honduras to Panama; West Indies; South America.

Ascending or decumbent herbs to 1.5 m. tall, slender, branching, often rooting at the lowest nodes, the branches bifariously pubescent; leaves on petioles 2–12 mm. long, the blades narrowly lanceolate to ovate-lanceolate, mostly 5–12 cm. long, narrowly long-acuminate, acute or obtuse at the base, glabrous or nearly so; inflorescences terminal and axillary, the lax panicles composed of a few opposite or alternate spikes 3–12 cm. long, the flowers distant; bracts and bracteoles subulate, 0.5–1 mm. long; calyx lobes 5, narrowly lanceolate, acuminate, 2–2.5 mm.

long, glandular-pubescent; corolla pale purple or white with purple, 7-9 mm. long, the lips almost as long as the tube; stamens included, thecae mucous at base, 0.5-1 mm. long, divergent, one smaller; pollen 2-porate, rectangular, with apparently one row of few, rather large insulae on either side of each aperture; capsule slender-clavate, 5-6 mm. long, puberulent.

***Justicia pedicellata*** D. Gibson, *Fieldiana: Botany* 34: 70. 1973.

Dense, wet forest or thickets, 300-1,200 m., Alta Verapaz (type from Chamá, *Harry Johnson 780*).

Branching shrubs 2 m. tall or more, the stems and branches terete, glabrous; leaves on glabrous petioles 0.2-1 cm. long, the blades lanceolate, lance-oblong, or elliptic, 3-9 cm. long, 1-3 cm. wide, acuminate to long-acuminate, attenuate to the base, glabrous on both surfaces, the cystoliths conspicuous; inflorescences axillary or terminal, the flowers on erect pedicels 2-5 cm. long, solitary or 2-several in an umbelliform arrangement; bracts ovate to broadly lanceolate, 12-24 mm. long, 7-12 mm. wide, acuminate to long-acuminate, the base rounded to subcordate, venose, glabrous; bracteoles lanceolate or elliptic, about 10 mm. long, ciliate; calyx lobes 5, linear or linear-lanceolate, acuminate, 6-7 mm. long, glabrous; corolla red, about 3.5 cm. long, the tube only slightly ampliate above, minutely pubescent outside, the lips 10-13 mm. long, the posterior lip bidentate, the anterior one trilobate, the lobes 1 mm. long, acute; stamens almost equalling the corolla, the filaments inserted below the throat, the anthers 2-2.5 mm. long, one theca below the other on the connective, at least the lower one calcarate; pollen 2-porate, isopolar, bilateral, with rows of insulae surrounding the apertures; style exerted, the stigma minutely bilobate; capsule 10-12 mm. long, glabrous; seeds compressed, puberulous.

***Justicia pilifera*** D. Gibson, *Fieldiana: Botany* 34: 72. 1973.

Near sea level to 200 m., Alta Verapaz; Petén (type, *Tún Ortíz 1529*, about 200 m., in tall forest along the road to El Remate km. 66, on the west side, Parque Nacional de Tikal).

Branching shrubs to 2 m. tall, more or less pubescent throughout, densely so on uppermost stems; leaves short-petiolate, the blades lanceolate to lance-elliptic, acuminate, acute at base, mostly 6-12 cm. long, 2-5 cm. wide, the margins undulate or entire, sparsely pubescent or glabrate above or the pubescence confined to costae and veins, softly and usually densely pubescent beneath; inflorescences axillary and terminal, the flowers sessile or on short pedicels in cymes or in short, few-flowered spikes, the rachis usually less than 3 cm. long, densely pubescent; bracts and bracteoles subulate, 3-5 mm. long, pubescent; calyx segments 4, linear or narrowly linear-lanceolate, acuminate, accrescent, 5-10 mm. long, glandular-pubescent; corolla white, or white spotted with buff, 3-4 cm. long, somewhat fusiform in bud, the tube slender, scarcely ampliate above, more or less pubescent with both glandular and eglandular hairs, the lips 1-1.5 cm. long, the upper one minutely bifid, the lower one very shallowly trilobate; stamens about equalling the upper lip, the filaments puberulent, inserted near the base of the corolla tube, the anthers 1-1.5 mm. long, the lower theca conspicuously calcarate; pollen 2-porate, isopolar, bilateral, with rows of insulae on either side of the apertures; style filamentous,

glabrous; ovary glabrous; disc conspicuous, irregularly lobate; capsule glabrous, clavate, stipiform at base, 15–18 mm. long, containing 4 lenticular, pubescent seeds.

The collector of the type says that the stem is 8 cm. in diameter.

**Justicia pringlei** Robinson, Proc. Am. Acad. 26: 173. 1891.

Department of El Quiché, *Aguilar 1513*. Mexico.

Slender, branching herbs to 50 cm. tall, hirsute throughout with long, slender, spreading white hairs; leaves short-petiolate, the blades ovate, ovate-oblong, or lanceolate, mostly 3–5 cm. long, 1–2 cm. wide, acuminate or acute, rounded to acute at the base, pilose on both surfaces, but more densely so beneath; inflorescences long-pedunculate, the peduncles 2–4 cm. long, with few-flowered cymes; bracts linear-subulate, 7–8 mm. long, the bracteoles subulate, 2–3 mm. long; calyx lobes 4, linear-subulate, 5–6 mm. long; corolla 8–10 mm. long, purplish red to pale purple, the lips not quite as long as the tube; stamens about equalling the corolla, the thecae 0.5–1 mm. long, superposed on the connective and divergent, the lower one calcarate; pollen 2-porate, isopolar, bilateral, with a row of insulae on either side of each aperture; capsule about 1 cm. long, densely pilosulous; seeds 4, compressed, densely pubescent.

**Justicia reptans** Swartz, Prodr. Veg. Ind. Occ. 13. 1788.

In gravel along streams or in shallow water, sea level to 150 m.; Alta Verapaz (Río Sebol, *Steyermark 45813*). Greater Antilles.

Perennial, herbaceous plants, the stems 5–15 cm. long, said to be somewhat succulent, repent or ascending, glabrous; leaves short-petiolate, the blades oblong-ovate or lance-oblong, mostly 0.5–2 cm. long, 0.3–1 cm. wide, obtuse-acuminate, acute at the base, glabrous; inflorescences spicate, terminal, 1–6 cm. long, usually simple, pedunculate, glabrous, the flowers secund and remote; bracts and bracteoles subulate, 1–1.5 mm. long; calyx lobes 5, glabrous, 1.3–2 mm. long; corolla minutely puberulent, about 2 mm. long, the lips 1–1.5 mm. long; stamens included, thecae 0.3 mm. long, superposed and divergent, mucicous or nearly so; pollen 2-porate, bilateral, isopolar; stigma bilobate; capsule about 5 mm. long, pubescent or glabrate, acute, appearing stipitate; seeds 4.

It should be noted that the Guatemalan material is in poor condition and contains no corollas; the determination was made by Dr. Standley and the plants certainly appear much like specimens in the West Indian collections.

**Justicia silvicola** D. Gibson, Fieldiana: Botany 34: 73. 1973.

Known only from the type collection, *Steyermark 41984*, Izabal, Cerro San Gil, uppermost ridges and summit, 1,200–1,300 m.

Simple or sparsely branching herbs 50–60 cm. tall, the stems glabrous; leaves on petioles 1–1.5 cm. long, the blades lance-elliptic to elliptic-ovate, mostly 5–12 cm. long, 2.5–4 cm. wide, acuminate, attenuate or acute at the base, glabrous, conspicuously paler beneath, the cystoliths numerous; inflorescences terminal or

axillary, subcapitate, subsessile; bracts clavate to spatulate, glabrous, 8–11 mm. long, bracteoles similar but smaller; calyx 5–6 mm. long, the 5 segments linear, acuminate, glabrous; corolla white, glabrous, about 2 cm. long; stamens about equalling the lips, the anthers 1.5–2 mm. long, the thecae one below the other on the connective, the lower one conspicuously calcarate; pollen 4-porate, the insulae scattered and the rows widely spaced; capsules clavate, stipitate, glabrous, about 1 cm. long, containing 4 compressed, ovate, minutely puberulent seeds borne on truncate retinacula.

**Justicia soliana** Standley, Journ. Wash. Acad. Sci. 14: 245. 1924.

Damp or dry thickets or mixed forest, 500–2,000 m.; Escuintla; Guatemala; Jutiapa; Sacatepéquez; Santa Rosa. Mexico (Chiapas) and El Salvador (type from Finca Chilata, Sonsonate).

Slender, erect, branching shrubs, 1–2.5 m. tall, the young branches puberulent; leaves slender-petiolate, the blades thin, oblong-lanceolate to oblong-ovate, mostly 6–20 cm. long, 2–10 cm. wide, long-acuminate, contracted at the base and usually long-decurrent on the petiole, usually glabrous but may be puberulent beneath along the costae, cystoliths conspicuous; inflorescences thyrsiform, mostly 10–30 cm. long, dense or interrupted, the rachis puberulent; bracts linear to linear-oblancheolate, 12–25 mm. long, acute or obtuse, minutely puberulent and often glandular-pilose about the apex; bracteoles narrowly linear, usually 10–12 mm. long; calyx lobes 5, acuminate, 4–5 mm. long, usually finely puberulent; corolla bright red to pale orange-red, 2.5–3 cm. long, pubescent outside and often bearing minute, gland-tipped hairs; stamens about equalling the corolla tube or only slightly exserted, thecae about 2 mm. long, the lower one calcarate; pollen grains 2 porate, bilateral, isopolar, with 2 rows of insulae on either side of each aperture; capsule 12–18 mm. long, glabrous; seeds 4, compressed, orbicular, 2.5–3 mm. in diameter, muricate.

**Justicia spicigera** Schlecht. Linnaea 7: 395. 1832. *Justicia atramentaria* Benth. Pl. Hartweg. 69. 1839. *Sericographis mohintli* Nees in DC. Prodr. 11: 361. 1847. *Jacobinia mohinlli* Hemsl. Biol. Cent. Am. Bot. 2: 521. 1882. *Jacobinia spicigera* L. H. Bailey, Stand. Cycl. Hort. 1715. 1915. *Jacobinia scarlatina* Blake, Contr. Gray Herb. 52: 102. 1917 (type from Manatee Lagoon, British Honduras, Peck 430). *Sacatinta*, *sacatinte* (Chimaltenango and Huehuetenango); *tinta* (Guatemala and Quezaltenango).

Damp or dry thickets, forest, hedgerows, near sea level to 1,800 m., and found in cultivation in almost all inhabited parts of Guatemala; Alta Verapaz; Chimaltenango; Guatemala; Huehuetenango; Petén; Quezaltenango; Retalhuleu; Sololá. Southern Mexico; British Honduras to Honduras and El Salvador, and southward to Costa Rica.

Erect or scandent, usually densely branched shrubs, commonly 1–1.5 meters tall, the branches bifariously pubescent or almost glabrous; leaves short-petiolate, the blades ovate or oblong-lanceolate, mostly 5–18 cm. long, 2–6 cm. wide, acute to long-acuminate, acute to rounded at the base, often abruptly decurrent, often blackening when dried, almost glabrous or more or less pilose, especially on the costae and veins and on or near the margins; inflorescences axillary and terminal, usually shorter than the leaves, basically spicate, but the spikes usually branching 2 or 3 times, glabrous or puberulent, flowers secund; bracts triangular, about 1.5 mm. long; calyx lobes narrowly lanceolate, 2–3 mm. long; corolla 3–3.5 cm. long, appearing fusiform when unopened, commonly orange but sometimes pale red or scarlet, glabrous outside, the lips about 1.5 cm. long, the posterior lip narrow, straight, entire, the anterior lip trilobate, the lobes rounded, 2–3 mm. long; anthers about 2 mm. long, thecae nearly parallel; pollen 2-porate, isopolar, bilateral, with 2 rows of insulae on either side of each aperture; capsule glabrous.

These plants are of considerable economic importance in Guatemala and other parts of Central America and are more commonly used in laundering linen, at least in country regions, than is indigo (*Indigofera*). Many homes at middle and low elevations have one or more bushes of the plant grown for this purpose, and large bales of fresh branches are often carried up to the highlands for sale in the markets. In conjunction with indigo brought from El Salvador it is employed for the dark blue dye characteristic of the woolen textiles of the Guatemalan highlands. It is believed that the plant was used by the ancient Mayas for painting walls and other surfaces. It is also employed in domestic medicine, especially in treating dysentery and the bites of stinging insects.

***Justicia steyermarkii*** Standley & Leonard, Field Mus. Bot. 23: 243, f. 4. 1947, non *Justicia steyermarkii* (Leonard) Leonard, Contr. U. S. Nat. Herb. 31: 523. 1958.

At 1,500–2,600 m.; Huehuetenango (Sierra de los Cuchumatanes, type collected between Xoxlac and Nucapuxlac, *Steyermark 48934*) also on Cerro Huitz).

Erect, herbaceous, or suffrutescent plants to 1.5 m. tall, the stems branched, terete or somewhat quadrangular above, puberulent with yellowish brown hairs; leaves on petioles to 1 cm. long, the blades oblong-lanceolate, mostly 3–6 cm. long and 1–2 cm. wide, acuminate, narrowed to the base and short-decurrent on the petiole, with inconspicuous cystoliths, sparsely hirtellous above, hirtellous beneath on costae and veins or glabrate, with 5–9 pairs of lateral veins; inflorescences axillary or in part subterminal, appearing subcapitate; bracts spatulate, conspicuously ciliate, about 10 mm. long and 3 mm. wide, rounded at the apex, narrowed into a petioliform base 5–6 mm. long; bracteoles similar but smaller; calyx lobes 5, subulate, 5–7 mm. long, sparsely hirtellous, ciliate; corolla 2 cm. long, sparsely pubescent, purplish, the tube 3.5 mm. broad at the base, about 5 mm. broad at the throat, the upper lip ovate, 10 mm. long, 7 mm. wide, rounded and





FIG. 88. *Justicia spicigera*. A, habit,  $\times \frac{1}{2}$ ; B, branch of inflorescence showing flower buds,  $\times 1\frac{1}{2}$ ; C, two flowers, one with corolla closed, the other with corolla in early anthesis,  $\times 1\frac{1}{2}$ ; D, corolla opened to show stamens and pistil (calyx and bract removed),  $\times 2$ ; E, inflorescences,  $\times \frac{1}{2}$ .

emarginate at the apex, the lower lip slightly shorter and narrower, trilobate; stamens about equalling the corolla, thecae about 1.5 mm. long, bearded, superposed, the lower one long-calcarate; ovary minutely puberulent; capsule unknown.

This species was described from one corolla as the flowers on all specimens are immature save this one. Because it was laminated in plastic by the authors, I have been unable to obtain pollen for examination.

***Justicia sulfurea*** (Donn.-Sm.) D. Gibson, *Fieldiana: Botany* 34: 74. 1973. *Dianthera sulfurea* Donn.-Sm. *Bot. Gaz.* 35: 6. 1903.

Known only from the type, Cerro Redondo, Santa Rosa, 1,200 m., *Heyde & Lux* 6215.

Plants suffrutescent, 1–2 m. tall, the young branches pubescent; leaves on petioles 2–5 mm. long, the blades ovate-lanceolate, 5–9 cm. long, 2–4 cm. wide, acuminate, rounded or subcordate at the base, glabrate except on costae and veins; inflorescences axillary, subcapitate, consisting of 2–4 flowers, pedunculate, the peduncles 1–3 cm. long; bracts 5–6 mm. long, bracteoles 7–8 mm. long, both linear and subulate, glandular-pilose; calyx lobes 4, lanceolate, attenuate, appearing subulate or caudate, pilosulous, 7–8 mm. long; corolla yellow, densely long-pilose, 2–2.8 cm. long, the tube straight, slightly ampliate above, the lips almost as long as the tube; stamens long-exserted, the filaments inserted below the throat of the corolla, thecae mucicous, about 2 mm. long, one a little lower than the other on the connective; pollen 2-porate, isopolar, bilateral, with 2 rows of large insulae on either side of the apertures; ovary containing 4 ovules; capsule unknown.

***Justicia tinctoria*** (Hemsl.) D. Gibson, *Fieldiana: Botany* 34: 74. 1973. *Sericographis tinctoria* Oerst. *Vid. Medd. Kjoebenhavn* 1854: 150. 1855 and Walp. *Ann. Bot. Syst.* 5: 663. 1858. *Jacobinia tinctoria* Hemsl. *Biol. Cent. Am. Bot.* 2: 522. 1882. *Tinta* (Quezaltenango).

Dry thickets, 350–1,500 m.; Alta Verapaz; Quezaltenango; Santa Rosa. Nicaragua and Costa Rica (type from Cartago, *Oersted* 170).

Branching shrubs to 2 m. tall, stems terete, glabrous; leaves on petioles 0.5–2 cm. long, the blades lanceolate to oblong-lanceolate, mostly 5–12 cm. long, 1.5–5 cm. wide, acuminate, attenuate to the base, glabrous; inflorescences axillary, spikelike, 3–10 cm. long, the flowers secund; bracts and bracteoles triangular-subulate, 1–2 mm. long, glabrous; calyx lobes triangular-subulate, 1.5–3 mm. long, glabrous, ciliate; corolla pale red, sometimes orange near base of tube and on the lips, glabrous outside, 4–4.5 cm. long, the lips about 1.5 mm. long, the upper lip minutely bidentate, the lower one trilobate, the lobes rounded; thecae 2.5 mm. long, unequally and obliquely attached on the connective, one a little lower than the other; pollen 2-porate, bilateral, isopolar, with 2 rows of insulae on either side of each aperture; capsule glabrous.

This species, like *J. spicigera* Schlecht. (with which it is sometimes confused but which has fusiform corollas) is often cultivated; it is

planted in Escuintla and Jalapa, and probably elsewhere in Guatemala. The leaves of both species, when steeped in hot water, produce a bluing solution used in laundering white clothes.

**Justicia tuerckheimiana** Donn.-Sm. Bot. Gaz. 48: 300. 1909. *Rhytiglossa mexicana* Oerst. Vid. Medd. Kjoebenhavn 1854: 157. 1855. *Dianthera mexicana* Benth. & Hook. ex Jackson, Ind. Kew. 2: 742. 1893 and 4: 719. 1895, non *Justicia mexicana* Rose, Contr. U. S. Nat. Herb. 1: 348. 1895.

Damp or wet thickets or forest, often in rocky places, 210–1,500 m.; Alta Verapaz (type from Cubilgüitz, *Tuerckheim 8726*); El Progreso; San Marcos. Mexico; Honduras.

Perennial, procumbent, decumbent, or ascending plants, rooting at the lower nodes, the stems slender, mostly 8–40 cm. long, simple or branched, more or less pilose with spreading hairs; leaves on petioles 1–15 mm. long, the blades ovate, oblong-ovate, or oblong-lanceolate, 1–8 cm. long, 0.5–3 cm. wide, thin, acuminate to obtuse at apex, acute or attenuate to the base or sometimes rounded, thinly villous above, sparsely pilose or almost glabrous beneath; inflorescences mostly terminal and simple, spicate, slender-pedunculate, 2–10 cm. long, slender, rather densely flowered; bracts laxly imbricate, lanceolate to lance-elliptic, 4–8 mm. long, acute or obtuse, venose, ciliate, hispidulous or glabrate; bracteoles linear-lanceolate, 3–5 mm. long; calyx lobes 5, linear, about 4 mm. long, the posterior fifth one filiform, 2 mm. long; corolla lilac, purple, or white with purple, 6–8 mm. long, pubescent outside, the lips about 2 mm. long; stamens included, thecae about 0.5 mm. long, remote on the connective, the lower one minutely calcarate; pollen 2-porate, isopolar, bilateral, with a row of insulae on either side of each aperture; capsule about 6 mm. long, containing 4 muriculate seeds.

This species is very much like *J. candelariae* (Oerst.) Leonard of Costa Rica and may later prove to be synonymous with it. It appears that the species in this well-marked group of the genus have been unnecessarily divided. Also see discussion under *J. chiapensis* Brandegee.

### LOPHOSTACHYS Pohl

Plants herbaceous or suffrutescent, erect or subscandent, branched, glabrous or pubescent; leaves petiolate, the blades entire, those of a pair sometimes unequal; inflorescences terminal and axillary, spicate, densely flowered, the flowers sessile in the axils of large bracts, the bracts green or colored, striate, biseriata and secund on the rachis, imbricate or lax; bracteoles smaller or none; calyx lobes 4, the 2 outer segments large, ovate or ovate-lanceolate, the posterior one entire, the anterior one often smaller, bifid at the apex, the lateral, interior segments narrow; corolla tube cylindrical, little dilated above, straight or somewhat curved, the limb bilabiate, spreading, the posterior lip shallowly bifid, the anterior lip trilobate, the

lobes imbricate, the lateral ones exterior, the anterior one innermost; perfect stamens 2 or 4 and didynamous, inserted below the apex of the corolla tube, the 2 anterior ones longer and exerted, the posterior ones included; anthers of the anterior stamens bithecos, thecae parallel, equal, mucous, the posterior anthers monothecos or abortive; pollen 3-colporate, prolate; disc cupular; style appearing entire at the apex but actually minutely bifid, subclavate; ovules 2 in each locule; capsule ellipsoidal, oblong, or ovate, acute or short-rostrate, terete or somewhat compressed parallel with the septum; seeds 4 or by abortion fewer, flat, lenticular, the retinacula subacute.

About 12 species, mostly Brazilian, with only one in North America.

**Lophostachys guatemalensis** Donn.-Sm. Bot. Gaz. 31: 119. 1901. Damp or dry thickets or forest, 750–1,300 m.; Escuintla; Guatemala; Santa Rosa (type from Casillas, *Heyde & Lux 4382*). El Salvador (fide Standley).

Herbaceous or suffrutescent plants, erect, to about a meter tall, or the stems sometimes 2 meters long and reclining or subscaudent over shrubs, the young branches slender, obtusely tetragonous, glabrous or nearly so; leaves on petioles 1–6 cm. long, the blades lance-elliptic or lance-ovate, mostly 3–12 cm. long and 1.5–4.5 cm. wide, falcate-acuminate, acute at the base or abruptly contracted and long-decurrent on the petiole, sparsely and minutely strigillose or glabrate, paler beneath, strigillose along the veins or glabrate; inflorescences subsessile, mostly 2–7 cm. long, about 1.5 cm. in diameter; the bracts green, conspicuously secund, linear-lanceolate, 9–10 mm. long, 2.5–3.5 mm. wide, falcate-acuminate and ciliate, pubescent on the veins; bracteoles usually red or reddish, 7–9 mm. long, asymmetric, ciliate; calyx reddish, 10–15 mm. long, the segments more or less spathulate-oblong, cuspidate-acuminate, the anterior one cleft to the middle, reticulate-veined, pubescent; corolla red, pubescent, 28–33 mm. long, the posterior lip truncate-ovate, often minutely bifid, 8–9 mm. long, the anterior lip 10–11 mm. long; stamens 4, as long as or exerted from the corolla, the anthers 2–3 mm. long; capsule puberulent, ellipsoidal, 10–12 mm. long, containing 2–4 seeds about 2 mm. in diameter.

### LOUTERIDIUM S. Watson

Shrubs or small trees, glabrous or villous; leaves petiolate, the blades thin, entire, subcrenate, or undulate-dentate; flowers large, long-pedicellate, in almost naked, terminal racemes or narrow panicles; bracts small and inconspicuous, usually early deciduous; calyx herbaceous, of 3 imbricate, subequal segments, the 2 lower sepals distinct, the upper one apparently formed by the fusion of 3 upper sepals united to the apex; corolla tube very short, abruptly dilated into the large, oblique, gibbous-campanulate throat; corolla limb convolute in bud, the 5 lobes subequal, usually very short; stamens 2 or 4, exerted, the filaments inserted on the corolla tube, dilated and somewhat pubescent below, the anthers bithecos, dorsifixed, glabrous, the thecae parallel; pollen grains spheroidal, verrucose,



FIG. 89. *Lophostachys guatemalensis*. A, habit,  $\times \frac{1}{2}$ ; B, detail of inflorescence showing bracts, bracteoles, and calyces,  $\times 2$ ; C, flower complete with bracteoles and calyx,  $\times 2\frac{1}{2}$ ; D, dissection showing point of filament attachment on corolla tube,  $\times 2\frac{1}{2}$ ; E, calyx opened to show pistil,  $\times 1\frac{1}{2}$ ; F, opened capsule,  $\times 2$ ; G, seeds,  $\times 3$ .

pantoporate; ovary containing 6-8 ovules in each locule; style filiform, the stigma bilobate; fruit capsular, sessile, subtetragonal and somewhat compressed dorsally, containing 12-16 flat, lenticular seeds borne on stout, acute retinacula.

Besides the following species, three others have been reported from Mexico and one from Costa Rica.

Leaf blades ovate or broadly ovate, rounded or subcordate at the base, sparsely or densely villous. . . . . *L. donnell-smithii*.

Leaf blades lanceolate, lance-oblong, or oblanceolate-oblong, long-attenuate to the base, glabrous or nearly so.

Stamens 2; calyx lobes mostly 8-10 mm. wide, more or less acuminate at the apex. . . . . *L. mexicanum*.

Stamens 4; calyx lobes 3-4 mm. wide, the apex obtuse or subacute. *L. chartaceum*.

**Louteridium chartaceum** Leonard, Carnegie Inst. Wash. Publ. 461: 197. f. 1. 1936.

Known only from the type, British Honduras, Gracie Rock, Sibun River, little above sea level, *P. H. Gentle 1526*.

A glabrous shrub; leaves slender-petiolate, the blades oblong-lanceolate, 14-18 cm. long, 4-6 cm. wide, long-acuminate, long-attenuate to the base; flowers few, borne in slender, lax racemes; bracts ovate, acute, deciduous; pedicels 3-4 cm. long; calyx segments linear-oblong, 1.5-2.5 cm. long, 3-4 mm. wide at the base, gradually attenuate to the obtuse or subacute apex; corolla about 3 cm. long, 2 cm. broad, yellowish green, the lobes about 1 cm. long; stamens 4, long-exserted, filaments sparsely pubescent, the anthers about 8 mm. long; capsule cylindric, 2-2.5 cm. long, 4-5 mm. broad; seeds flat, white, pubescent on the margins, the surfaces rugulose.

**Louteridium donnell-smithii** S. Wats. Proc. Amer. Acad. 23: 284. 1888; Donnell-Smith, Bot. Gaz. 14: 29, t. 7. 1889. *Vejiga* (Alta Verapaz); *tabaco silvestre* (Petén).

Wet, mixed forest or in dense thickets, sea level to 1,600 m.; Alta Verapaz (type from Pansamalá, *Tuerckheim 856*); Huehuetenango; Izabal; Petén; El Progreso; Zacapa. Mexico (Chiapas); British Honduras; Honduras.

Rather stout, erect shrubs 2-4 m. tall, or small trees as much as 9 m. tall, the branches very brittle, densely short-villous with fulvous or sordid hairs; leaves petiolate, the blades thin, ovate or broadly ovate, mostly 10-36 cm. long and 6-28 cm. wide, acute or abruptly short-acuminate, broadly rounded or shallowly cordate at the base, densely villous or villous-tomentose on both surfaces or only thinly villous above, the margins usually undulate-dentate; flowers long-pedicellate, few in each inflorescence, forming rather large, terminal racemes or open, narrow panicles; calyx segments lance-oblong to falcate, green or sometimes purplish, 3-4 cm. long, the two anterior ones acute or short-acuminate, short-villous or glabrate, the posterior segment acuminate, carinate, folding over the



FIG. 90. *Louteridium donnell-smithii*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and pistil,  $\times 1$ ; C, corolla prior to anthesis,  $\times \frac{1}{2}$ ; D, calyx with ovary,  $\times 1$ ; E, capsule opened to show placentae with retinacula and seeds,  $\times 2$ ; F, seed,  $\times 3$ , with section of papillate surface greatly enlarged.

margins of the other two flat segments; corolla usually dark, dull purplish-red or brownish red, often flushed with green, sometimes white tinged with purple, sparsely short-villous outside or almost wholly glabrous, 5–6 cm. long, the throat 3.5–5 cm. broad; stamens 2, exerted, the anthers 10–13 mm. long; capsule broadly cylindrical, thinly villosulous, 2.5–3 cm. long, about 6 mm. broad, containing 12–16 seeds, 3–4 mm. in diameter.

Abundant in some localities of the mountains of Alta Verapaz, sometimes forming dense thickets, growing always in well shaded and very wet situations. These plants appear most handsome in herbarium specimens and drawings; however, the coloring of the flowers is such that they are more bizarre than beautiful. In spite of the plants' evident dependence upon abundant and constant moisture, the leaves soon suffer if they become too wet, drooping and decaying on the branches, producing an untidy appearance.

**Louteridium mexicanum** (Baill.) Standl. Contr. U. S. Nat. Herb. 23: 1338. 1926. *Neolindenia mexicana* Baill. Bull. Soc. Linn. Paris 2: 851. 1889. *L. purpusii* Brandg., Univ. Calif. Publ. Bot. 6: 68. 1914.

Dense, damp or wet, mixed mountain forest, often forming dense thickets along streams, 1,200–2,000 m.; Quezaltenango; San Marcos. Mexico (Chiapas).

Sparsely branched, erect, brittle shrubs or small trees, 3–6 m. tall, glabrous throughout or nearly so, except in the inflorescences, these minutely puberulent; leaves petiolate, the blades oblanceolate-oblong to elliptic, commonly 12–30 cm. long and 5–9 cm. wide, acuminate, long-attenuate to the base, usually entire or nearly so, sometimes subcrenate; inflorescences long, open, narrow, few-flowered racemes or narrow panicles, the flowers on slender pedicels 2–6 cm. long; calyx segments mostly 2.5–4 cm. long and 0.8–1 cm. wide, acuminate or short-acuminate, green or tinged with purple, very minutely puberulent; corolla pale green with pale purplish veins, 4–5 cm. long, about 3 cm. wide, sparsely puberulent outside; stamens long-exserted, the filaments about twice as long as the corolla; anthers yellowish brown, about 1 cm. long; capsule columnar, about 2.5 cm. long, pilosulous.

### MEGALOSTOMA Leonard

Branched shrubs, almost glabrous, the branches obtusely tetragonous, constricted at the nodes when dried; leaves on very short petioles, blackening when dried, the blades acuminate, entire; inflorescences terminal or possibly lateral, the flowers secund along the short branches of very small panicles; bracts leaflike, soon deciduous; calyx lobes 5, very unequal in breadth, the posterior one elliptic, the lateral ones falcate, the anterior ones very narrow; corolla large, bilabiate, the posterior lip erect, the anterior one spreading, the tube short, broad; stamens 2, equalling the corolla in length; anthers bitheous, thecae parallel, nearly equal,





FIG. 91. *Megalostoma viridescens*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and pistil,  $\times 2$ ; C, anterior view of calyx,  $\times 2$ ; D, posterior view of calyx,  $\times 2$ .

one only slightly longer than the other, acute at the base; pollen grains ellipsoidal, tubercular, with an equatorial band of pores; fruits unknown.

Only one species is known.

**Megalostoma viridescens** Leonard, Journ. Wash. Acad. Sci. 30: 503. f. 2. 1940.

Known only from the type locality, wet mixed forest, Escoba, across the bay (west) from Puerto Barrios, Izabal, at or near sea level, type, *Standley 72948*.

Slender shrubs about 2 m. tall, the branches glabrous, with very small cystoliths; leaves on petioles to 5 mm. long, the blades oblong-elliptic or lance-elliptic, mostly 4–12 cm. long and 2–5 cm. wide, long-acuminate, rounded or obtuse at the base, the cystoliths obscure; bracts leaflike, soon deciduous; calyx glabrous, 1.5–2 cm. long, the posterior lobe elliptic, about 7 mm. wide, obtuse, the lateral lobes lanceolate, about 5 mm. wide, subacute, the anterior segments narrowly lanceolate, 1.5 mm. wide; corolla greenish-white, glandular-pubescent outside, about 3.5 cm. long, the lips entire, the upper one linear-oblong, about 5 mm. wide, obtuse, erect, the lower lip about 15 mm. wide, obtuse, spoonlike; anthers 6–7 mm. long; style equalling the stamens, reclining in the lower lip of the corolla; fruits unknown.

## MENDONCIA Vellozo

*References:* W. B. Turrill, A Revision of the Genus *Mendoncia*, Kew Bull. 407–425. 1919; C. E. B. Bremekamp, The Delimitation of the Acanthaceae, Proc. Kon. Ned. Akad. v. Wetensch, Ser. C, 56: 533–546. 1953. Delimitation and Subdivision of the Acanthaceae, Bull. Bot. Surv. India 7: 21–24. 1965; Bhoj Raj, Pollen Morphological Studies in the Acanthaceae, Grana Palynol. 3(1): 24, 93. 1961.

Herbaceous or suffrutescent vines, pubescent with simple (in ours) or stellate hairs, the older stems obsoletely tetragonous, the young ones subterete; leaves opposite, penninerved, petiolate; flowers solitary or binate in the leaf axils; bracts 2, large and spathe-like, often equalling the corolla tube, often partially connate, flat or carinate; calyx small, annular or cupular, entire, glabrous or pubescent; corolla purple, red, greenish-white or cream, tubular, the tube straight or incurved, cylindrical or ampliate above, often gibbous or oblique near the base, the limb small or large, the 5 lobes spreading or reflexed; stamens 4, included, didynamous, the short filaments inserted near the middle of the corolla tube, the anthers bithecous, linear, glabrous or glandular-puberulent dorsally, the thecae parallel, subequal or very unequal at the base, more or less bearded at the base; pollen 5–6-colporate, prolate spheroidal; disc annular, carnos, strongly convex, including the base of the ovary; ovary usually oblique and compressed, unequally bilocular but one locule usually abortive; ovules 1–2 in the locule; style filiform, the stigma shallowly and unequally bilobate; fruit drupaceous, ovoid to ellipsoid, more or less compressed, the mesocarp fleshy or pulpy, the endocarp osseous; seeds 1–2, erect, affixed laterally at the base.

About 25 species, in tropical America. Three other Central American species are found in Costa Rica and Panama.

Although I agree with Bremekamp and Raj that the Mendoncioideae should be raised to family rank as Mendonciaceae, they are included here in the traditional usage as a matter of convenience.

Leaves and bracts glabrous or nearly so; bracts retuse and apiculate at the apex.

*M. retusa.*

Leaves and bracts usually densely pilose; bracts not retuse-apiculate.

Pedicels pilose with long, spreading hairs; bracts 3-4 cm. long, oblong-lanceolate, acuminate. . . . . *M. lindavii.*

Pedicels pubescent with short, appressed hairs; bracts 2.2-2.5 cm. long, broadly elliptic, obtuse or subacute. . . . . *M. guatemalensis.*

**Mendoncia guatemalensis** Standl. & Steyerl. Field Mus. Bot. 23: 245. 1947. *Ciruela de pasa silvestre.*

Known only from the type, Huehuetenango, between Ixcán and Río Ixcán, 150-200 m., *Steyermark 49270.*

Suffrutescent vines, the stems densely pubescent with fulvous, subappressed, short hairs; leaves on petioles 1.5-2 cm. long, the blades ovate-elliptic, 7-11.5 cm. long, 3.5-6 cm. wide, abruptly acuminate, rounded at the base, sometimes abruptly short-decurrent on the petiole, sparsely appressed-pilosulous or glabrate above, densely appressed-pilosulous on the costae, slightly paler beneath and densely pilosulous with appressed, fulvous hairs, the lateral veins 4-5 pairs; pedicels usually geminate, rather stout, in fruit 10-14 mm. long, pubescent with appressed hairs; bracts broadly elliptic, 2.2-2.5 cm. long, 1-1.5 cm. wide, obtuse to subacute, rounded at the base, densely pilosulous with incurved hairs; drupe obovoid to broadly ellipsoidal, about 2 cm. long, obtuse or subacute, glabrous.

**Mendoncia lindavii** Rusby, Mem. Torrey Club 4: 241. 1895. *M. belizensis* Standley, Field Mus. Bot. 11: 142. 1932 (type from Stann Creek Valley, British Honduras, *W. A. Schipp 961*).

Damp or wet, mixed lowland forest, sea level to 350 m.; Alta Verapaz; Izabal. British Honduras; Costa Rica; western South America.

Large vines, sometimes 18 m. long, herbaceous or suffrutescent, the stems densely pilose with long, spreading or ascending, fulvous hairs; leaves short-petiolate, the blades elliptic or ovate-elliptic, mostly 5-11 cm. long and 2.5-5 cm. wide, abruptly acuminate, obtuse or rounded at the base, long-pilose on both surfaces, more densely so beneath, with long, laxly appressed hairs; pedicels solitary or geminate, 2-3 cm. long, densely fulvous-pilose with long, soft, spreading hairs; bracts oblong-lanceolate, subfalcate, 3-4 cm. long, about 1 cm. wide, long-acuminate, fulvous-pilose; corolla bright rose-red, glabrous, 4-5 cm. long, the lobes rounded, 3-5 mm. long; drupe broadly ellipsoid, about 2 cm. long, 1-1.5 cm. wide, black at maturity, puberulent.



FIG. 92. *Medoncia lindavii*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens,  $\times 1$ ; C, bracts and drupe,  $\times 1$ ; D, pistil with calyx and disc,  $\times 1$ .

**Mendoncia retusa** Turrill, Kew Bull. 423. 1919.

Damp or wet forest, about 600–800 m.; Sololá. Mexico (Chiapas); British Honduras; Honduras; Costa Rica; Panama.

Large, herbaceous or suffrutescent vines, sometimes 10 m. long, the stems somewhat tetragonous, sparsely strigose or almost glabrous; leaves petiolate, the blades elliptic, lance-elliptic, or ovate-elliptic, mostly 5–12 cm. long and 3–7 cm. wide, abruptly long-acuminate, rounded or obtuse at the base, glabrous or nearly so, but sparsely strigose on the veins, somewhat paler beneath; pedicels solitary, 2–3 cm. long, glabrate; bracts oblong, 2–3 cm. long, 1–2 cm. wide, rounded at each end, retuse and apiculate at the apex, green, glabrous or nearly so; corolla pale green, greenish white, or creamy buff, spotted or streaked with purple, or purple in the throat, glabrous, 4–5 cm. long, the lobes spreading, broadly obovate, 5–10 mm. long; fruit purple-black at maturity, ellipsoid to ovoid, about 1.5 cm. long, minutely puberulent or almost glabrous.

**NEOHALLIA** Hemsley

Glabrous, erect shrubs; leaves opposite, petiolate, the blades very large, long-acuminate, attenuate to the base, cystoliths numerous and minute; inflorescences axillary, pedunculate, the flowers sessile, very large, in groups of 2–4, surrounded by a large involucre of united bracts; calyx tubular, shallowly dentate, the 5 almost equal teeth mucronulate; corolla tube a little longer than the limb, slightly curved, not or scarcely ampliate above, the limb bilabiate, the posterior lip suberect, entire or emarginate, the anterior lip shallowly trilobate, recurved; stamens 2, slightly longer than the posterior lip; anthers bithecos, the thecae discrete, unequally inserted on the connective, calcarate; pollen ellipsoidal, 2-porate, bilateral; disc very large, carnose, cupular; ovary glabrous, with 2 ovules in each locule.

The genus consists of a single species.

**Neohallia borraerae** Hemsley, Biol. Centr. Am. Bot. 2: 519. 1882. *Palma de monte*.

Wet mountain thickets, 1,300–1,500 m.; San Marcos (southern slopes of Volcán de Tajumulco, above Finca El Porvenir, *Steyermark 37219*). Mexico (Chiapas).

Glabrous shrubs, the branches stout, terete, strongly constricted at the nodes in drying; leaves on petioles 2–4 cm. long, the blades thick, oblanceolate, 20–35 cm. long, 4–9 cm. wide, long-acuminate, long-attenuate to the base, slightly paler beneath, with 15–20 pairs of lateral veins; peduncles solitary in the leaf axils, 2–8 cm. long, thickened above; bracts 4–6.5 cm. long, acute, bluish purple; corolla 7–7.5 cm. long, coral red, the posterior lip about 4 cm. long; anthers barely exerted, 4–5 mm. long.

**ODONTONEMA** Nees

Shrubs or suffrutescent herbs, glabrous or sparsely pubescent; leaves opposite, entire; flowers heterostylous, sessile or pedicellate, solitary, geminate, or fascicu-



FIG. 93. *Neohallia borraerae*. A, habit,  $\times \frac{1}{2}$ ; B, bract opened to show developing buds within,  $\times 1$ ; C, corolla opened to show stamens and pistil,  $\times 1\frac{1}{2}$ ; D, opened calyx,  $\times 1\frac{1}{2}$ ; E, capsule with remnant of calyx,  $\times 1$ ; F, seed,  $\times 1\frac{1}{4}$ .

late in the axils of usually small bracts, the fascicles or cymules arranged in a terminal raceme or panicle; bracts small and narrow, the bracteoles minute; calyx lobes 5, narrow, acute or acuminate; corolla tube elongated, straight or slightly incurved, ampliate above the middle, the limb somewhat bilabiate, the posterior lip innermost in bud, erect, entire or bifid, the anterior lip trilobate, the lobes erect or spreading, subequal, the middle one outermost in bud; stamens 2, included or subexserted, the filaments inserted at or above the middle of the corolla tube, slightly dilated at the base, the anthers bithecous, thecae oblong-linear, nearly parallel, mucous, equal or one of them slightly longer; staminodes 2, posterior, small; pollen 3-colporate, subprolate; disc inconspicuous; style filiform, subcapitata at the apex, truncate or didymous; ovules 2 in each locule; capsule oblong, contracted at the base and stipelike; seeds 4 or by abortion fewer, lenticular, smooth or tuberculate-rugose or verrucose.

Species 20 or more, widely distributed in tropical America.

Corollas yellow.

Inflorescence branching 3-5 times, forming a lax, open panicle; flowers solitary or rarely geminate in the axil of a bract; calyx 1-2 mm. long; anthers about 1.5 mm. long. . . . . *O. hondurensis*.

Inflorescence a racemiform panicle; flowers fasciculate or in cymules of usually 3 or more flowers; calyx 2-4 mm. long; anthers 2-3 mm. long. . . . . *O. glabrum*.

Corollas not yellow.

Flowers subsessile or on pedicels 1-2 mm. long; corollas white or white with lavender on one or more lobes, 1-1.5 cm. long; seeds ovate. . . . . *O. albiflorum*.

Flowers all or mostly on pedicels 3-15 mm. long; corollas pink, red, purple, or lavender, 1.5-3 cm. long; seeds lenticular. . . . . *O. callistachyum*.

**Odontonema albiflorum** Leonard, Carnegie Inst. Wash. Publ. 461: 219, f. 14. 1936.

Dense, wet, mixed forest, sometimes on limestone, near sea level to 1,650 m.; Alta Verapaz (type from Cubilgüitz, *Tuerckheim 7937*); Baja Verapaz; Chimaltenango; Guatemala; Izabal; Petén. Mexico (Chiapas); British Honduras.

Shrubs to 1.5 m. tall, the branches puberulent or almost glabrous; leaves on stout petioles 5-10 mm. long, the blades rather thick and firm, oblong-ovate or elliptic-obovate, mostly 15-30 cm. long, 5-12 cm. wide, cuspidate-acuminate to abruptly acuminate, cuneate-attenuate to the base and decurrent to long-decurrent on the petiole, puberulent beneath on the costae and veins or almost glabrous, the venation usually conspicuous beneath; inflorescences spiciform, often elongating and equalling the leaves or nearly so, the fascicles usually with 6 or more flowers, densely crowded, subsessile or on pedicels 1-2 mm. long, the rachis stout, usually densely pubescent; bracts narrowly triangular, 3-4 mm. long, acuminate and mucronate, ciliolate; bracteoles about 1 mm. long; calyx 2.5-4 mm. long, the lobes linear and subulate, ciliate; corolla white or white with purple spots on one or more lobes, 1-1.4 cm. long, glabrous, the lips 4-6 mm. long; anthers 1.5 mm. long; capsule 2-2.5 cm. long, usually containing 2 ovate seeds.

**Odontonema callistachyum** (Schlecht. & Cham.) Kuntze, Rev. Gen. 2: 494. 1891. *Justicia callistachya* Schlecht. & Cham. Linnaea 6: 370. 1831. *J. corymbulosa* Bertol. Fl. Guat. 404. 1840, *ex descr.* *J. tubaeformis* Bertol. *l.c.*, *ex descr.* *Thyrsacanthus cuspidatus* Nees in DC. Prodr. 11: 323. 1847. *T. tubaeformis* Nees, *tom. cit.* 324. *T. strictus* Nees, *l.c.* *T. callistachyus* Nees, *tom. cit.* 326. *Rhytiglossa corymbulosa* Nees, *tom. cit.* 355. *Thyrisicanthus geminatus* Donn.-Sm. Bot. Gaz. 13: 75. 1888 (type from Alta Verapaz, *Tuerckheim 740*). *Odontonema cuspidatum* Kuntze, Rev. Gen. 2: 494. 1891. *O. strictum* Kuntze, *l.c.* *O. tubiforme* Kuntze, *l.c.* (type from Escuintla, *Velásquez*). *O. geminatum* Blake, Contr. Gray Herb. 52: 104. 1917. *O. steyermarkii* Leonard, Journ. Wash. Acad. Sci. 33: 71. 1943 (type from Quezaltenango, *Steyersmark 35020*). *Coralillo, palo de agua* (Retalhuleu); *flor de la cruz* (Quezaltenango); *flor de mayo* (San Marcos); *hoja de tinta* (Guatemala).

Damp or wet thickets or mixed forest, 75–2,800 m.; Alta Verapaz; Chimaltenango; Escuintla; Guatemala; Huehuetenango; Izabal; Petén; El Progreso; Quezaltenango; Retalhuleu; Sacatepéquez; San Marcos; Santa Rosa; Suchitepéquez; Totonicapán. Southern Mexico; British Honduras; Honduras; El Salvador; Nicaragua; Costa Rica; Panama.

Slender, usually erect shrubs, occasionally subscaudent, commonly 1–2 m. tall, rarely to 4 or 5 m.; usually sparsely branched, the branches terete or obscurely tetragonus, pubescent or glabrous; leaves on short petioles, the uppermost leaves sometimes sessile, the blades ovate-oblong, lance-oblong, elliptic, or obovate-oblong, mostly 8–30 cm. long, 4–14 cm. wide, acuminate to long-acuminate, acute or attenuate to the base, rarely abruptly contracted and decurrent on the petiole, more or less pubescent or short-villosulous on the veins or almost glabrous; inflorescences pedunculate, simple and racemiform or sometimes with ascending branches and becoming paniculate, the racemes often much elongated and exceeding the leaves, usually more or less interrupted, the rachis usually pubescent or puberulent, rarely nearly glabrous; flowers pedicellate, usually 2 or more in a sessile fascicle, but sometimes disposed in pedunculate cymes, the peduncles 2–10 mm. long; bracts usually narrowly triangular or subulate, carinate, often cuspidate, ciliolate, usually 2–4 mm. long, rarely the outermost involucral bracts as much as 6–8 mm. long; calyx lobes 2–5 mm. long, lance-subulate, ciliolate, often tinged with red or purple; corolla usually red or purple, sometimes pink, lavender, or pale salmon red, rarely buff with lavender lobes, 1.5–2.8 cm. long, the lobes 4–6 mm. long, rounded at the apex and usually ciliolate; stamens of the short-styled flowers about equalling the corolla; those of the long-styled flowers much shorter; anthers 2–3 mm. long; capsule about 2 cm. long, glabrous, containing 4 more or less verrucose, lenticular seeds.

Odontonemas with pink, red, or purple flowers have at times been separated into various species based on degree of pubescence of





FIG. 94. *Odontonema callistachyum*. A, habit,  $\times \frac{1}{2}$ ; B, flower with corolla separated to show ovary,  $\times 3\frac{1}{4}$ ; C, corolla opened to show stamens and staminodes,  $\times 3\frac{1}{4}$ ; D, section of fruiting branch with capsules,  $\times 1\frac{1}{4}$ .

the rachis, corolla color, and/or the number of flowers in a cymule. It seems clear that neither pubescence nor corolla color within the pink to purple range can be considered dependable criteria for distinguishing specific units. However, some plants with only two or three flowers in a fascicle and only two fascicles opposite each other on the rachis do present quite a different aspect to that of vigorous plants with numerous flowers densely disposed on the rachis. According to the original description of *Justicia callistachya*, the fascicles are 3–7–11 flowered; Nees, in his description of *Thyrsacanthus tubaeformis* states, "Flores . . . inferiores fasciculati duo-tres." Actually, each fascicle of all plants in this complex is commonly composed of two to four flowers, but in some plants several fascicles may be produced in a compact cluster. A single inflorescence may produce both sessile fascicles and pedunculate cymules. Leaf size and shape and pedicel length were also compared and found to be quite variable, with obvious intergradation throughout the range.

**Odontonema glabrum** Brandegee, Univ. Calif. Publ. Bot. 6: 195. 1915. *O. galbanum* Leonard, Journ. Wash. Acad. Sci. 33: 72. 1943.

Wet woods and thickets, 720–1,600 m.; Escuintla (type of *O. galbanum*, Standley 63875); Sacatepéquez; San Marcos. Southern Mexico (type from Chiapas, Purpus 7208); British Honduras.

Slender, sparsely branched shrubs 1–2 m. tall, glabrous throughout or nearly so; leaves on very short petioles, the blades oblong-lanceolate to oblong-elliptic, mostly 9–35 cm. long, 3–9 cm. wide, acuminate to narrowly long-acuminate, attenuate to the base; inflorescence a terminal, narrow, racemiform panicle, pedunculate, 10–30 cm. long, the flowers pedicellate, fasciculate or in short-pedunculate, few-flowered cymules; bracts triangular or subulate, 2–3 mm. long; calyx 2–4 mm. long, the lobes linear-lanceolate, acuminate; corolla yellow, 2–3 cm. long, glabrous, the lips 4–5 mm. long, the lobes minutely fimbriate; stamens included or exserted (flowers heterostylous), the anthers 2–3 mm. long; capsule glabrous, 1.5–2 cm. long, containing 2 lenticular, verrucose seeds.

Type material of *O. glabrum* differs from that of *O. galbanum* only in its shorter corollas which appear to be immature.

**Odontonema hondurensis** (Lindau) D. Gibson, Fieldiana: Botany 34: 74. 1973. *Diateinacanthus hondurensis* Lindau, Bull. Herb. Boiss. II. 5: 369. 1905. *Odontonema paniculiferum* Blake, Contr. Gray Herb. 52: 104. 1917.

Damp or wet, mixed forest, near sea level to 1,300 m.; Izabal; Petén; Chiquimula. British Honduras (type from Manatee Lagoon,

Peck 278); Atlantic coast of Honduras (type of *Diateinacanthus hondurensis* Lindau from Tela, Percy Wilson 129).

Slender shrubs 1-3 m. tall, glabrous throughout or nearly so; leaves on petioles 3-7 mm. long, the blades mostly oblong-elliptic, commonly 7-16 cm. long, acuminate to cuspidate-acuminate, acute or obtuse at the base; inflorescences usually terminal, branching 3-5 times, forming a lax, open panicle, 7-15 cm. long and often as broad, the lower branches often elongating, the slender pedicels 3-10 mm. long; the flowers opposite, usually solitary in the axil of a bract, rarely geminate; bracts subulate, 1-1.5 mm. long; calyx 1-2 mm. long, the lobes first triangular, becoming subulate, sparsely ciliolate; corolla yellow or cream-colored, 1.8-2.2 cm. long, the short lobes obtuse or rounded, ciliolate; anthers about 1.5 mm. long; capsule glabrous, 1.5-1.8 cm. long, containing 2-4 lenticular, verrucose seeds.

### POIKILACANTHUS Lindau

Branched herbs or shrubs; leaves opposite, anisophyllous, petiolate, the blades membranaceous, usually pubescent; inflorescences axillary or terminal, few-flowered, headlike; bracts often foliaceous, the bracteoles smaller; calyx lobate almost to the base, the 5 segments narrow; corolla tube elongated, slender, little ampliate above, straight or slightly curved, the limb bilabiate, the posterior lip galeiform, hooded, the lower lip elongated, recurved; stamens about equalling the corolla or slightly exserted, anthers bithecous, the thecae superposed or remote on the connective, muticous or very minutely calcarate; pollen prolate, polyporate, the sexine composed of densely spaced polygonal insulae; disc conspicuous; stigma obscurely bilobate; capsule acute, subterete, appearing stipitate, containing 2 compressed seeds in each locule.

This genus often appears superficially like *Justicia* (*Jacobinia*), but may be distinguished (in ours) by the anisophyllous leaves as well as characters of the pollen.

Of the 12 species described, four are in Guatemala, one in Nicaragua, and the remainder in South America.

Corollas red, 3.5-4.5 cm. long.

Bracts cuneiform above, tapering to a clawlike base; calyx 9-10 mm. long; thecae remote from one another on the connective. . . . . *P. pansamalanus*.

Bracts spatulate; calyx 6-7 mm. long; thecae superposed, one a little lower than the other on the connective. . . . . *P. skutchii*.

Corollas lavender or purple, 5-7.5 cm. long.

Leaves puberulent beneath with short, incurved, or appressed hairs; bracteoles spatulate, short-ciliate. . . . . *P. macranthus*.

Leaves usually densely hirsute beneath with long, spreading, rather stiff hairs (sometimes confined to costae and veins); bracteoles oblanceolate to lance-linear, long setose-ciliate. . . . . *P. setiferus*.

**Poikilacanthus macranthus** Lindau. Bull. Herb. Boiss. 3: 481. 1895. *Jacobinia purpusii* Brandege, Univ. Calif. Publ. Bot. 6:

195. 1915 (type from Chiapas, Mexico). *Sacatillo chillet* (Quezaltenango).

Dense, wet, mixed forest, 350–2,650 m.; Alta Verapaz; Izabal; Quezaltenango; San Marcos; Suchitupéquez. Mexico (Chiapas); Honduras; Nicaragua (type *Rothschuh 228*); Costa Rica.

Slender, densely branched, brittle shrubs 1–4.5 m. tall, sometimes elongated, weak, reclining or subscaudent, the young branches rather densely pubescent with short, yellowish, incurved hairs; leaves on slender petioles 1–3 cm. long, the blades thin and soft, ovate or oblong-ovate, mostly 3–11 cm. long, acuminate with an obtuse tip, acute to rounded and often oblique at the base, with numerous, conspicuous, short cystoliths, sparsely pilose with short subappressed hairs above, slightly paler beneath, pubescent on the veins with short, curved, subappressed hairs; inflorescences headlike, commonly with 3–6 flowers; bracts foliaceous, oblong to spatulate, 9 mm. long and 2 mm. wide, hirsutulous, the bracteoles spatulate, often nearly truncate; calyx segments lanceolate, 5–6 mm. long, ciliate; corolla pale lavender to bright purple, sparsely pubescent outside, the tube 3–4 cm. long, 2–6 mm. in diameter, the upper lip 3–3.5 cm. long, bilobate at the apex, the lower lip about 2.5 cm. long; stamens about equalling or slightly exceeding the corolla, the anthers about 2 mm. long; capsule 1.5–2 cm. long, pilosulous, the stipelike portion 4–6 mm. long, solid, the upper portion ovoid, containing 4 flat, nearly ovate, black or brown, almost smooth seeds.

These shrubs are plentiful in some parts of Alta Verapaz and in many of the narrow canyons of the mountains of the Occidente, where fog hangs for much of the year, at least in late afternoon and early morning. They are among the most beautiful of Guatemalan plants, the flowers produced in abundance.

**Poikilacanthus pansamalanus** (Donn.-Sm.) D. Gibson, Fieldiana: Botany 34: 75. 1973. *Beloperone pansamalana* Donn.-Sm. Bot. Gaz. 13: 75. 1888.

Known only from the type locality, wet mixed forest, 1,300 m., Pansamalá, type, *Tuerckheim 732*, Alta Verapaz.

Epiphytic shrubs, the branches ascending, the stems nodose, the intervals between the nodes relatively short, bifariously puberulent or glabrate; leaves short-petiolate, the blades small, mostly 2–3 cm. long, broadly elliptic or oblanceolate, obtuse-acuminate, attenuate to the base, glabrous; inflorescences terminal, cymose, short-pedunculate, of 2–4 flowers, these subsessile or short-pedicellate; bracts 5–6 mm. long, cuneiform above and tapering abruptly to a clawlike base, truncate to obtuse at the apex, glandular-pubescent; bracteoles 7–9 mm. long, linear-spatulate; calyx lobes linear-subulate, 9–10 mm. long, pubescent and more or less ciliate; corolla 3.5–4 cm. long, scarlet, the lips about 1.5 cm. long, pubescent outside, the posterior lip bidentate, the 3 lobes of the anterior lip about 4 mm. long; stamens about equalling the lips, the anthers 1.5–2 mm. long, thecae curved, remote, one much lower than the other on the connective; the style shortly exerted; capsule unknown.



FIG. 95. *Poikilacanthus macranthus*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens,  $\times 1$ ; C, calyx (with bracts and bracteoles) opened to show pistil,  $\times 2$ ; D, two capsules, one opened, with retinacula and seeds,  $\times 2$ .

**Poikilacanthus setiferus** Standl. & Steyerl. Field Mus. Bot. 23: 246. 1947.

Damp or wet forest, 900–1,800 m.; Alta Verapaz (type collected between Chamá and Cobán, *Harry Johnson 523*); Huehuetenango (Cerro Chiblac, between Ixcán and Finca San Rafael, Sierra de los Cuchumatanes). Mexico (Chiapas).

Erect herbs 60–90 cm. tall, branched, the stems densely villous-hirsute with long, spreading, multicellular hairs; leaves on slender hirsute petioles 1–3 cm. long, the blades thin, entire, ovate or oblong-ovate, 3–10 cm. long, 1.5–4 cm. wide, obtuse-acuminate, rounded to subacute at the base, sparsely setose-hirsute above, the cystoliths dense and conspicuous, paler beneath, densely hirsute with very long, spreading, rather stiff hairs; inflorescences headlike, 2–4-flowered; bracts foliaceous, to 2 cm. long, the bracteoles oblanceolate or lance-linear, slightly longer than the calyx, usually densely hirsute, long setose-ciliate; calyx about 6 mm. long, the segments narrowly lanceolate, attenuate-acuminate, hirtellous; corolla purple, 5–6 cm. long, sparsely villous outside, the tube gradually ampliate upward, the posterior lip about 3 cm. long, shallowly bilobate at the apex, the lower lip slightly shorter; stamens about as long as or slightly exceeding the corolla; thecae about 2 mm. long; fruits unknown.

**Poikilacanthus skutchii** D. Gibson, Fieldiana: Botany 34: 75. 1973.

Wet forest, 1,800–2,400 m.; Quezaltenango (type, *Skutch 936*); San Marcos.

Weak shrubs to 2 m. tall, the stems and young branches pubescent or glabrate; leaves on petioles 0.5–1.5 cm. long, the blades usually elliptic to lance-elliptic, rarely ovate-elliptic, mostly 2–6 cm. long, 1–2.5 cm. wide, apex usually abruptly acuminate, attenuate to the base, glabrous or with some scattered pubescence along the veins; inflorescences terminal, cymose, short-pedunculate, the flowers few, sessile or short-pedicellate; bracts spatulate, 7–9 mm. long, 3–4 mm. broad, more or less glandular-puberulent; bracteoles similar but a little smaller; calyx lobes linear-oblong, acute, 6–7 mm. long; corolla red, 4–4.5 cm. long, only a little ampliate above, pubescent outside, the lips 1.5–2 cm. long, the posterior lip shortly bilobate, the anterior one trilobate, the lobes about 2 mm. long; stamens about equalling the corolla lips, the filaments attached below the throat; thecae 2–3 mm. long, one lower than the other on the connective, both minutely calcarate; style exserted, the stigma obscurely bilobate; capsule glabrous, about 1.5 cm. long, containing 4 smooth, compressed, orbicular seeds.

This plant resembles *P. pansamalanus* (Donn.-Sm.) D. Gibson, but the latter has cuneiform bracts tapering to a clawlike base, a longer calyx, 9–10 mm., smaller thecae, 1.5–2 mm., these mucous, curved, and remote from one another on the connective instead of merely superposed as in *P. skutchii*.

## PSEUDERANTHEMUM Radlkofer

Herbaceous or suffruticose perennials, usually erect; leaves small or large, entire, commonly petiolate; flowers in short or elongated, usually terminal bracteate spikes; bracts and bracteoles small and narrow; calyx usually divided nearly to the base, the 4 or 5 sepals usually narrow, lanceolate to subulate; corolla white, pink, or purple, the tube slender, straight, not ampliate upward, the limb spreading, the 5 lobes broad, subequal; stamens 2, included, the short filaments inserted at or above the middle of the corolla tube; anthers bithecous, thecae mucous or acute at the base, often slightly unequal, the connective often broad; staminodes 2 or none; pollen 3-colporate, prolate-spheroidal to subprolate; style filiform, stigma bilobate; seeds 4 or fewer in the capsule, suborbicular, flat, smooth or rugose.

About 60 species, in the tropics of both hemispheres. A few additional species are found in southern Central America.

## Sepals 5.

Leaf blades shallowly cordate or truncate at base, abruptly long-decurrent nearly to the base of the petioles; petioles often nearly as long as the blades.

*P. alatum*.

Leaf blades neither cordate nor truncate at base; if long-decurrent on the petioles, the petioles usually considerably shorter than the blades.

Leaf blades thick, little if at all decurrent on the petioles; calyx 2-3.5 mm. long; capsule glandular-puberulent. . . . . *P. verapazense*.

Leaf blades thin, more or less decurrent on the petioles; calyx 4-8 mm. long; capsule glabrous.

Leaves mostly 6-18 cm. long; corolla tube 3-3.5 cm. long; staminodes about 0.5 mm. long. . . . . *P. cuspidatum*.

Leaves mostly 2-6 cm. long; corolla tube 1.5-2.5 cm. long; staminodes 1-1.5 mm. long. . . . . *P. praecox*.

Sepals 4. . . . . *P. tetrasepalum*.

**Pseuderanthemum alatum** (Nees) Radlk. Sitzb. Math.-Phys.

Cl. Akad. Wiss. Muench. 13: 286. 1883. *Eranthemum alatum* Nees in DC. Prodr. 11: 450. 1847.

Petén. Mexico.

Slender, erect herbs, commonly 30-70 cm. tall, simple or sparsely branched, the stems thinly pubescent or glabrous; leaves very thin, long-petiolate, the petioles often almost equalling the blades, blades ovate or broadly ovate, mostly 7-15 cm. long and 5-12 cm. wide, acute or abruptly short-acuminate, shallowly cordate or truncate at the base, abruptly long-decurrent almost to the base of the petiole, glabrous or sparsely villosulous, paler beneath; inflorescences terminal, simple or branched, the peduncle bearing 1-2 pairs of suborbicular, sessile, reduced leaves; flowers solitary or fasciculate along the rachis, the spikes much interrupted, the rachis glabrous or sparsely pilosulous; calyx about 2 mm. long, the sepals narrowly lanceolate, glabrous or sparsely pubescent; corolla bluish to pale purple, 2-3 cm. long, glabrous, the tube very slender, the limb 1.5-2 cm. broad, the lobes rounded at the apex; staminodes about 0.5 mm. long; capsule 10-13 mm. long, glabrous, appearing slender-stipitate; seeds 4, verrucose.

***Pseuderanthemum cuspidatum*** (Nees) Radlk. Sitsb. Math.-Phys. Cl. Akad. Wiss. Muench. 13: 286. 1883. *Eranthemum cuspidatum* Nees in DC. Prodr. 11: 451. 1847.

Damp or wet, mixed forest, 1,200–2,000 m. Alta Verapaz; Guatemala; Huehuetenango. Southern Mexico; Nicaragua; Costa Rica; northwestern South America.

Slender, erect herbs to 1 m. tall, simple or sparsely branched, the stems glabrous, sparsely or bifariously pilose; leaves long-petiolate, the blades thin, ovate or elliptic, 6–18 cm. long and 2–9 cm. wide, acuminate, rounded to acute at the base and abruptly long-decurrent almost to the base of the petiole, sparsely pilosulous or almost glabrous; inflorescences terminal, sometimes simple but usually branched from the base, the peduncle bearing 1–2 pairs of ovate, sessile, reduced, sometimes cordate leaves, the spikes interrupted, mostly 10–25 cm. long, the flowers subsessile, solitary and opposite or densely fasciculate, the rachis sparsely pilosulous; bracts narrowly triangular; calyx accrescent, 4–6 mm. long, glabrous or pubescent, the 5 sepals ciliate, subulate; corolla usually purple, lavender, or rose, rarely white, glabrous, the tube very slender, 3–4 cm. long, the limb about 1.5 cm. broad, the lobes ovate or elliptic; staminodes about 0.5 mm. long; capsule 12–15 mm. long, clavate, glabrous; seeds 4, flat, verrucose.

Apparently closely related to *P. alatum* (Nees) Radlk., in which the leaf blades are also decurrent on the petiole.

***Pseuderanthemum praecox*** (Benth.) Leonard, Journ. Wash. Acad. Sci. 31: 99. 1941. *Eranthemum praecox* Benth. Pl. Hartweg. 291. 1848.

Damp or dry, open, often rocky, grassy or brushy hillsides, often in pine-oak forest, 1,400–1,800 m.; Baja Verapaz; Chimaltenango; Huehuetenango; El Progreso; El Quiché; San Marcos; Santa Rosa; Zacapa. Southern Mexico; El Salvador; Honduras; Nicaragua; Costa Rica.

Low herbs, 3–30 cm. tall, the stems simple or branched, bifariously puberulent or glabrate; leaves on short or long petioles, often deciduous, the blades ovate, lance-ovate, oblong-ovate, or lanceolate, mostly 2–4 cm. long, rarely as much as 6 cm. long, acute or obtuse, attenuate or abruptly contracted at the base and short-decurrent on the petioles, glabrous or sparsely pilosulous beneath along the costae and veins, somewhat paler beneath; inflorescences spicate, terminal or axillary, 1–10 cm. long, the flowers solitary and opposite, or fasciculate at the nodes, the nodes often distant, puberulent; bracts small, ciliate; calyx about 4 mm. long at early anthesis, but soon accrescent and usually 5–8 mm. long in fruit, the sepals linear-lanceolate; corolla pink, lilac, or bright rose, glabrous outside or sparsely pubescent just below the lobes, the tube 1.5–2.5 cm. long, very slender, the lobes oblong or elliptic, 0.8–1.2 cm. long, obtuse or subacute, spreading; staminodes 1–1.5 mm. long; capsule glabrous, about 1.5 cm. long, containing 4 verrucose seeds.



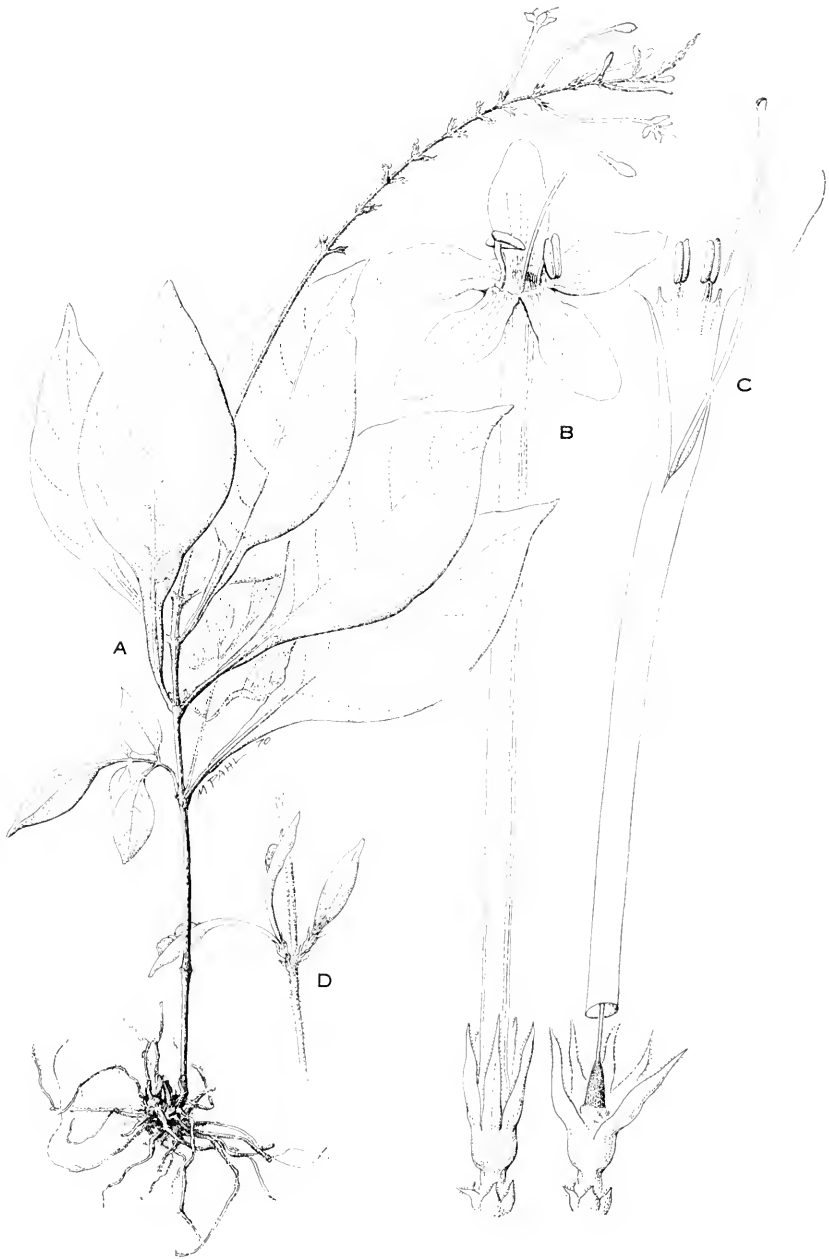


FIG. 96. *Pseuderanthemum cuspidatum*. A, habit,  $\times \frac{1}{2}$ ; B, flower with calyx and bracts,  $\times 5$ ; C, corolla opened to show stamens, staminodes, and style,  $\times 5$ ; D, section of fruiting branch with two capsules,  $\times 1\frac{1}{2}$ .

Plants rather widely distributed in the drier mountains, but of sparing occurrence. It is unusual to find more than two or three plants in a given locality.

**Pseuderanthemum tetrasepalum** Blake, Proc. Biol. Soc. Wash. 34: 200. 1923. *Eranthemum tetrasepalum* Blake, Contr. Gray Herb. 52: 99. 1917.

Known only from the type, British Honduras, Moho River, *M. E. Peck 552*.

Plants 1-1.5 m. high, branched, the stems bifariously hispidulous; leaves ovate or ovate-oval, 7.5-10 cm. long, 3.5-4.5 cm. wide, acuminate, rounded to cuneate at the base, sinuate-crenate, glabrous; inflorescences terminal and axillary, the spikes 8-12 cm. long, the rachis hispidulous, the flowers opposite in the interrupted spikes; bracts linear-subulate, about 2.5 mm. long; calyx segments 4, linear-subulate, 4-5 mm. long; corolla about 2.5 cm. long, the tube very slender, the 2 upper lobes about 8 mm. long, the 3 lower ones slightly shorter; staminodes about 1 mm. long; capsule 8.5-10 mm. long, stipitate, glabrous; seeds 4, papillate.

**Pseuderanthemum verapazense** Donn.-Sm. Bot. Gaz. 48: 299. 1909. *P. adenocalix* Lindau, in Fedde, Rep. Sp. Nov. 12: 425. 1913. *Eranthemum adenocarpum* Blake, Contr. Gray Herb. 52: 98. 1917 (type from Toledo, British Honduras, *M. E. Peck 830*). *P. adenocarpum* Blake, Proc. Biol. Soc. Wash. 34: 200. 1923.

Damp or wet, lowland forest or thickets, near sea level to 400 m.; Alta Verapaz (type from Yaxcabnal, Cubilgüitz, *Tuerckheim 8258*); Chiquimula; Izabal; Petén. Mexico (Chiapas); British Honduras.

Plants perennial, the stems usually simple, erect or decumbent, often rooting at the lowest nodes, bifariously puberulent or pilosulous, glabrate below; petioles mostly 3-7 mm. long; leaf blades lanceolate, ovate, or ovate-elliptic, mostly 3-7 cm. long and 1-3 cm. wide, acuminate, acute at the base, little if at all decurrent, rather thick, glabrous, the margins often sinuate; inflorescences mostly terminal, the spikes very slender, interrupted, to 9 cm. long, usually glabrous or nearly so, rarely pilosulous; flowers opposite, solitary; bracts subulate, 2-3 mm. long; calyx segments 5, subequal, subulate, about 2.5 mm. long; corolla pink, lilac, white with lilac lobes, or bluish, 2-2.5 cm. long, the tube very slender, 1.5-2 cm. long, the 2 upper lobes 9 mm. long and 5.5 mm. wide or smaller; stamens included, filaments 1-1.5 mm. long; staminodes as long as the filaments of the stamens; capsule as much as 15 mm. long, clavate, glandular-puberulent; seeds 4, verruculose.

## RAZISEA Oersted

Large, erect herbs, sometimes suffrutescent below, glabrous or pubescent; leaves petiolate, the blades membranaceous, entire, with minute cystoliths;

inflorescences elongated, narrowly thyrsiform or paniculate, composed of few to many open or fasciculate and verticillate cymes or cymules; bracts and bracteoles small but conspicuous; calyx segments 5, narrow, subequal; corolla tube rather stout, gradually ampliate, glabrous outside, slightly curved, bilabiate, the upper lip narrow, minutely bifid or fimbriate, the lower lip shorter, broad, with 3 small lobes; stamens 2, long-exserted; anthers oblong to linear-oblong, monotheous, muticous; pollen 2-porate, bilateral, spheroidal, the sexine verrucose with blunt spines; style filiform, long-exserted, the stigma minutely bifid; capsule slender-clavate, narrowed and stipiform at base; seeds 4, verrucose.

The genus is closely related to the South American *Kalbreyiella* which differs in its corollas that are rostrate at the tip before the lips are expanded, and the lower lip about equal in length to the upper one. Pollen grains of *Kalbreyiella* and of the genus *Hansteinia* are also 2-porate, bilateral, and spheroidal, with verrucose sexine composed of blunt spines.

Three species occur in Central America with only one in Guatemala.

**Razisea spicata** Oerst. Vid. Medd. Kjoebenhavn 1854: 142. 1855.

Wet, mixed forest, about 1,200 m.; Izabal (Cerro San Gil, *Steyermark 41979*). Costa Rica; Panama.

Plants slender, to 1.5 m. tall, the stems pilose or glabrous; leaves slender-petiolate, the blades ovate to oblong-ovate or elliptic, mostly 10-20 cm. long (rarely to 30 cm.) and 3-10 cm. wide (rarely to 20 cm.), acuminate or long-acuminate, acute at the base and usually contracted and decurrent on the petiole, glabrous or nearly so, sometimes minutely pubescent beneath on the veins; inflorescences appearing spicate, pedunculate, as much as 30 cm. long, dense, the rachis puberulent or almost glabrous, the flowers borne in opposite fascicles; pedicels 2-10 mm. long; bracts triangular, about 5 mm. long, glabrous; bracteoles similar but smaller; calyx glabrous, the segments linear, 7-10 mm. long; corolla bright red, 4-6 cm. long, the tube 5-7 mm. broad at the apex, the upper lip about 8 mm. long; anthers 4-5 mm. long; capsule about 17 mm. long, glabrous.

The single Guatemalan collection has immature corollas only 2.5-3 cm. long and cleistogamous, tubular corollas 8-15 mm. long, but matches other Central American specimens in other respects.

## RUELLIA L.

*References:* E. C. Leonard, *Ruellia tuberosa* and a few of its close relatives, Journ. Wash. Acad. Sci. 17: 509-520. 1927; The Acanthaceae of Colombia, Contr. U. S. Nat. Herb. 31: 66-109; 684-696. 1951. C. E. B. Bremekamp and N. E. Nannenga-Bremekamp, A prelimi-

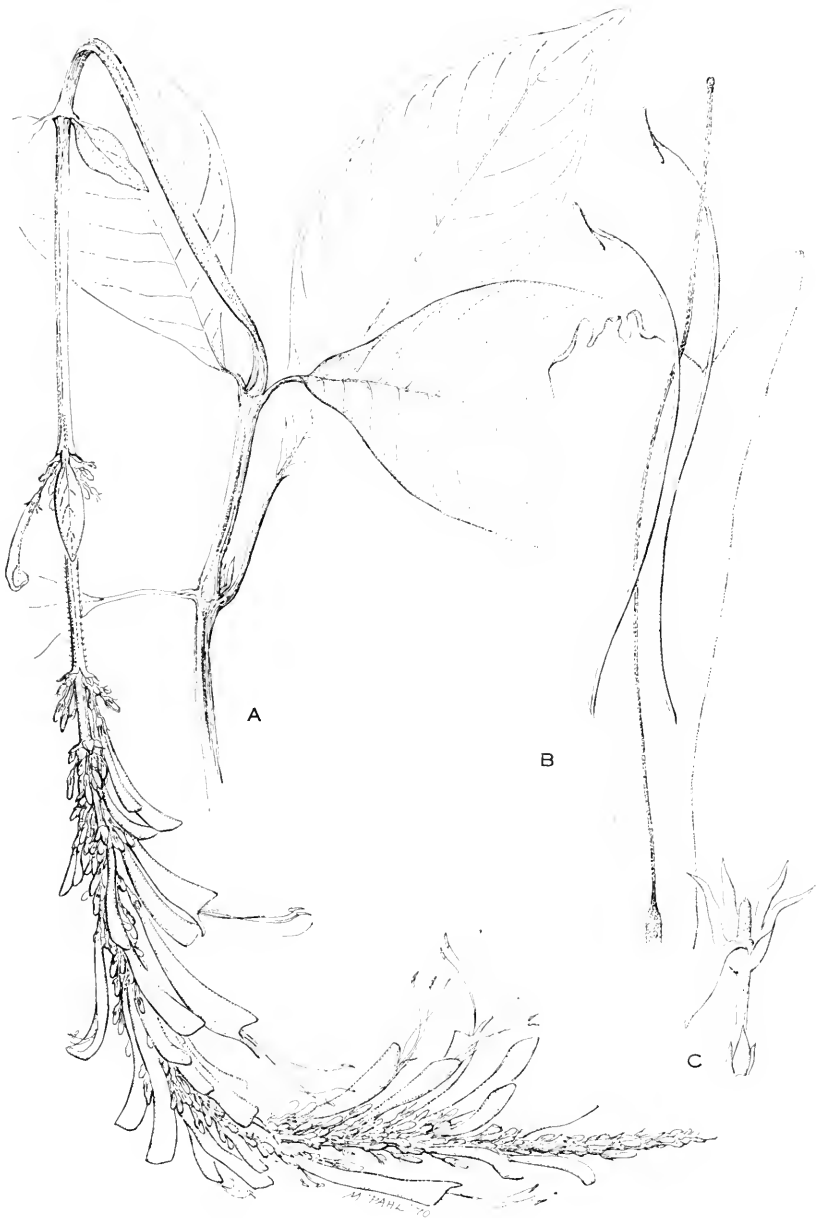


FIG. 97. *Razisea spicata*. A, habit,  $\times \frac{1}{2}$ ; B, corolla opened to show stamens and pistil,  $\times 1\frac{1}{2}$ ; C, bract and bracteoles, pedicel, calyx, and ovary,  $\times 1\frac{1}{2}$ .

nary survey of the Ruelliinae (Acanthaceae) of the Malay Archipelago and New Guinea, Verh. Nederl. Akad. Wet. 2.45 (1): 1-39. 1948. B. C. Tharp and Fred A. Barkley, The Genus *Ruellia* in Texas, Amer. Midl. Nat. 42: 1-86. 1949. R. W. Long, The Genera of the Acanthaceae of the Southeastern United States, Journ. Arn. Arb. 51: 285-292. 1970.

Perennial herbs or shrubs, erect to decumbent, usually abundantly pubescent; leaves opposite, petiolate or sessile, the blades entire or crenate-undulate (rarely dentate); chasmogamous flowers usually showy, cleistogamous flowers small and tubular, sessile or subsessile in the leaf axils or in terminal cymes; bracts usually narrow and small, not imbricate; calyx deeply cleft, the 5 segments linear or lanceolate, usually subequal; corolla purple, lavender, white, or red, the tube straight, incurved, or abruptly inflexed, the basal portion usually long and slender, abruptly or gradually dilated into the broad throat, the limb spreading, oblique or almost regular, the 5 lobes ovate or rounded, contorted, equal or the 2 posterior ones more or less connate to form a posterior lip; stamens 4, didynamous, included or exerted, the filaments inserted below the throat of the corolla, slightly dilated at the base, the anthers bithecos, oblong-sagittate, dorsifixed, the thecae parallel, equal, muticous; staminode sometimes present; pollen 3-porate, spheroidal; disc usually inconspicuous; style slender, subulate at the apex and recurved, the posterior lobe dentiform or obsolete; ovules 2-10 in each locule; capsule obovate, clavate, oblong-linear, or ellipsoid, contracted and more or less stipiform at the base, terete or somewhat compressed above; seeds 4-20, compressed and flat, obliquely ovate or orbicular, the retinacula acute.

The second largest genus of Acanthaceae, with about 250 species reported, although the true number of species is uncertain, is found mostly in the tropics but sometimes in temperate regions in America, Asia, and Africa. A few species besides those given here are found in southern Central America. Plants of this genus are often variable in some characters; many species have been described from Mexico and Central America, and as the genus has not been monographed in recent years, the nomenclature and taxonomy are confused. When all the little-known species of Mexico have been studied carefully, it is possible that some names in current use will have to be altered.

Flowers or flower clusters conspicuously pedicellate or pedunculate, the inflorescences basically cymose but often appearing thyrsiform to paniculate.

Inflorescences densely glandular-pilose, or at least the calyces glandular-puberulent.

Ovary and capsule densely puberulent; mature chasmogamous corollas 3-4 cm. long (in ours) . . . . . *R. nudiflora*.

Ovary and capsule glabrous (or pubescent only at apex in *R. standleyi*); mature chasmogamous corollas 2-3 cm. long.

Flowers disposed in a terminal, pedunculate, thyrsoid-paniculate inflorescence; corollas greenish-yellow . . . . . *R. standleyi*.

- Flowers in axillary cymes, these branching and often forming small or large, often leafy panicles; corollas lavender to purple.
- Capsules clavate, conspicuously contracted below, somewhat compressed above, commonly 8–9 mm. long. . . . . *R. inundata*.
- Capsules ellipsoid to slender-cylindric, scarcely contracted below, scarcely compressed, commonly 10–13 mm. long. . . . . *R. paniculata*.
- Inflorescences glabrous, or if pubescent, with eglandular hairs.
- Leaves narrowly lanceolate or lanceolate-elliptic. . . . . *R. jussieuoides*.
- Leaves ovate, lance-ovate, or oblong-ovate.
- Peduncles 2–10 cm. long, terete or nearly so; narrow lower portion of corolla tube longer than the funnellform throat, 2–2.5 cm. long, then abruptly ampliate, the lobes commonly 9–10 mm. long.  
*R. stemonacanthoides*.
- Peduncles 9–22 cm. long, conspicuously angled to narrowly winged; narrow lower portion of corolla tube shorter than the throat, 1–1.5 cm. long, then gradually ampliate, the lobes commonly 7–8 mm. long.  
*R. pereducta*.
- Flowers sessile or nearly so, often solitary; if arranged in clusters, these not pedunculate.
- Corollas with the narrow basal portion of the tube longer than the funnellform throat.
- Plants acaulescent or nearly so, commonly 2–4 cm. tall; corollas 3–3.5 cm. long. . . . . *R. abbreviata*.
- Plants caulescent, commonly considerably more than 4 cm. tall; corollas 4.5–10 cm. long.
- Leaves essentially glabrous; calyx usually puberulent, rarely glabrous.  
*R. matagalpae*.
- Leaves more or less pubescent; calyx pilose or densely glandular-pubescent.
- Calyx densely glandular-pubescent; corollas rose-red. . . . . *R. parva*.
- Calyx pilose; corollas lavender, purple, or white.
- Narrow lower portion of corolla tube 3.5–5 cm. long, usually conspicuously curved. . . . . *R. longituba*.
- Narrow lower portion of corolla tube 2–3 cm. long, straight or nearly so.
- Leaves rather densely pilose; one sepal lanceolate, the remaining 4 linear; capsule about 15 mm. long, glabrous except at the apex.  
*R. harveyana*.
- Leaves hirtellous, more or less glandular-punctate beneath; all 5 sepals narrowly linear-subulate; capsule 6–8 mm. long, densely puberulent. . . . . *R. hookeriana*.
- Corollas with the narrow basal portion of the tube about equalling or shorter than the funnellform throat.
- Leaves glabrous or nearly so, mostly 7–15 cm. long. . . . . *R. metallica*.
- Leaves (at least the uppermost ones) pubescent on one or both surfaces, mostly 2–7 cm. long.
- Calyx indument conspicuously glandular. . . . . *R. donnell-smithii*.
- Calyx indument eglandular.
- Leaves short-acuminate at apex; calyx 3–4 mm. long. . . . . *R. pygmaea*.
- Leaves rounded or acute at apex; calyx 7–17 mm. long.
- Capsules glabrous.
- Leaves broadly ovate, acute at apex, mostly 2–3.5 cm. long; calyx 12–18 mm. long, the segments all narrowly linear. *R. pratensis*.

Leaves oblong, obtuse at apex, mostly 3–5 cm. long; calyx 7–12 mm. long, the posterior segment lanceolate. . . . . *R. obtusata*.

Capsules pubescent. . . . . *R. geminiflora*.

***Ruellia abbreviata*** D. Gibson, *Fieldiana: Botany* 34: 78. 1973.

*Cryphiacanthus lacteus* var. *acaulis* Nees in DC. *Prodr.* 11: 198. 1847.

*Ruellia lactea* Cav. var. *acaulis* Hemsley, *Biol. Cent. Am.* 2: 506. 1882, non *R. acaulis* R. Br., Nees, Badillo, nec Ruiz ex Nees.

Open plains and meadows, 1,500–2,000 m.; Huehuetenango; El Quiché. Mexico (Oaxaca).

Small perennials, acaulescent or nearly so, commonly 2–4 cm. tall; leaves short-petiolate, the blades broadly obovate, oblong, or nearly elliptic, 1–2 cm. long, rounded or obtuse at the apex, acute or rounded at base, and abruptly decurrent on the petiole, sometimes appearing nearly spatulate, entire, somewhat pilose or glabrate above, more or less pilose beneath, especially near the base and on the costae; bracts broadly linear to oblong, 4–6 mm. long; calyx segments 5, linear, 7–11 mm. long, pilose or glabrate; corollas lavender or purple, 3–3.5 cm. long, pubescent outside, the narrow lower portion of the tube 1.5–2 cm. long, the lobes rounded; anthers about 2.5 mm. long; capsule ellipsoid, 8–10 mm. long, glabrous.

***Ruellia donnell-smithii*** Leonard, *Journ. Wash. Acad. Sci.* 31: 97, *f.* 2. 1941.

Damp or dry thickets, 120–1,200 m.; Escuintla; Retalhuleu. Mexico (Chiapas); El Salvador.

Erect herbs to 60 cm. tall, sparsely branched, the young branches pilosulous with spreading hairs; leaves short-petiolate, the blades rather thick and firm, ovate to oblong-ovate, mostly 2–7 cm. long, usually obtuse or subacute, rarely acute, acute or attenuate to the base, puberulent or glabrate, dotted beneath with small, dark glands; flowers axillary, solitary or geminate, subsessile; calyx 8–14 mm. long, densely glandular-puberulent, the segments linear-acuminate; corolla pale purple, commonly 3–4.5 cm. long, sparsely puberulent, the narrow portion of the tube equalling or shorter than the dilated throat, the throat 7–10 mm. broad below the lobes, the lobes suborbicular, 7–10 mm. long; capsule clavate, 10–12 mm. long, 4–6 mm. broad, glandular-puberulent or puberulent; seeds flat, black, lenticular, minutely puberulent.

***Ruellia geminiflora*** HBK. *Nova Gen. & Sp.* 2: 240. 1817.

*Dipteracanthus geminiflorus* Nees in DC. *Prodr.* 11: 136. 1847.

Damp or dry, grassy or brushy hillsides or plains, sometimes in pine or pine-oak forest, sea level to 1,200 m.; Alta Verapaz; Baja Verapaz; Izabal; Guatemala; Petén. Southern Mexico; British Honduras to Panama; West Indies; northern South America.



FIG. 98. *Ruellia donnell-smithii*. A, habit,  $\times \frac{1}{2}$ ; B, detail of inflorescence,  $\times 1\frac{1}{2}$ ; C, corolla opened to show stamens,  $\times 2\frac{1}{2}$ ; D, pistil,  $\times 2\frac{1}{2}$  (with enlargement at left of surface indument, showing both simple and glandular hairs); E, detail of stigma, greatly enlarged; F, capsule,  $\times 3$ ; G, capsule opened,  $\times 2\frac{1}{4}$ ; H, seeds,  $\times 3$ .



Low perennial herbs to 30 cm. tall, the stems erect or ascending, simple or branched, pilose with short spreading soft hairs; leaves short-petiolate or nearly sessile, the blades oblong-ovate to lance-oblong, mostly 2-6 cm. long, obtuse or acute, acute at the base, usually entire, hirtellous; flowers sessile, usually clustered in leaf axils, sometimes in terminal cymes; bracts usually small and narrow; calyx 8-10 (12) mm. long, pilosulous, the segments narrowly lance-linear or linear, acute; corolla (in ours) lavender, purple, or white, commonly 2.5-3.5 cm. long, sometimes longer, pubescent outside, the lobes rounded, 5-10 mm. long; cleistogamous corollas smaller, tubular, closed; style pubescent; capsule obovate-clavate, 7-9 mm. long, about 4 mm. broad, puberulent; seeds usually 4.

**Ruellia harveyana** Stapf, Bot. Mag. 139, t. 8485. 1913. *R. longipila* Standley, Field Mus. Bot. 8: 44. 1930 (type from British Honduras, Stann Creek District, *C. L. Stocker 20*). *Violeta* (Izabal).

Damp or wet forest or thickets, sea level to 550 m.; Alta Verapaz; Izabal. Mexico (Oaxaca and Veracruz); British Honduras.

Rather weak perennial herbs to about 30 cm. tall, erect, ascending, or decumbent, the stems simple or sparsely branched, pilose with spreading, long and short hairs; leaves on pilose petioles 0.5-2 cm. long, the blades thin, ovate to oblong-elliptic or lance-oblong, mostly 5-10 cm. long, acute or subacute, rounded to acute at the base, rather densely pilose on both surfaces with long, soft, white hairs; flowers few, axillary or terminal, solitary, sessile; bracts leaflike, commonly 1-2 cm. long; calyx long-pilose, the posterior segment lanceolate, 1.5-2.5 cm. long, the 4 other segments linear, 10-17 mm. long; corolla bluish to pale purple, or the tube white and the lobes lavender, 5-7.5 cm. long, finely pubescent outside, the narrow portion of the tube 1.5-3 cm. long, usually longer than the throat, abruptly dilated into a broad throat, the lobes rounded or shallowly emarginate, 1-2 cm. long, 1-1.5 cm. broad; capsule 1.5-1.7 cm. long, ellipsoid, glabrous except at the apex, containing 6-8 flat, brown, lenticular seeds about 3 mm. in diameter, minutely appressed-pilose.

**Ruellia hookeriana** (Nees) Hemsley, Biol. Centr. Am. Bot. 2: 505. 1882. *Dipteracanthus hookerianus* Nees in DC. Prodr. 11: 130. 1847. *Hierba de toro* (Huehuetenango).

Open or brushy hillsides, often in grassy or rocky places, sometimes in pine-oak forest, or on limestone, 500-1,900 m.; Chiquimula; Huehuetenango; Jalapa; Jutiapa; Santa Rosa; Zacapa. Southern Mexico: Honduras.

Erect or ascending, often suffruticose herbs to 1 m. tall, the young stems densely short-pilose or puberulent; leaves short-petiolate, the blades ovate or oblong-ovate, mostly 3-5 cm. long, acute or acuminate, acute or obtuse at the base, pubescent or hirtellous on both surfaces, often densely so, glandular-punctate beneath, sometimes glabrate in age; bracts oblong-lanceolate, mostly 8-17 mm. long; calyx 10-17 mm. long, pilose, ciliate with segmented hairs, the lobes narrowly linear-subulate; corolla 4.5-6 cm. long, purple, lavender, or white, finely puberulent

outside, the slender portion of the tube 2–3 cm. long, the lobes rounded, 1–1.5 cm. long; capsule nearly ovoid, 6–8 mm. long, densely puberulent, containing 4 flat, brown, smooth, lenticular seeds 3–4 mm. in diameter.

**Ruellia inundata** HBK. *Nova Gen. & Sp.* 2: 239. 1817. *R. albicaulis* Bertero in Spreng. *Syst.* 2: 822. 1825. *Aphragmia haenkii* Lindley, *Nat. Syst.* 444. 1836. *Dipteracanthus haenkei* Nees in DC. *Prodr.* 11: 141. 1847.

Damp or dry, brushy, often rocky slopes, 120–1,250 m.; Alta Verapaz; Baja Verapaz; Chimaltenango; Chiquimula; Guatemala; Jutiapa; El Quiché; Retalhuleu; Santa Rosa; Zacapa. Southern Mexico; El Salvador to Panama; Colombia; Ecuador; Brazil.

Herbaceous or suffruticose plants usually 0.5–1 m. tall, rarely to 2 m., the stems simple or branched, often brittle, the older branches pale and glabrate, the younger ones glandular-pilose; leaves petiolate, the blades ovate to lance-oblong, mostly 3–15 cm. long, 2–7 cm. wide, acuminate, acute to rounded at the base, more or less crenate to denticulate or essentially entire, hispidulous or pubescent; inflorescences axillary, usually branching dichotomously, often forming an elongated, cylindric, leafy panicle, glandular-pubescent; bracts oblong, 3–8 mm. long; calyx 8–15 mm. long, densely glandular-pubescent, the segments linear; corolla purple or rose-purple, pubescent, 2–2.5 cm. long, the throat commonly about 4 mm. wide below the lobes, the lobes short, rounded; capsule broadly clavate, 7–11 mm. long, compressed above, contracted and stipiform below, subacute, glabrous, containing 2–6 flat, ovate seeds about 4 mm. long, smooth when dry, mucilaginous-pubescent when wetted.

Common weedy, fetid plants of the Pacific lowlands of Central America.

**Ruellia jussieuoides** Schlecht. *Linnaea* 6: 370. 1830.

Wet thickets or forest, sometimes in marshes, 100–500 m.; Alta Verapaz; Petén. Southern Mexico; Costa Rica.

Rather stout, erect herbs to 1.5 m. tall, simple or branched, the stems puberulent with incurved hairs or glabrate; leaves petiolate, the blades narrowly lanceolate, mostly 6–15 cm. long and 1–3 cm. wide, narrowly long-attenuate to each end, usually short-pilosulous on the costae and veins, somewhat paler beneath, the cystoliths conspicuous; inflorescences axillary, the flowers in clusters of 1–3, sessile, borne on slender peduncles 7 cm. long or shorter; bracts narrowly lanceolate, to 2.5 cm. long; calyx 6–14 mm. long, short-pilosulous, the segments narrowly linear; corolla lavender, 4–5.5 cm. long, minutely pubescent outside, the narrow portion of the tube very slender, usually somewhat curved, longer than the broad throat, the lobes 9–12 mm. long, rounded; capsule clavate, 12–14 mm. long, 3–5 mm. broad, contracted and stipitate below, obscurely puberulent; seeds about 12, flat, lenticular, 1.5 mm. in diameter.

**Ruellia longituba** D. Gibson. *Fieldiana: Botany* 34: 80. 1973. *Cryphiacanthus macrosiphon* Nees in DC. *Prodr.* 11: 198. 1847. *Ruellia macrosiphon* Donn.-Sm. *Enum. Pl. Guat.* 1: 32. 1889. NON *Ruellia macrosiphon* Kurz, *Journ. Royal As. Soc. Bengal* 42(2): 92. 1873. *R-ucúux kamenaq* (Quecchí, Alta Verapaz).

Damp or wet thickets or mixed forest, 250–1,500 m.; Alta Verapaz. Southern Mexico.

Erect, rather stout herbs to a meter or more tall, simple or sparsely branched, the stems villous-hirsute or glabrate; leaves petiolate, the blades rather thick and firm, narrowly lanceolate to ovate-oblong, mostly 6–12 cm. long, acuminate to long-acuminate, acute or attenuate to the base, short-villous or villous-hirsute on both surfaces or glabrate beneath; inflorescences axillary, the flowers solitary and sessile in the axils of the upper leaves, sometimes crowded at the ends of branches; bracts leaflike but much smaller; calyx 13–16 mm. long, villous, the segments linear-lanceolate and attenuate; corolla lavender or the tube white with lavender markings and lobes, 6–9 cm. long, densely pilose outside, the narrow portion of the tube usually somewhat curved, slender, 2–4 times longer than the dilated throat, the lobes 1.5–2 cm. long, 1.5–2.5 cm. broad, rounded or emarginate; ovary and style pubescent; capsule unknown.

Handsome plants, often cultivated for ornament in Guatemala City and doubtless in other parts of the country.

**Ruellia matagalpae** Lindau, *Bull. Herb. Boiss.* 3: 364. 1895.

Damp or wet mixed forest near sea level to 600 m.; Alta Verapaz; Petén. British Honduras; Honduras; Nicaragua.

Erect herbs to about one meter tall, simple or sparsely branched, the stems glabrous or puberulent, leaves on petioles 0.5–3.5 cm. long, the blades lanceolate to oblong-ovate, 4–16 cm. long, 3–7 cm. wide, caudate-acuminate, acute or attenuate to the base, essentially glabrous, minutely glandular-punctate beneath, entire, the cystoliths inconspicuous; flowers sessile, axillary and solitary, or several terminating a short axillary branch; bracts similar to the leaves but smaller, mostly 3–4 cm. long; calyx 9–13 mm. long, minutely puberulent or nearly glabrous, often minutely glandular-punctate, the segments subulate; corolla pink to violet, 4.5–6 cm. long, minutely puberulent outside, the basal portion of the tube very slender, much longer than the amplified throat, the lobes rounded, somewhat undulate, 1.2–1.5 cm. long; ovary and style pubescent; capsule clavate, puberulent, about 15 mm. long, short-stipitate, containing 2–4 flat, lenticular, minutely puberulent seeds 3–4 mm. in diameter.

**Ruellia metallica** Leonard in Standley, *Field Mus. Bot.* 18: 1253. 1938.

Damp or wet, mixed forest, near sea level to 600 m.; Izabal; Santa Rosa. Nicaragua; Costa Rica; Panama.

Erect herbs to 60 cm. tall, the stems slender, simple or sparsely branched, glabrous, or pubescent on the angles; leaves on petioles 1–4.5 cm. long, the blades

ovate, ovate-oblong, or elliptic-oblong, mostly 5-15 cm. long, 2-6 cm. wide, acuminate or long-acuminate, acute to rounded at the base, often abruptly decurrent, sometimes undulate, glabrous or nearly so, usually lustrous, slightly paler beneath; inflorescences axillary and terminal, the flowers sessile, fasciculate, the uppermost bracts linear or lanceolate, mostly 1.5-3 cm. long, the lower ones intergrading with the leaves; bracteoles triangular, 2-3 mm. long; calyx 5-8 mm. long, glabrous or minutely puberulent, the segments subulate; corolla lavender or the tube white with lavender lobes, 2.5-3 cm. long, sparsely pubescent outside, the slender portion of the tube shorter than the funnelliform throat, the limb 1-2 cm. broad, the lobes rounded, 5-8 mm. broad; ovary minutely puberulent; capsule 7-10 mm. long, about 3 mm. broad, clavate, subacute, narrowed into a slender stipe; seeds about 6, flat, lenticular, reddish brown, about 2 mm. in diameter, minutely puberulent on the margins.

**Ruellia nudiflora** (Engelm. & Gray) Urban, Symb. Ant. 7: 382. 1912. *Dipteracanthus nudiflorus* Engelm. & Gray, Boston Journ. Nat. Hist. 5: 229. 1845. *Cryphiacanthus viscosus* Oerst. Vid. Medd. Kjoebenhavn 1854: 128. 1855, non *Ruellia viscosa* HBK. 1818. *Ruellia nudiflora* var. *puberula* Leonard, Journ. Wash. Acad. Sci. 17: 517. 1927. *R. nudiflora* var. *glabrata* Leonard, *tom. cit.* 518. *R. nudiflora* var. *yucatanana* Leonard, *l.c.* *R. glabrata* Tharp & Barkley, Amer. Midl. Nat. 42: 13. 1949. *R. puberula* Tharp & Barkley, *tom. cit.* 17. *R. yucatanana* Tharp & Barkley, *tom. cit.* 56.

Damp or dry fields or borders of thickets, near sea level to 900 m.; Chiquimula; Guatemala; Petén; Santa Rosa. Arizona; Mexico; British Honduras to Costa Rica; West Indies?

Erect or decumbent, perennial herbs, very low or ascending to 60 cm., the stems simple or sparsely branched, usually puberulent or short-pilose; leaves petiolate, the blades oblong-elliptic, ovate, or lance-oblong, mostly 4-10 cm. long, rounded to subacute at the apex, acute at the base, often undulate, densely puberulent or short-pilose or almost glabrous; inflorescences terminal and axillary, pedunculate, composed of dichotomous cymes, these sometimes compound and often appearing paniculate, the rachis more or less glandular-pubescent; bracts leaflike, more or less linear, commonly 4-10 mm. long, sometimes larger, bracteoles small; pedicels commonly 3-10 mm. long; calyx of chasmogamous flowers 7-17 mm. long (of cleistogamous flowers 4-11 mm. long), glandular puberulent, the segments linear-acuminate; chasmogamous corolla 3-4 cm. long (in ours), the narrow portion of the tube 6-12 mm. long, the ampliate throat 12-15 mm. broad below the lobes, the lobes rounded, often emarginate; capsule elliptical, 15-20 mm. long, densely puberulent, commonly containing 8-18 flat, lenticular, brown seeds, appearing glabrous but more or less pubescent when wetted.

An extremely variable and weedy species, apparently closely related to *R. tuberosa* L., divided by Leonard into nine varieties, including the typical one, most of which Tharp and Barkley later elevated to specific rank. Whether the presumed differences in some

of these plants represent varieties or subspecies is not clear at this time. Until a revision of the genus can be completed, it seems best to treat the complex collectively as *R. nudiflora* (Engelm. & Gray) Urban, *sens lat.*

***Ruellia obtusata*** Blake, Contr. Gray Herb. 52: 105. 1917.

Known only from the type, British Honduras, damp, open, cultivated ground, Toledo, *M. E. Peck 871.*

Slender, suffruticose plants, the stems pale, the young stems pilose with long and short, spreading hairs; leaves on short, slender petioles, the blades oblong, 3-6 cm. long, obtuse or rounded at the apex, cuneate at the base, rather densely pilose with long, spreading, white hairs; flowers axillary, solitary, sessile, the bracts leaflike; calyx pilose, 7-12 mm. long, the posterior segment lanceolate, the anterior segments linear-subulate; corolla pilose outside, about 3 cm. long, the lobes rounded, 8-9 mm. long; capsule clavate, glabrous, 14 mm. long, 3-3.5 mm. broad, containing about 10 flat, brown, smooth seeds.

***Ruellia paniculata*** L. Sp. Pl. 635. 1753. *Dipteracanthus paniculatus* Nees in DC. Prodr. 11: 142. 1847.

Wet or dry thickets or low forest, sometimes in salt meadows, sea level to 700 m.; Chiquimula; Jutiapa; Petén; Retalhuleu; San Marcos; Zacapa. Southern Mexico; Honduras to Costa Rica; West Indies; Colombia; Venezuela; Brazil.

Erect, ascending, or procumbent herbaceous or suffrutescent plants to 1 m. tall; often much branched, the stems usually densely glandular-pubescent; leaves petiolate, the blades ovate or oblong-ovate, mostly 3-7 cm. long, 1-3 cm. wide, acute or obtuse, acute or attenuate to the base, glandular-pubescent, puberulent, or glabrate, the margins entire or somewhat crenulate or obscurely denticulate; inflorescences axillary, cymose, usually intricately branched, often forming a large panicle; bracts leaflike, those subtending the flowers 2-10 mm. long; calyx 10-15 mm. long, glandular-pubescent, the segments linear-acuminate, unequal; corolla bluish, lavender, or purple, commonly 2-3 cm. long (rarely to 3.5 cm.), finely pubescent outside, funnelform, the lower portion of the tube very slender, the throat 5-7 mm. wide below the lobes, the lobes rounded, 5-7 mm. long; capsule ellipsoid to narrowly cylindrical, 10-15 mm. long, about 2 mm. in diameter, subacute, glabrous, usually containing 8 flat, lenticular seeds about 2 mm. in diameter, smooth when dry but mucilaginous-pubescent when wetted.

In general appearance these plants are similar to *R. inundata* HBK., which differs in its narrower corollas and clavate capsules.

***Ruellia parva*** (Nees) Hemsley, Biol. Centr. Amer. Bot. 2: 506. 1882. *Ophthalmacanthus parvus* Nees in DC. Prodr. 11: 220. 1847. *R. megasphaera* Lindau, Bull. Herb. 3: 364. 1895.

Damp or dry thickets or forest, 200–1,400 m.; Chimaltenango; Chiquimula; Escuintla; Guatemala; Retalhuleu; Santa Rosa. Mexico; El Salvador.

Erect, rather coarse herbs, to 1 m. tall, simple or sparsely branched, the young branches densely pubescent or subtomentose; leaves petiolate, the blades rather thick and firm, ovate-oblong or ovate, mostly 4–9 cm. long, acute or short-acuminate, acute at the base, often abruptly decurrent on the petiole, finely pubescent on both surfaces; flowers solitary and sessile in the upper leaf axils or often crowded at the ends of the branches, subtended by leaflike bracts; calyx 15–20 mm. long, densely glandular-pubescent, the segments linear or linear-acuminate; corolla rose-red, 5–6 cm. long, the tube slender, curved, very gradually ampliate, glandular-pubescent outside, the lobes subequal, oval, 10–13 mm. long and about 6 mm. wide, rounded or shallowly emarginate at the apex; capsule ellipsoid, puberulent, 12–15 mm. long, about 4 mm. broad, short-stipitate, containing about 12 flat, brown, minutely puberulent seeds, 2.5–3 mm. in diameter.

In Guatemala this species is rather weedy, especially abundant in the hills above Escuintla.

**Ruellia pereducta** Standley, Carnegie Inst. Wash. Publ. 461: 89. 1935.

Damp or wet thickets or forest, often on limestone, near sea level to 400 m.; Alta Verapaz; Izabal; Petén. Mexico (type from Campeche); British Honduras.

Erect, slender, usually branched, often suffruticose plants 1–2 m. tall, essentially glabrous; leaves on petioles commonly 4–11 cm. long, the blades ovate to ovate-oblong, mostly 7–15 cm. long, 3–8 cm. wide, long-acuminate, obtuse to rounded and often oblique at base, the margins entire or obscurely crenate, the cystoliths numerous; inflorescences axillary, subumbelliform, long-pedunculate, the peduncles commonly 9–22 cm. long, conspicuously angled to narrowly winged, the flowers sessile or on pedicels 1–4 mm. long; bracts leaflike; bracteoles linear, rigid, mostly 2–3 mm. long; calyx 4–8 mm. long, glabrous, often ciliate, the segments linear-subulate; corolla magenta, 3.5–4.5 cm. long, the lower, narrow portion of the tube about 2 mm. wide, 1–1.5 cm. long, then gradually ampliate to 5–8 mm. wide in the throat below the lobes, the lobes oval, usually shallowly emarginate, 7–8 mm. long; capsule clavate, 17–22 mm. long, glabrous, containing 8 or more flat, brown, lenticular seeds about 3 mm. in diameter, the margins minutely pubescent.

These plants are often confused with *R. stemonacanthoides* (Oerst.) Hemsley, but may be separated by their more gradually ampliate corolla tubes. The narrow lower portion of the tubes of *R. stemonacanthoides* are 2–2.5 cm. long, then abruptly dilated. Further, the peduncles of the latter are terete or nearly so.

**Ruellia pratensis** D. Gibson, Fieldiana: Botany 34: 82. 1973.

Open meadows and prairies, 1,300–1,600 m.; Guatemala (*Tonduz 620*, type); Huehuetenango. Mexico.

Erect or ascending perennials, commonly 10–20 cm. tall, more or less pilose throughout; leaves subsessile to short-petiolate, the blades ovate or broadly ovate, mostly 1.5–4 cm. long, 1–2 cm. wide, acute or obtuse, acute at base or sometimes rather abruptly decurrent on the petiole, sparsely or densely pilose on both surfaces, the margins entire or somewhat crenate-undulate; inflorescences axillary and terminal, sessile; bracts narrowly lanceolate, mostly 3–8 mm. long; calyx 14–18 mm. long, the 5 segments narrowly linear, laxly long-pilose; corolla 3–4 cm. long, pubescent outside, the narrow part of the tube about 1 cm. long; stamens included; style pubescent; capsule glabrous, ellipsoid, about 14 mm. long, containing 8–9 lenticular seeds.

***Ruellia pygmaea*** Donn.-Sm. Bot. Gaz. 48: 298. 1909; Leonard, Carnegie Inst. Wash. Publ. 461: 203, f. 4. 1936. *Raxruquén* (Alta Verapaz).

Damp or wet thickets or wet, dense, mixed forest, sea level to 600 m.; Alta Verapaz (type collected near Cubilgüitz, *Tuerckheim 8725*); Izabal. British Honduras.

Small, perennial herbs, the stems simple or branched, procumbent or ascending, mostly 10–30 cm. long, pilose with long and short, mostly spreading, brownish hairs, at least when young; leaves small, petiolate, the blades thin, ovate to oblong-ovate, 2.5–5 cm. long, obtuse-acuminate, mostly rounded or obtuse at the base, often abruptly short-decurrent on the petiole, the lower leaves strigose beneath on the costae and veins, otherwise glabrous or nearly so, the uppermost leaves long-pilose or villous, at least on the upper surface and often beneath; inflorescences axillary, the flowers sessile and usually solitary, sometimes appearing fasciculate due to crowding; bracts linear, slightly longer than the calyx; calyx 3–4 mm. long, puberulent outside, the slender portion of the tube 8–10 mm. long, the throat ampliate, about 5 mm. broad at the apex, the lobes rounded, 3–4 mm. long; capsule clavate, 7–9 mm. long, short-stipitate, acute, puberulent, containing 4 flat, brown, lenticular seeds about 2 mm. broad, puberulent on the margins.

***Ruellia standleyi*** Leonard, Journ. Wash. Acad. Sci. 31: 98, f. 3. 1941.

Damp or wet thickets or mixed forest, 400–1,500 m.; Petén; Quezaltenango (type from Finca Pirineos, below Santa Mariá de Jesús, *Standley 60390*); San Marcos; Suchitepéquez.

Erect, very viscid herbs to 1 m. tall, simple or branched, the stems brittle, the branches glandular-pilose; leaves on long, slender petioles, the blades thin, broadly ovate to broadly elliptic, mostly 7–17 cm. long and 4–10 cm. wide, commonly large, caudate-acuminate, usually rounded at the base and abruptly short-decurrent, thinly villous-pilose on both surfaces, more densely so beneath, the margins more or less crenate; inflorescences terminal, thyrsoid-paniculate, long-pedunculate, densely glandular-pilose, 15–25 cm. long, the flowers numerous,

sessile or nearly so, the branches very slender; bracts small, lanceolate or subulate, or the lowest ones larger and leaflike; calyx at maturity about 15 mm. long, densely glandular-pilose, the segments linear-subulate; corolla greenish yellow, 1.5-2 cm. long, pubescent, the narrow part of the tube about 2 mm. long, then narrowly campanulate, the lobes about 3 mm. long; capsule oblong-cylindric, 15 mm. long, 3.5 mm. broad, glabrous except sometimes pubescent at the apex, containing 8-10 flat, brown, lenticular seeds about 2.5 mm. in diameter.

**Ruellia stemonacanthoides** (Oerst.) Hemsley, Biol. Cent. Am. Bot. 2: 507. 1882. *Arrhoxylum stemonacanthoides* Oerst. Vid. Medd. Kjoebenhavn 1854: 130. 1855. *Ruellia guatemalensis* Donn.-Sm. Bot. Gaz. 48: 298. 1909 (type from Concepción, Escuintla, *J. D. Smith 2115*).

Damp or wet thickets or forest, 200-1,300 m.; Escuintla; Guatemala; Retalhuleu; San Marcos; Suchitépéquez. Southern Mexico; El Salvador; Costa Rica.

Erect, slender, usually branched, often suffruticose plants to 1 m. tall, glabrous or glabrate throughout, the stems sometimes puberulent when young; leaves on petioles 1-5 cm. long, the blades firm, ovate, oblong-ovate or lance-oblong, mostly 7-15 cm. long, 2-7 cm. wide, long-acuminate, obtuse to rounded and sometimes oblique at base, the cystoliths numerous, the margins nearly entire or more or less crenate-undulate; inflorescences axillary, usually pedunculate and branching, the peduncles 2-10 cm. long, the flowers sessile in 2-4 flowered cymes, these rarely sessile in leaf axils; lower bracts leaflike, commonly 20-30 mm. long, others linear-lanceolate to narrowly linear and acuminate, often rigid, 4-20 mm. long; calyx 6-10 mm. long, glabrous or nearly so, the segments linear-subulate; corolla usually purple or lavender, rarely white, 3-4.5 cm. long, the slender lower portion of the tube longer than the ampliate throat, 2-2.5 cm. long, the throat 7-9 mm. wide below the lobes, the lobes 9-10 mm. long, emarginate; capsule clavate, 1.5-2 cm. long, glabrous, containing about 12 flat, brown, lenticular seeds 2.5-3 mm. in diameter, the margins minutely pubescent.

See comment under *R. pereducta* Standley.

### SANCHEZIA Ruiz & Pavón

*Reference*: E. C. Leonard, Notes on the genus *Sanchezia*, Journ. Wash. Acad. Sci. 16: 484-492. 1926.

Large, erect herbs or shrubs, glabrous or more or less pilose; leaves large, the blades entire or undulate-dentate; flowers large, sessile or short-pedicellate in the axils of large opposite bracts, fasciculate or rarely solitary, forming interrupted terminal spikes or panicles; bracteoles similar to the calyx lobes or smaller; calyx deeply lobate, the 5 segments herbaceous or membranaceous, rounded to acute at the apex; corolla yellow, reddish, or purple, the tube long-cylindric, or somewhat ventricose above, the limb spreading, the 5 lobes short, rounded, contorted, subequal; perfect stamens 2, anterior, inserted below the middle of the corolla tube,





FIG. 99. *Sanchezia parvibracteata*. A, habit,  $\times \frac{1}{2}$ ; B, detail of inflorescence showing bract and bracteoles with flower bud,  $\times 1$ ; C, flower,  $\times 2\frac{1}{2}$ , complete with calyx and bracteoles, the corolla opened to show stamens, staminodes, and pistil; D, corolla lobes reflexed in anthesis,  $\times 2\frac{1}{2}$ .

exserted; staminodes 2, short; anthers bithecos, oblong, dorsifixed, introrsely ciliate in a longitudinal line, thecae equal, parallel, calcarate; pollen 2-porate, bilateral, subspheroidal; disc thick, inconspicuous; style linear at the apex, the posterior lobe small; ovules 4 or fewer in each locule; capsule oblong, not compressed, scarcely contracted at the base; seeds 8 or by abortion fewer, orbicular, compressed, the retinacula acute, thick at the base.

About 20 species, natives of western South America, one of them extending into Panama. One species is widely cultivated in tropical regions for ornament and has been naturalized in some areas of Guatemala.

***Sanchezia parvibracteata*** Sprague & Hutchinson, Kew Bull. 253. 1908. *S. sprucei* var. *salvadorensis* Donn.-Sm. Bot. Gaz. 44: 116. 1907. *Hoja verde* (Alta Verapaz).

Native of tropical America, but the habitat unknown; cultivated in most parts of Central America for ornament, also in the East Indies; planted commonly in the lowlands of Guatemala, especially in hedges, and has become naturalized in Quezaltenango, Retalhuleu, and Suchitepequez, 500–1,300 m.

Stout shrubs 1–2.5 m. tall, sparsely branched, glabrous; stems obtusely tetragonous; leaves on short petioles, the blades thick and succulent when fresh, oblong-elliptic, mostly 12–24 cm. long and 5–11 cm. wide, acuminate to obtuse, cuneate at the base, the margins repand-crenate or subentire, the veins conspicuously lined with yellowish-white, especially on the upper surface, the lateral veins 13–16 pairs; inflorescences as much as 20 cm. long, with few narrow erect branches; bracts broadly ovate, 1.5–2 cm. long, green or rose-red, each pair containing 3–5 flowers; bracteoles usually obovate-oblong, obscurely veined, 1.5–2 cm. long; calyx lobes unequal, oblong, obtuse, 2–2.5 cm. long, 4–7 mm. wide, ciliolate at the apex, minutely glandular-pilose within; corolla tubular, pale yellow, about 5 cm. long, minutely puberulent outside on the upper portion, the throat 5 mm. broad, the lobes oblong, reflexed, 5–7 mm. long, ciliolate; filaments sparsely villous, the anthers 6–7 mm. long, hirsute; style puberulent below.

In the uplands of Guatemala this shrub is rather uncommon in gardens, but along the roads through the cafetales of the Pacific coastal region, it has been planted in vast numbers to form hedges, usually in association with various other showy plants. The bright green leaves with the conspicuous yellow veins are quite handsome.

### SIPHONOGLOSSA Oersted

Mostly low perennial herbs, sometimes suffrutescent, pubescent or glabrate; leaves usually rather broad, entire, the cystoliths numerous; inflorescences axillary, sessile or subsessile, bracteate, the bracts and bracteoles short, linear; calyx lobes

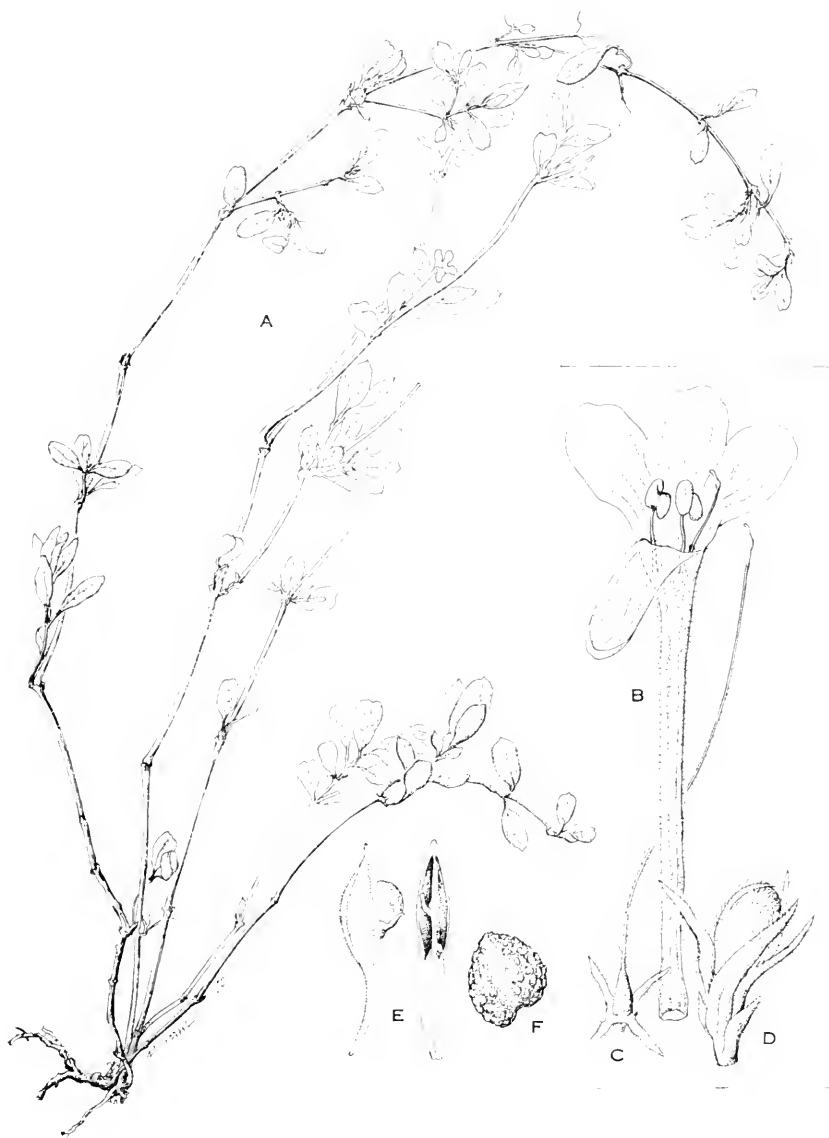


FIG. 100. *Siphonoglossa sessilis*. A, habit,  $\times \frac{1}{2}$ ; B, corolla with stamens and style,  $\times 4$ ; C, calyx opened to show pistil,  $\times 4$ ; D, bracts and calyx enclosing budding corolla,  $\times 8$ ; E, capsule opened to show retinacula and seed,  $\times 3\frac{1}{2}$ ; F, seed,  $\times 7\frac{1}{2}$ .

4 or 5 (4 in ours), short and narrow; corolla commonly purple or lavender, the tube elongated, slender-cylindric, not or scarcely ampliate above, the limb bilabiate but spreading, the posterior lip innermost in bud, entire or bifid, the anterior lip broad, spreading, trilobate; stamens 2, inserted near the apex of the corolla tube, included or exerted, anthers bitheous, one theca placed lower on the connective than the other, the lower one or sometimes both minutely calcarate at the base; staminodes none; pollen grains 3-colporate, subspheroidal; style filiform, obtuse, shallowly bilobate; ovules 2 in each locule; capsule oblong, contracted below and appearing stipiform; seeds 4 or by abortion fewer, suborbicular, flat, marginate, tuberculate-rugulose or colliculate-rugose, the retinacula obtuse.

Of the eight species in tropical or warm-temperate America, only one is known from Central America. One species has been reported from South Africa.

**Siphonoglossa sessilis** (Jacq.) D. Gibson, *Fieldiana: Botany* 34: 82. 1973. *Justicia sessilis* Jacq. Enum. Pl. Carib. 11. 1760. *Rhytiglossa sessilis* Nees in DC. Prodr. 11: 345. 1847. *Siphonoglossa ramosa* Oerst. Vid. Medd. Kjoebenhavn 1854: 159-160, t. 5, f. 34, 35. 1855. *S. discolor* Blake, Contr. U. S. Nat. Herb. 24: 24. 1922. *S. hondurensis* Standley & Steyermark, *Ceiba* 3: 131. 1952.

Damp or dry thickets and forest, 180-850 m.; Jutiapa; Zacapa (type of *S. discolor* Blake, *Blake 7669*). Mexico; Honduras; West Indies; Venezuela.

Herbaceous or suffruticose plants, usually ascending or erect, sometimes procumbent, the stems usually 30-40 cm. long, branching, sparsely puberulent; leaves on short petioles, the blades ovate, obovate, or rarely elliptic, usually 1-2.5 cm. long, rarely to 5 cm., usually 0.5-1.5 cm. wide, rarely to 3 cm., rounded or subacute at the apex, occasionally appearing apiculate, cuneate to subcordate at the base, glabrous or pubescent above, paler beneath and glabrescent or pilosulous, chiefly on the veins; flowers usually 1-3 in a leaf axil, sessile or subsessile; bracts linear-subulate, about 2 mm. long, bracteoles similar or slightly smaller; calyx lobes linear-subulate, nearly equal, about 4 mm. long, ciliate, puberulent; corolla rose-purple, to 2.5 cm. long, pilosulous outside, the tube elongated and very slender, about 0.5 mm. in diameter, the throat short, the limb spreading, appearing 4-lobate, the upper lip entire; the lips 5-6.5 mm. long; thecae about 0.5 mm. long or less; capsule about 1 cm. long, puberulent, containing 4 colliculate-verrucose seeds.

Although leaf shape, size, and degree of puberulence are variable, the floral characters are constant.

### SPATHACANTHUS Baillon

Shrubs or small trees, glabrous throughout or nearly so, much branched; leaves opposite, petiolate, the blades membranaceous, entire; flowers pedicellate, in short, terminal, few-flowered racemes, the bracts and bracteoles small; calyx

large, spathe-like, enclosing most of the corolla tube, deeply cleft on the anterior side, more shallowly cleft on the posterior side, acute or acuminate; corolla white, the tube narrow below, ampliate upward, the limb 5-lobate, the lobes subequal, broad, short, rounded or emarginate; stamens 4, very unequal, didynamous, included, the short filaments inserted at or above the middle of the corolla tube; anthers bithecal, thecae equal, mucicous at the base; pollen 3-colporate, subprolate; disc conspicuous; style about equalling the stamens, the stigma shallowly bilobate; capsule long-stipitate, the stipiform portion equalling or longer than the calyx, the upper seminiferous portion obtuse, subterete, glabrous; seeds usually 4, discoid.

Four species are known. In addition to the two in Guatemala, there is one other in Costa Rica, and another in Mexico.

Calyx 3-4 cm. long; corolla 6-6.5 cm. long.....*S. simplicifolius*.

Calyx 1-2.5 cm. long; corolla about 2.5 cm. long.....*S. parviflorus*.

***Spathacanthus parviflorus*** Leonard, Proc. Biol. Soc. Wash. 50: 15. 1937.

Damp or wet, mixed forest, 1,000-2,000 m.; Chimaltenango; Guatemala; Quezaltenango (type from Volcán de Zunil, *A. F. Skutch 961*); San Marcos; Sololá; Suchitépéquez. Mexico (Chiapas).

Densely branched shrubs or small trees, 3-8 m. tall, glabrous or nearly so; leaves on petioles 1-1.5 cm. long, the blades oblong-elliptic or ovate-oblong, 5-18 cm. long and 2-6 cm. wide, abruptly acuminate or narrowly long-acuminate, acute and often very unequal at the base, bearing numerous small cystoliths, paler beneath and sometimes barbate beneath in the axils of veins; flowers few, in short terminal racemes, the bracts minute, triangular, acuminate, 1-2 mm. long, the pedicels 5-6 mm. long; calyx greenish yellow, acute or acuminate in bud and enclosing the corolla, 1-1.5 cm. long at anthesis, 2-2.5 cm. long in fruit; corolla white, about 2.5 cm. long, glabrous outside, pubescent within below the stamens; anthers 3-4 mm. long; style glabrous, the lobes of the stigma spatulate; ovary glabrous; capsule 4-4.5 cm. long, about 1 cm. broad above, the stipiform portion equalling or longer than the calyx; seeds 4, thickly discoid, brown, 6-7 mm. in diameter, very minutely puberulent.

***Spathacanthus simplicifolius*** (Donn.-Sm.) Leonard, Proc. Biol. Soc. Wash. 50: 16. 1937. *Macfadyena simplicifolia* Donn.-Sm. Bot. Gaz. 16: 198. 1891. *S. donnell-smithii* Lindau, Bull. Herb. Boiss. 3: 371. 1895 (based on the same collection as *M. simplicifolia*).

Dense, wet, mixed forest, 1,200-1,650 m.; Alta Verapaz (type from Pansamalá, *Tuerckheim 1030*) also in the mountains above Tactic).

Densely branched shrubs or small trees of 4-6 meters, glabrous; leaves short-petiolate, the blades obovate, oblong, or elliptic, mostly 8-16 cm. long and 4-7.5 cm. wide, acute at apex and at the base, with conspicuous small cystoliths on the



FIG. 101. *Spathacanthus parviflorus*. A, habit,  $\times \frac{1}{2}$ ; B, flower with bracts and bracteoles,  $\times 1\frac{1}{2}$ ; C, corolla opened, with pistil removed, to show stamens,  $\times 1\frac{1}{2}$ ; D, opened calyx,  $\times 1\frac{1}{2}$ ; E, capsules with calyces, one opened to show retinacula and seeds,  $\times 1$ .

upper surface, slightly paler beneath; flowers short-pedicellate, in short, few-flowered racemes; bracts subulate, 3-4 mm. long, inserted about the middle of the pedicel; calyx 3-4 cm. long, long-acuminate, deeply cleft anteriorly; corolla white, 6-6.5 cm. long, the tube ampliate above, about 1.5 cm. broad in the throat, glabrous outside, pubescent within below the filaments, the upper lip about 2 cm. long; anthers about 4 mm. long; stigma shallowly bilobate; capsule unknown.

### STENANDRIUM Nees

Perennial herbs, acaulescent or with elongated leafy stems; pubescent; leaves petiolate, opposite or basal, entire, membranaceous; flowers sessile in the axils of opposite or subopposite, green bracts, these forming short, headlike or elongated spikes, the peduncles mostly axillary or scapiform, simple or branched; bracts ovate to lanceolate, more or less imbricate, the bracteoles mostly linear and shorter than the calyx; calyx lobes 5, the segments narrow, acute, subequal; corolla usually pink, purple, or white, the tube slender, cylindric, ampliate above into a short throat, the limb oblique, spreading, the 5 lobes obovate, rounded or retuse, imbricate, the 2 posterior ones usually longer-connate and innermost, the anterior lobe outermost in bud; stamens 4, didynamous, inserted below the corolla throat, included, the filaments short; anthers monotheous, connivent by pairs or subcoherent, sometimes barbellate at the apex, mucicous at the base; pollen 3-colpate (in ours) (pantoporate in *S. pohii* Nees, Brazil), anomotreme, prolate to spheroidal; disc inconspicuous; style subclavate at the apex, very shallowly bilobate; ovules 2 in each locule; capsule oblong or ellipsoid, subterete; seeds 4 or by abortion fewer, compressed, orbicular to ovate, hispidulous or muricate, supported on rather long retinacula.

Of the 25 species reported from tropical and warm-temperate America, only the following three have been found in Central America.

Plants with elongated leafy stems. . . . . *S. pedunculatum*.

Plants acaulescent, the peduncles scapiform.

Leaf blades subcordate or very obtuse at the base; bracts narrowly linear-attenuate. . . . . *S. subcordatum*.

Leaf blades acute or attenuate to the base; bracts lanceolate to oblong-lanceolate. *S. dulce*.

**Stenandrium dulce** (Cav.) Nees in DC. Prodr. 11: 282. 1847. *Ruellia dulcis* Cav. Icon. Pl. 6: 62, t. 585, f. 2. 1801. *Crossandra* (?) *fascicularis* Benth. Pl. Hartweg. 22. 1839. *S. dulce* Nees var. *floridanum* A. Gray, Syn. Fl. N. Am. 2(1): 327. 1878. *S. floridanum* Small, Fl. Southeast U. S. 1: 1085, 1338. 1903. *Gerardia dulcis* Blake, Contr. Gray Herb. 52: 101. 1917. *S. guatemalense* Leonard, Carnegie Inst. Wash. Publ. 461: 212, f. 13, 1936 (type from Alta Verapaz, *Tuerckheim* 3588). *S. fascicularis* (Benth.) Wasshausen, Phytologia 12: 427. 1965.

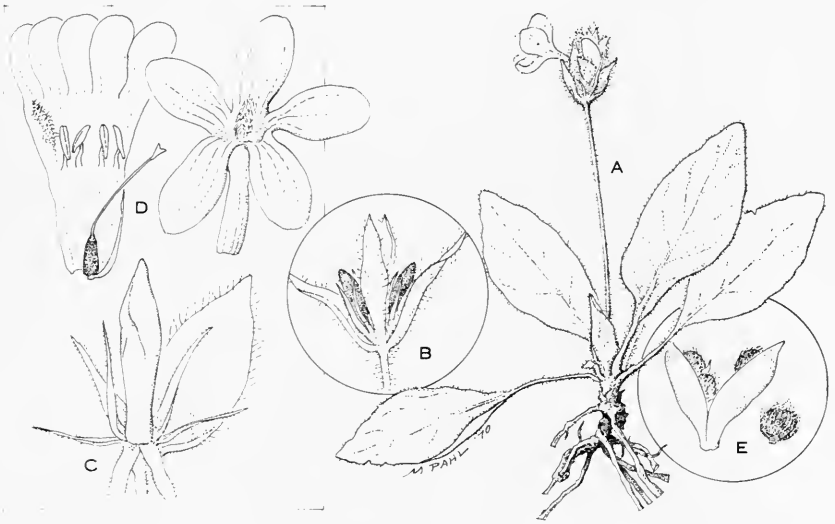


FIG. 102. *Stenandrium dulce*. A, habit, natural size; B, detail of inflorescence showing bracts and calyces,  $\times 2\frac{1}{2}$ ; C, bracts and calyx opened to show corolla in bud,  $\times 3$ ; D, two corollas, one opened to show stamens and pistil,  $\times 2\frac{1}{2}$ ; E, capsule opened to show seeds.

Savannas or damp, open places, near sea level to 350 m.; Alta Verapaz; Petén. Florida; Mexico; Colombia; Peru; Chile; Bolivia; Argentina.

Small perennials, acaulescent with short, thick, erect rootstocks; leaves short-petiolate, the blades ovate to oblong, mostly 1.5–5 cm. long, 1–2.5 cm. wide, obtuse or rounded at the apex, acute or attenuate to the base, entire or obscurely crenate, sparsely white-pilose; inflorescences subsessile or on naked, puberulent peduncles mostly 2–6 cm. long, the spikes densely flowered, 1–3 cm. long; bracts lanceolate or oblong-lanceolate, 8–12 mm. long, 1.5–3.5 mm. wide, acute to acuminate, green, pilose, ciliate; bracteoles narrowly lanceolate-acuminate, 4–5 mm. long, ciliate; calyx segments narrowly lanceolate-acuminate, 5–7 mm. long, ciliate; corolla purple, glabrous or nearly so, 1–1.5 cm. long, the tube 6–7 mm. long, 1–2 mm. broad, the lobes subequal, to 7 mm. long, rounded at the apex; capsule oblong, about 7 mm. long, glabrous or somewhat puberulous at the apex; seeds ovate, flat, 2.5–3 mm. in diameter, appressed-pilulosus.

A variable species with an unusual distributional range. Although the plants of the Andean slopes are often small (2–4 cm. tall), I can find no other differences between them and the plants of Mexico and Guatemala. Some Florida specimens are about 10 cm. tall; the Mexican ones range from 4–8 cm., and those from Guatemala are commonly 3–6 cm. tall.



**Stenandrium pedunculatum** (Donn.-Sm.) Leonard, Journ. Wash. Acad. Sci. 32: 187. 1942. *Blechnum pedunculatum* Donn.-Sm. Bot. Gaz. 49: 457. 1910.

Damp or dry thickets, 200–1,500 m.; Huehuetenango; Jalapa; Jutiapa; Zacapa (type from Gualán, *C. C. Deam 6277*). Mexico (Chiapas); Honduras.

Erect or ascending perennials to 40 cm. tall, branched, the stems slender, densely pilose with spreading, white or brown hairs; leaves petiolate, the blades ovate to elliptic-oblong, mostly 3.5–9 cm. long, 1.5–5 cm. wide, somewhat narrowed to an obtuse or rounded apex, usually abruptly contracted at the base and decurrent on the petiole nearly or quite to the base, paler beneath, pilose on both surfaces with spreading hairs; inflorescences axillary, the peduncles usually equalling or shorter than the subcapitate or short-spicate inflorescences, the spikes 1–2.5 cm. long; bracts spatulate-obovate, 6–11 mm. long, rounded at the apex, green, venose, attenuate to the base, ciliate; bracteoles linear, small, inconspicuous; calyx lobes linear-lanceolate, about 3 mm. long, scarious; corolla pale pink or white, the tube about 5 mm. long, the lobes unequal, the largest 7–8 mm. long and broad, pubescent outside; anthers sessile; style about 3 mm. long; capsule elliptic-oblong, about 7 mm. long, containing 4 glochidiate-pubescent seeds.

**Stenandrium subcordatum** Standley, Journ. Arn. Arb. 11: 48. 1930.

In damp or wet savannas, near sea level to 200 m.; Petén (Uaxacún). Mexico (Yucatan).

Scapose perennial herbs commonly 4–11 cm. tall, arising from a short, thick, nodose rhizome; leaves basal, on petioles 1.5–5 cm. long, the blades oblong-ovate or oval-ovate, 3–5 cm. long, 1.5–2.5 cm. wide, rounded or very obtuse at the apex, shallowly cordate to nearly rounded at the base, rather densely pilosulous on both surfaces; peduncle densely pilose with spreading white hairs, the spike 2–3.5 cm. long; bracts appressed, linear-acuminate, 5–7 mm. long, densely puberulent, the bracteoles similar but smaller; calyx segments linear-subulate, 3–4.5 mm. long, scaberulous; corolla purplish, glabrous outside, the slender tube 7–8 mm. long, scarcely 1 mm. thick, the lobes obovate, subequal, 6–7 mm. long, rounded at the apex; capsule ellipsoid, 6–8 mm. long, containing 4 hispidulous seeds.

A rare species of which I have seen only two specimens.

## STREBLACANTHUS Kuntze

Erect perennial herbs; leaves opposite, usually long-petiolate, the blades entire or nearly so; inflorescences spikelike, terminal and axillary, the bracts narrowly linear to filiform, long, and conspicuous, the bracteoles lanceolate or linear, almost twice as long as the calyx; calyx lobes 4, the segments narrow, equal; corolla pubescent outside, usually white or purple, the tube slender, the throat ampliate, the limb bilabiate, spreading, the upper lip bifid, the lower one trilobate; stamens 2, exserted, the filaments inserted in the throat of the corolla;

anthers bithecos, one theca usually only slightly lower than the other on the connective, one or both minutely calcarate at the base, one sometimes abortive; pollen grains 3-colpate, subspheroidal to spheroidal; staminodes none; style filiform, the stigma minutely bilobate, appearing capitate; capsule slender, compressed, ovate, narrowed below into a slender, solid, stipelike portion; seeds 2-4, lenticular, the retinacula acute.

Of the six species ranging from Mexico to Bolivia, four are found in Costa Rica and Panama, and only one in Guatemala.

**Streblacanthus parviflorus** Leonard, Journ. Wash. Acad. Sci. 31: 103, f. 7. 1941.

Wet mixed forest, at sea level; known only from the vicinity of the type locality, Izabal, Escoba, across the bay (west) from Puerto Barrios; type, *Standley 72949*).

Slender, erect herbs to 60 cm. tall, simple or with a few branches, the stems terete, bifariously pubescent; leaves on long, slender petioles, the blades ovate-elliptic to broadly lanceolate, 4-9 cm. long, 1.5-4 cm. wide, narrowly long-acuminate, rounded at the base, minutely puberulent with curved hairs on the costae and veins, otherwise glabrous; spikelike inflorescences terminal and axillary, rather lax, 2-5 cm. long, glabrous or somewhat puberulent; bracts and bracteoles filiform-caudate, 15-20 mm. long; calyx segments filiform-subulate, sparsely and minutely pubescent, 7-10 mm. long; corolla white, 20-25 mm. long, minutely pubescent outside, the tube slender from the base to the middle, 1 mm. broad, the upper half slightly dilated, 3.5 mm. broad, the limb shallowly bilabiate, the posterior lip oblong-ovate, about 2 mm. wide, minutely bifid, the anterior lip trilobate, the lobes ovate, 4 mm. long; style glabrous; capsule about 12 mm. long, compressed above, 4 mm. broad, minutely and inconspicuously pubescent with spreading hairs; seeds 4, light brown, flat, about 4 mm. in diameter, minutely alveolate and more or less papillose.

### TELIOSTACHYA Nees

*References:* C. G. Nees von Esenbeck, Acanthaceae, in DC. Prodr. 11: 262-264. 1847. C. E. B. Bremekamp, Notes on the Acanthaceae of Surinam, Rec. Trav. Bot. Neerl. 35: 149. 1938.

Perennial herbs, diffuse or rarely erect; leaves usually small, petiolate, the blades membranaceous, entire; inflorescences terminal or axillary, spicate, the spikes usually cylindrical and elongating, sometimes nearly globose or ovoid and appearing subcapitate, composed of numerous bracteate, verticillate cymes commonly of 3-7 flowers, these sessile or nearly so, each flower subtended by 2 bracteoles; bracts and bracteoles rigid and spinose-aristate; calyx segments 5, usually scarious, acute, unequal, the posterior one broad, trinerved, the others smaller, the 2 anterior ones often connate for a part of their length; corolla usually little exceeding the calyx, the tube cylindric below, the throat campanulate, the limb bilabiate, the posterior lip innermost in bud, emarginate, the lower lip trilobate,



FIG. 103. *Streblacanthus parviflorus*. A, habit,  $\times \frac{1}{2}$ ; B, section of fruiting branch with capsule,  $\times 1\frac{1}{2}$ ; C, corolla opened to show stamens and pistil,  $\times 2\frac{1}{2}$ ; D, bracts and calyx with immature ovary and style,  $\times 2\frac{1}{2}$ ; E, flower bud,  $\times 2\frac{1}{2}$ .

spreading; stamens 4, didynamous, included, the short filaments inserted only a little below the throat, the anthers bithecos, the thecae discrete, subequal, very minutely calcarate; pollen 3-colporate, prolate; ovary with 2 ovules in each locule; capsule oblong, acute, bilocular from the base, containing 2-4 lenticular seeds.

The genus is apparently limited to tropical America and western Africa. All known species of the allied genus *Lepidagathus* Willd. are natives of the Old World. Of the 10 reported American species of *Teliostachya*, only one is known from Central America.

***Teliostachya alopecuroidea*** (Vahl) Nees in Mart. Fl. Bras. 9: 72. 1847, and in DC. Prodr. 11: 263. 1847. *Ruellia alopecuroides* Vahl, Eclog. Amer. 2: 49. 1798. *Lepidagathis alopecuroides* R. Br. ex Griseb. Fl. Brit. W. Ind. 453. 1861.

Damp or wet forest or thickets, or on open hillsides or meadows, near sea level to 1,400 m.; Alta Verapaz; Izabal. British Honduras; Honduras; Nicaragua; Costa Rica; Panama; West Indies; northern South America.

Perennial herbs, decumbent or ascending, the slender stems sometimes to 50 cm. long, rooting at the lower nodes, more or less short-pilose; leaves petiolate, the blades ovate, lance-ovate, or elliptic, mostly 2-6 cm. long, acute or obtuse, abruptly contracted at the base and more or less decurrent on the petiole, sparsely short-pilose on both surfaces, the cystoliths numerous; inflorescences mostly terminal, 2-8 cm. long, 0.8-1.5 cm. in diameter, very densely flowered; bracts green, ovate to lanceolate or oblong, 4-6 mm. long, venose, ciliate, spinose-tipped; calyx lobes unequal, 4-6 mm. long, the posterior one obovate, the anterior ones lanceolate, connate below, the lateral ones linear; corolla white or lavender, about equalling the calyx; capsule glabrous, about 4 mm. long, containing 4 lenticular seeds.

### TETRAMERIUM Nees

*Reference:* George B. Happ, Monograph of *Tetramerium* and *Henrya*, Ann. Mo. Bot. Gard. 24: 501-582, pl. 27-33. 1937.

Herbaceous or somewhat suffrutescent perennials, usually pubescent, the older stems pale and hard; leaves opposite, petiolate, the blades entire; inflorescences terminal and axillary, spicate; bracts more or less 4-ranked, herbaceous or subcoriaceous, closely imbricate, usually broad, venose, entire, sessile or short-petiolate, more or less mucronate at the apex; bracteoles filiform to ovate, ciliate; flowers usually solitary, sessile or short-pedicellate; calyx lobes 4 or 5, equal or nearly so, ciliate; corolla tubular-funnelform, bilabiate, the tube straight or slightly curved, abruptly ampliate in the throat; stamens 2, included, the filaments inserted in the corolla throat, somewhat dilated at the base, hispidulous below; anthers bithecos, the thecae subequal, muticous, borne on a rather broad connective; pollen 3-colporate, prolate; ovules usually 4; stigma bilobate; capsule obovate,

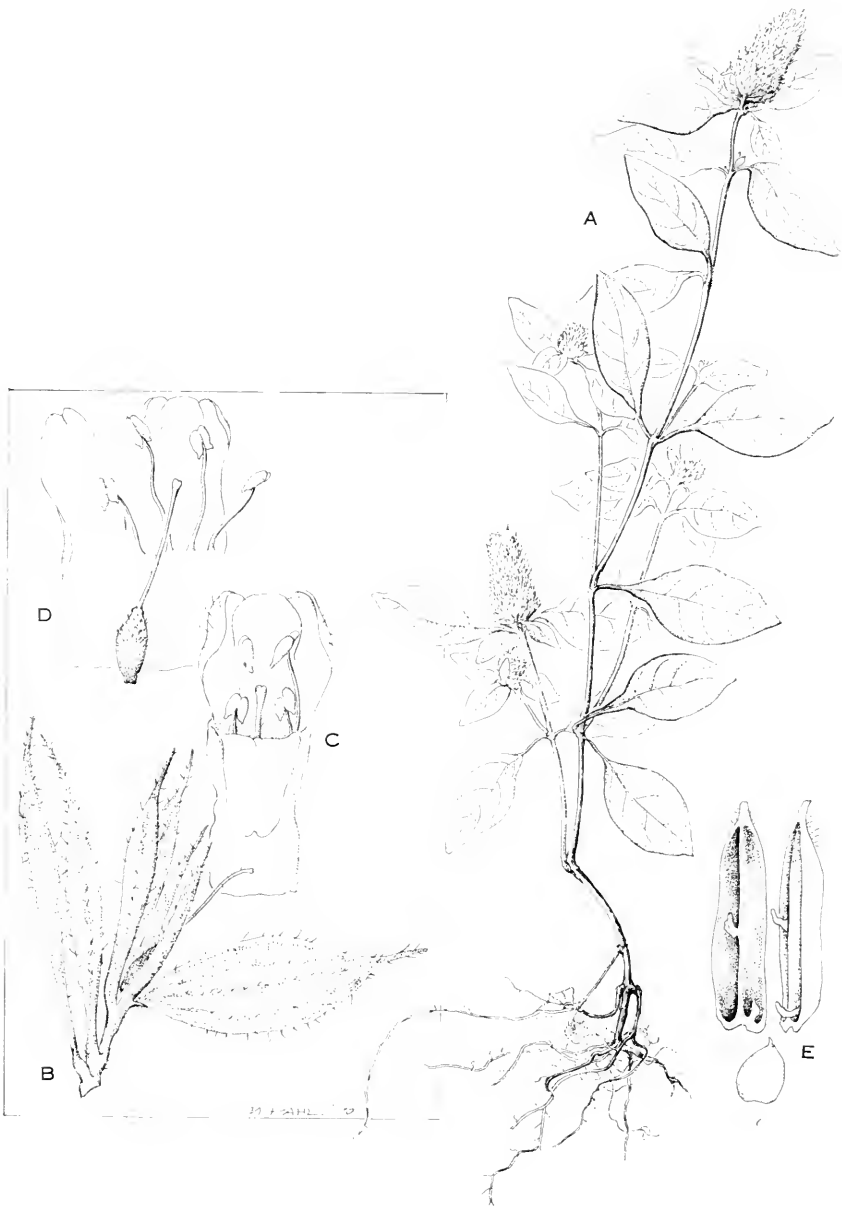


FIG. 104. *Teliostachya alopecuroidea*. A, habit,  $\times \frac{1}{2}$ ; B, two bracteoles, calyx, and pistil,  $\times 10$ ; C, corolla showing stamens and tip of style,  $\times 10$ ; D, corolla opened to show pistil and stamens,  $\times 10$ ; E, opened capsule and seed,  $\times 9$ .

apiculate, usually pubescent, contracted below into a solid stipe; seeds commonly 4, tuberculate or muriculate.

The genus is wholly American and chiefly North American, the species growing in tropical and warm-temperate regions. Although Happ recognized 23 species, five of them in Central America, the true number is probably considerably less. Only one is known in Guatemala.

**Tetramerium nervosum** Nees in Benth. Bot. Voy. Sulphur, 148, t. 48. 1844. *T. nervosum* var. *angustifolia* Nees in DC. Prodr. 11: 468. 1847. *T. hispidum* Nees, l.c. *T. standleyi* Happ, Ann. Mo. Bot. Gard. 24: 514. 1937.

Damp or dry thickets or fields, often on rocky slopes, sometimes on gravel bars along streams, 100–1,800 m.; Chiquimula; Escuintla; Guatemala; Huehuetenango; Jutiapa; El Progreso; El Quiché; Santa Rosa; Zacapa. Southwestern United States; Mexico; El Salvador to Costa Rica.

Erect or ascending herbs, sometimes suffrutescent at the base, to 50 cm. tall, usually much branched, the stems and branches pale and brittle, glabrous or pubescent, sometimes viscid; leaves petiolate, the blades thin, ovate to lance-ovate or lanceolate, mostly 2–5 cm. long, acuminate or obtuse, rounded or obtuse at the base, more or less pubescent; inflorescences 2–10 cm. long, 1.5–2 cm. broad; bracts suborbicular to broadly ovate, 8–14 mm. long, 5–10 mm. wide, obtuse or rounded at the apex and mucronate, with 3–5 conspicuous veins, more or less hispidulous, ciliate, closely imbricate; bracteoles lanceolate-aristate, 2.5–4 mm. long; calyx lobes 4, similar to the bracteoles but slightly smaller; corolla 9–17 mm. long, white or cream-colored, sometimes marked with red or purple, glabrous outside or somewhat pubescent on the upper portion, the tube slender, the lips about 5 mm. long; anthers about 1 mm. long; capsule 5–6 mm. long, pubescent or glabrate; seeds tuberculate.

## THUNBERGIA L. f.

Herbs or shrubs, usually scandent, sometimes erect, pubescent or glabrous; leaves opposite, ovate to lanceolate, cordate, or hastate; flowers usually large and showy, pedicellate, solitary in the leaf axils or in terminal racemes; bracts 2, foliaceous, ovate or lanceolate, much longer than the calyx and often almost equalling the corolla; calyx short, annular, truncate or with 10–15 teeth; corolla tube incurved or oblique, often compressed, ampliate above, the limb spreading, the 5 lobes broad, subequal, contorted; stamens 4, didynamous, inserted near the base of the corolla tube, the filaments thickened at the base; anthers bithecos, glabrous or barbate, the connective apiculate, thecae oblong or ovoid, parallel, equal or somewhat unequal, usually conspicuously long-calcarate at the base, rarely muticous; pollen spirotreme, spheroidal; disc pulvinate or short-annular; style cuneately dilated at the apex, obliquely funnellform, or unequally bilobate;



FIG. 105. *Tetramerium nervosum*. A, habit,  $\times \frac{1}{2}$ ; B, inflorescences,  $\times 4\frac{1}{2}$ ; C, bracts,  $\times 2\frac{1}{2}$ ; D, bract, bracteoles, calyx, and pistil,  $\times 5$ ; E, corolla with stamens and style,  $\times 5$ ; F, capsule opened to show retinacula and seeds,  $\times 4\frac{1}{2}$ ; G, seed,  $\times 5$ .

ovules 2 in each locule, collateral; capsule coriaceous, subglobose, seminiferous at the base, abruptly rostrate, loculicidally dehiscent; seeds 2 in each locule, semi-globose to ovoid, with a conspicuous excavation on the ventral side, verrucose or smooth.

I agree with Bremekamp (The Delimitation of the Acanthaceae, Proc. Kon. Ned. Akad. v. Wetensch. Ser. c, 56: 533-546. 1943; Delimitation and Subdivision of the Acanthaceae, Bull. Bot. Surv. India 7: 21-30. 1965) and with Raj (Pollen Morphological Studies in the Acanthaceae, Grana Palynol. 3(1): 3-108. 1961) that on the basis of pollen and seed morphology, as well as other characters such as the unusual calyx and capsule, the Thunbergioideae should be made into the separate family Thunbergiaceae. I have included it in the Acanthaceae, however, following the traditional usage as a matter of convenience.

About 30 species, in Africa and Asia. Several are cultivated widely for ornament because of their showy flowers, and frequently become naturalized.

Plants erect shrubs; petioles mostly 2-3 mm. long. . . . . *T. erecta*.

Plants scandent, herbaceous throughout or nearly so; petioles mostly 1.5-8 cm. long.

Petioles narrowly but conspicuously winged; corollas pale yellow to buff or orange (rarely white), usually with a dark purple "eye" . . . . . *T. alata*.

Petioles not winged, or if so, the wings minute and inconspicuous; corollas white, purple, or lavender.

Corollas white, 3-4 cm. long. . . . . *T. fragrans*.

Corollas purple or lavender, 6-8 cm. long. . . . . *T. grandiflora*.

**Thunbergia alata** Bojer ex Sims, Bot. Mag. 52, t. 2591. 1825.  
*Pijín* and *Principe Alberto* (Alta Verapaz).

Damp to dry thickets or hedges, common in cultivation, sea level to 1,400 m., and in some localities thoroughly naturalized; Alta Verapaz; Escuintla; Guatemala; Izabal; Jutiapa; Petén; Quezaltenango; El Quiché; Retalhuleu; Sacatepéquez; San Marcos; Santa Rosa; Suchitepéquez. Native of eastern Africa; widely cultivated and naturalized throughout tropical America.

Small herbaceous vines, rather densely and softly pilose or pilosulous throughout; leaves on narrowly winged petioles mostly 2-6 cm. long, the blades ovate or hastately deltoid-ovate, 2-8 cm. long, acute, cordate-hastate at the base, remotely undulate-dentate or entire; flowers axillary, the slender peduncles longer than the petioles; bracts ovate-lanceolate, 1.5-2 cm. long, acute or acuminate; calyx teeth 10-16; corolla 2.5-4 cm. long, usually yellow, buff, or orange with a dark purple eye, sometimes white, the tube shorter or slightly longer than the bracts, the lobes truncate; capsule pubescent, globose, 7-10 mm. broad, abruptly contracted into a stout compressed beak 10-13 mm. long.





FIG. 106. *Thunbergia alata*. A, habit,  $\times \frac{1}{2}$ ; B, flower with corolla opened to show stamens and pistil,  $\times 2$ ; C, anther, much enlarged; D, hairs of anther, greatly enlarged; E, fruiting pedicels, one bearing opened calyx after capsule has fallen,  $\times \frac{1}{2}$ ; F, capsule with bracteoles and calyx,  $\times 2$ ; G, capsule opened,  $\times 2$ ; H, seeds,  $\times 2\frac{1}{2}$ .

Numerous color variants of *Thunbergia alata* have been recognized as horticultural varieties, and in some cases described as valid species or varieties, but none differ from the typical form in any other way.

***Thunbergia erecta*** (Benth.) T. Anders. Journ. Linn. Soc. Bot. 7: 18. 1864. *Meyenia erecta* Benth. Niger. Fl. 476. 1849.

Native of tropical Africa, often planted for ornament in tropical America; occasional in Guatemala, chiefly in the coastal lowlands.

Erect shrubs, usually 1.5–3 m. tall, the branches slender, tetragonous, glabrous; leaves small, on petioles mostly 2–3 mm. long, the blades ovate or oblong-ovate, mostly 2–4(5) cm. long, acute or acuminate, obtuse or acute at the base, entire or sinuate, glabrous or nearly so, much paler beneath; pedicels axillary, to 2 cm. long; bracts oblong, oblique, 1–2 cm. long, 0.5–0.8 cm. wide, acute, glabrous or nearly so; calyx teeth 8–12, only 1–4 mm. long; corolla 4.5–8 cm. long, royal purple or lavender, with a white or yellowish throat.

***Thunbergia fragrans*** Roxb. Pl. Coromand. 1: 47. 1795.

Native of southern Asia, widely cultivated for ornament in other parts of the earth; planted rather commonly in Guatemala, chiefly in the lowlands; sometimes escaping and becoming naturalized in thickets and hedges of the tierra caliente; Izabal; Petén; Retalhuleu.

Slender herbaceous vines, the stems minutely strigillose or glabrous; leaves on petioles 1–4 cm. long, the blades rather thick when dried, ovate to lance-ovate, 3–11 cm. long, 1.5–6 cm. wide, obtuse to acute, truncate, subcordate, or subhastate at the base, the margins entire or with a few undulate teeth near the base, sparsely strigillose or almost glabrous, the veins 3–5; flowers axillary, the pedicels 2–7 cm. long, often stout; bracts connate and spathe-like, oblong-lanceolate, acute, 1.5–2 cm. long, green, pubescent; calyx 3–5 mm. long, the 12–16 teeth subulate, 1–3 mm. long; corolla white, generally 3–3.5 cm. long, the broad lobes subtruncate, often somewhat crenate, sometimes broadly tridentate, about equalling the rather slender tube; capsule about 8 mm. broad, puberulent, contracted into a stout beak 1–1.5 cm. long.

***Thunbergia grandiflora*** Roxb. Hort. Beng. 45. 1814. *Presidio de amor* (San Marcos).

Native of southeastern Asia; often planted for ornament in other regions; cultivated rather commonly in Guatemala, especially at low elevations, but often at middle altitudes; rarely becoming more or less naturalized; Alta Verapaz; Guatemala; Petén; San Marcos. British Honduras.

Large vines, sometimes more or less woody below, the stems rather stout, puberulent or glabrate; leaves on petioles 2–6 cm. long, the blades rather thick, ovate to lance-oblong, mostly 6–10 cm. long, acute or acuminate, subcordate to obtuse at the base, the margins entire or with a few coarse, acute or obtuse teeth,

both surfaces scabrous-puberulent or glabrate; flowers axillary or said to be in elongated terminal racemes, the pedicels stout, 1-8 cm. long; bracts more or less connate, ovate or oblong, 3-3.5 cm. long, usually rounded and mucronate at the apex, sometimes obtuse, minutely scabrous-puberulent; calyx truncate, the margin densely pubescent; corolla usually 6-8 cm. long, bright blue or purple with a white throat, glabrous, the tube abruptly contracted about 0.5 cm. above the base, the large lobes rounded; capsule coriaceous, about 1.5 cm. broad, contracted into a stout beak about 2 cm. long.

These are exceptionally showy and handsome plants, blossoming luxuriantly under tropical conditions, requiring little or no attention when once established.

### TRYBLIOCALYX Lindau

Erect, suffrutescent plants, the branches pubescent or glabrous; leaves subsessile or petiolate, the blades ovate, lanceolate, or lance-oblong, acuminate, pubescent or glabrate, the cystoliths abundant but not conspicuous; inflorescences cymose, becoming paniculate, terminal, usually leafy at the base; bracts small, subulate or linear-acuminate; calyx cupular, inflated, accrescent, the 5 lobes unequal, acute or acuminate; corolla tube cylindrical, gradually somewhat ampliate toward the apex, the limb bilabiate, the posterior lip bilobate, the anterior lip deeply trilobate; stamens 2, included, the anthers bithecos, thecae mucicous at the base; staminodes very short, appearing as appendages at the base of the filaments or only a short distance removed; pollen 3-colporate; ovary glabrous, the style pubescent or nearly glabrous; fruits unknown.

Only two species are known, one in Guatemala and one in Mexico. Because this genus has been misinterpreted in the past, with the result that specimens have been erroneously identified in herbaria as Verbenaceae or Scrophulariaceae, both species are treated here.

Peduncles and pedicels pubescent; calyces at anthesis 8-12 mm. long, more or less pubescent, the lobes triangular and acute; corollas 15-23 mm. long; staminodes appearing as appendages at the base of the filaments. . . . . *T. pyramidatus*.

Peduncles and pedicels glabrous; calyces at anthesis 5-8 mm. long, essentially glabrous, the lobes acuminate; corollas 12-18 mm. long; staminodes a short distance removed from base of the filaments. . . . . *T. albicaulis*.

**Trybliocalyx albicaulis** (Brandg.) D. Gibson, *Fieldiana: Botany* 32: 176, f. 2. 1970. *Jacobinia albicaulis* Brandege, *Univ. Calif. Pub. Bot.* 4: 386. 1913.

Mexico (Vera Cruz, *Purpus* 6049, type, and Oaxaca, *MacDougall* 26062).

Suffrutescent plants, the branches glabrous or nearly so; leaves sessile, subsessile, or on petioles to 8 mm. long, the blades ovate, lance-ovate, or lance-oblong,



FIG. 107. *Trybliocalyx pyramidatus*. A, habit,  $\times \frac{1}{2}$ ; B, corolla,  $\times 2\frac{1}{2}$ ; C, corolla opened to show stamens, staminodes, and style,  $\times 2\frac{1}{2}$ ; D, bracts and calyx,  $\times 2\frac{1}{2}$ ; E, calyx opened to show pistil,  $\times 2\frac{1}{2}$ ; F, flower bud,  $\times 2\frac{1}{2}$ .

5–11 cm. long, 2–5 cm. wide, acuminate, gradually narrowed to the base, glabrous, or sometimes pubescent beneath, especially on costae and veins, cystoliths abundant on upper surface, lateral veins 7–12 pairs; inflorescences cymose, becoming paniculate, terminal or lateral, shorter or longer than the leaves, usually leafy at base; bracts subtending each flower 2–3 mm. long, subulate, puberulent or glabrous; peduncles and pedicels usually glabrous or nearly so, sometimes minutely puberulent, the pedicels 3–10 mm. long; calyx cupular, inflated, accrescent, glabrous or sometimes minutely puberulent at tips of lobes, the tube 2–5 mm. long, 3–4 mm. broad, the 5 lobes 3–7 mm. long, unequal, acuminate; corolla glabrous or the lobes very minutely puberulent outside, the tube 7–10 mm. long, the lobes unequal, those of the anterior lip 6–8 mm. long, rounded; stamens reaching a point above the throat; posterior staminodes 0.3–0.5 mm. long; style at maturity 4–6 (8–12) mm. long, more or less pubescent; fruits unknown.

It should be noted that the styles of *Purpus 6049* are only 4–6 mm. long, while those of *MacDougall 26062* are 8–12 mm. long.

**Trybliocalyx pyramidatus** Lindau, Bull. Herb. Boiss. II. 4: 401. 1904. *Clerodendrum standleyi* Moldenke, Known Geogr. Distr. Verben. 76. 1942.

Guatemala: Huehuetenango, near Nentón, in thickets, *Seler 3276* (type); Zacapa, alt. 500–660 m., *Standley 73793* (type of *Clerodendrum standleyi*).

Shrubs, the branches more or less pubescent; leaves sessile or subsessile, the blades lance-ovate to lance-oblong, 6–15 cm. long, 2–6 cm. wide, acuminate, gradually narrowed to the base, glabrous or sometimes sparsely pubescent on costae and veins beneath, cystoliths abundant on upper surface, lateral veins 9–12 pairs; inflorescences cymose, becoming paniculate, terminal, often longer than the leaves, usually leafy at the base; bracts subtending each flower 3–6 mm. long, linear-acuminate or subulate, pubescent; peduncles and pedicels pubescent, the pedicels 5–15 mm. long; calyx cupular, inflated, accrescent, more or less pubescent, at least near the base, the tube 4–6 mm. long, 6–9 mm. broad, the 5 lobes 4–6 mm. long, unequal, triangular, acute; corolla lilac to bluish-purple, glabrous, the tube 10–14 mm. long, the lobes unequal, those of the anterior lip 5–9 mm. long, rounded; stamens included, rising to a point well below the throat, filaments inserted at about the middle of the corolla tube, anthers 2–3 mm. long; posterior staminodes about 0.5 mm. long, appearing as appendages at the base of the filaments; style at maturity 10–11 mm. long, pubescent; fruits unknown.

## PLANTAGINALES

The order Plantaginales consists of a single family, Plantaginaceae, and its characters are those of the family. There are three genera but *Plantago* is the only one in our area and by far the largest with perhaps 250 species worldwide. Although a cosmopolitan genus,

representatives are lacking in some tropical areas. Several are adventive in tropical America.

## PLANTAGINACEAE. Plantain Family.

DOROTHY NASH GIBSON

*References:* Robert Pilger, *Plantaginaceae*, *Pflanzenr.* IV. 269. 466 pp. 1937; Knud Rahn, *Plantagináceas*, *Fl. Illustr. Catarinense*, I. 37 pp. 1966.

Annual or perennial herbs, rarely shrubs; leaves usually forming basal rosettes, commonly alternate, the blades linear or broad, usually dilated and sheathing at the base, entire or variously lobate or dentate, the venation often appearing parallel; inflorescences scapose, spicate or capitate, the flowers small, bracteate, usually bisexual; calyx segments 4, imbricate; corolla tubular, scarious, persistent in fruit, the limb actinomorphic, the 4 lobes spreading or reflexed in anthesis, but sometimes closing in fruit; stamens usually 4, rarely 2, alternate with the corolla lobes, exserted, the slender filaments inserted on the corolla tube, the anthers bithecous, versatile, introrse, longitudinally dehiscent; ovary superior, usually bilocular, sometimes unilocular or falsely 3-4-locular, the placentation axile (in ours); ovules solitary or numerous in each locule, semianatropous; style 1, filiform, the stigma obscurely bifid; fruit usually capsular, circumscissile at or below the middle, rarely indehiscent; seeds 1-several in each locule, often lustrous, the endosperm carnose, the embryo straight.

Three genera are known, *Littorella* in temperate or cold regions of both hemispheres, *Bougueria*, with one species in the South American Andes, and *Plantago*, a cosmopolitan genus and the only one in Guatemala.

## PLANTAGO L.

Annual or perennial herbs, acaulescent in Central American species; leaves basal, rosulate; inflorescences spicate, the spikes 1-many-flowered, often much elongated, borne on naked scapes; flowers sessile in the axils of small bracts; calyx segments 4, equal, or 2 of them longer, imbricate, carinate (in ours), the margins scarious; corolla salverform, dry and membranous, the tube cylindrical or constricted at the throat, the limb spreading or reflexed in anthesis, the 4 lobes sometimes closing in fruit; stamens 4 or 2, the filaments inserted on the corolla tube; ovary bilocular or falsely 3-4-locular; ovules 1-several in each locule; capsule bilocular, circumscissile at or below the middle; seeds various in form, often concave on the inner side.

Species about 250, in almost all parts of the earth, but few in tropical regions. Only four are known in Guatemala.

Plants dioecious; scapes usually no more than 5 mm. long; spikes with only 1 or 2 flowers; capsule borne on a columnar carpophore 2-3.5 cm. long. *P. tubulosa*.

Plants not dioecious, the flowers bisexual; scapes 3–30 cm. long; spikes many-flowered; capsule maturing within the calyx, not borne on a carpophore.

Leaves linear, 1–3 mm. wide. . . . . *P. linearis*.

Leaves broadly ovate to oblanceolate or elliptic-obovate, 1–12 cm. wide.

Leaves broadly ovate to elliptic-ovate, 3–12 cm. wide, usually rather abruptly contracted at the base, then decurrent on long petioles. . . . . *P. major*.

Leaves lanceolate, oblanceolate, or narrowly elliptic-obovate, 0.5–4 cm. wide, long-attenuate to the base, sessile or short-petiolate. . . . . *P. australis*.

***Plantago australis*** Lam. Encycl. Méth. Bot. Illust. Gen. 1: 339. 1793. *P. hirtella* HBK. Nov. Gen. & Sp. 2: 187. 1817. *P. schiedeana* Dene. in DC. Prodr. 13(1): 723. 1852. *P. leptophylla* Dene. l.c. *P. macrostachys* Dene. l.c. 724; Pilger, in Pflanzenr. IV. 269: 249. f. 26. 1937. *P. galeottiana* Dene. in DC. Prodr. 13(1): 726. 1852. *P. australis* ssp. *hirtella* (HBK.) Rahn, Bot. Tidsskr. 60: 50. 1964; Fl. Illust. Catarinense I. 19. 1966. *Llantén* (Quezaltenango and Sacatepéquez); *sraetzí* (Alta Verapaz, Quecchí).

Damp meadows, fields, banks, roadsides, thickets, mixed forest or pine or *cupressus* forest, 360–3,500 m.; Alta Verapaz; Chimaltenango; Guatemala; Huehuetenango; Jalapa; Quezaltenango; El Quiché; Retalhuleu; Sacatepéquez; San Marcos; Sololá; Zacapa. Mexico; El Salvador; Honduras; Costa Rica; southward to Brazil, Bolivia, and Argentina.

Perennial plants, the caudex short and thick; leaves few or numerous, alternate in basal rosettes, variable in size and shape, the blades mostly 5–25 cm. long, 0.5–4 cm. wide, lanceolate or oblanceolate to narrowly elliptic-obovate, obtuse or subacute, attenuate to the base, sessile or short-petiolate, subentire or undulate-dentate, the veins 5–7, sparsely or densely pubescent to villous on both surfaces or almost glabrous; flowering scapes erect or somewhat decumbent, 3–30 cm. long, usually considerably longer than the leaves, often much elongated, sparsely pubescent to densely villous, densely flowered or interrupted below; bracts variable, narrowly triangular to ovate, commonly 2–4 mm. long, nearly glabrous or the margins commonly more or less irregularly ciliate, sometimes pubescent along the keel; calyx segments obliquely ovate to oblanceolate, 2–3 mm. long, one a little longer than the other 3, usually more or less pubescent along the keel and very minutely ciliate on the margins, especially near the apex; corolla lobes narrowly ovate; seeds brown.

Common weeds in many mountainous regions of Guatemala.

Although Rahn considers *P. hirtella* HBK. one of his many subspecies of the weedy *P. australis* complex, it apparently differs from the typical variety only in its leaves being somewhat pubescent to short-villous rather than glabrous. Both have more or less pubescent to villous scapes. One of our Guatemalan collections, *Breedlove 8472* from Huehuetenango, has completely glabrous leaves and matches in all respects the photographs of the type specimen of *P. australis*

Lam., collected by Commerson in Argentina, F. M. Neg. 39579. I have also compared both the glabrous and the pubescent forms with a fragment of the type specimen, and can find no significant differences in any of the details of the inflorescence.

**Plantago linearis** HBK. Nov. Gen. & Sp. 2: 186. 1817. *P. xorulensis* HBK. l.c. *P. mexicana* Link, Enum. Pl. Hort. Berol. 1: 121. 1821. *P. linearis* var. *mexicana* Pilger, Rep. Sp. Nov. 15: 422. 1919.

In alpine meadows and on damp or dry, often rocky slopes and hillsides, sometimes in open pine-oak woods, 1,950–4,000 m.; Huehuetenango; Quezaltenango; San Marcos. Mexico; Andes of South America.

Plants usually perennial from a slender taproot; leaves usually numerous, linear, erect or more or less decumbent, 5–15 cm. long, 1–2 mm. wide (in ours), rarely to 3 mm., dilated and sheathing at the base, essentially glabrous to sparsely or densely villous; inflorescences few or numerous, the scapes about equalling or considerably longer than the leaves, mostly 5–20 cm. long, villous, the flowering spikes mostly 1–3 cm. long; bracts ovate, acute or acuminate, villous, the keel brown, the margins scarious, 1.5–2 mm. long; sepals oblanceolate, obtuse, glabrous or villous along the brown keel, the margins scarious, 2.5–3 mm. long; corolla lobes ovate, with a brown spot near the base of each, subacute or rounded, spreading in fruit, about 2 mm. long; stamens exserted; style pubescent; capsule 2–3 mm. long, containing 2 boat-shaped brown seeds.

A variable complex, divided by Pilger into 10 varieties.

**Plantago major** L. Sp. Pl. 112. 1753. *Llantén*; *lantén*; *sraetzí* (Alta Verapaz, Quecchí); *socchicam* (Huehuetenango, fide Tejada).

Naturalized as a weed in waste and cultivated ground, in damp thickets, and along stream banks; abundant in some localities, 600–1,200 m.; Alta Verapaz; Escuintla; Guatemala; Jalapa; Quezaltenango; Sacatepéquez; Santa Rosa. Native of the Old World but extensively naturalized as a weed in most regions of America, at least the temperate ones; United States through Mexico and Central America; West Indies; South America.

Perennial from short, thick rootstocks; leaves few or numerous in basal rosettes, long-petiolate, the blades broadly ovate to elliptic-ovate, obtuse, mostly 5–20 cm. long, 3–12 cm. wide, palmately 3–7(11)-costate, entire or coarsely and irregularly dentate, usually rather abruptly contracted at the base and decurrent on the petiole, glabrous or nearly so (in Central American plants); flowering scapes mostly 10–50 cm. long, often villous or pubescent when young, usually glabrate in age, the inflorescences commonly 5–25 cm. long, 6–8 mm. thick, the spikes cylindrical, usually densely flowered, often interrupted below; bracts usually shorter than the calyx at anthesis but often longer in age; sepals broadly ovate to obovate or ellip-



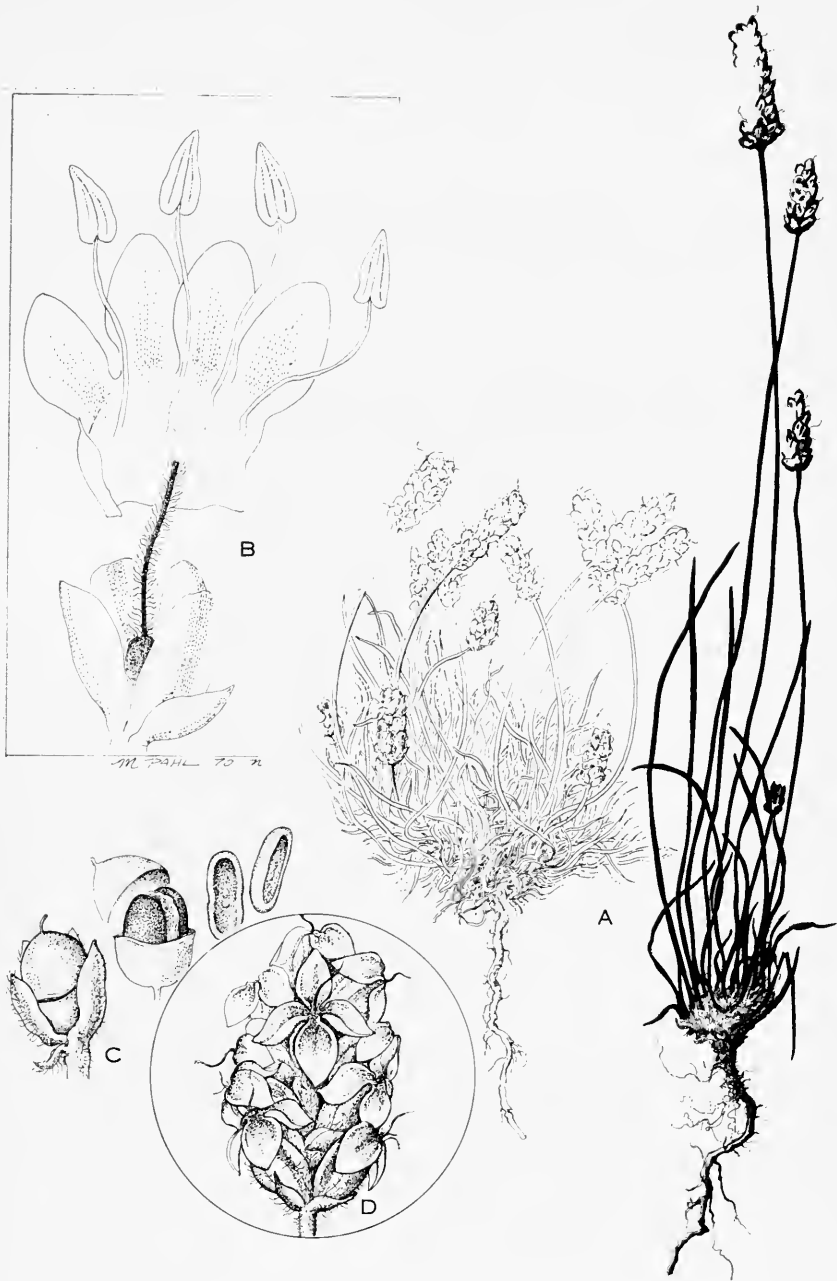


FIG. 108. *Plantago linearis*. A, habit of plant (two sketches to show variation of form),  $\times \frac{3}{4}$ ; B, flower with corolla (above) removed and opened to show stamens, and calyx (below) with pistil,  $\times 10$ ; C, two views of capsule, first enclosed in calyx, and the second opened to show two seeds within, and the two seeds removed,  $\times 5$ ; D, flowering spike,  $\times 3$ .

tical, 1.5–2 mm. long, glabrous or minutely pubescent along the keel, the margins scarious; corolla lobes narrowly triangular, 0.5–1 mm. long, scarious, obtuse or subacute, spreading; capsule broadly ovoid, containing 5-many, small brown seeds.

Common weeds, but more abundant in the United States than in Central America.

***Plantago tubulosa*** Dcne. in DC. Prodr. 13(1): 728. 1852. *P. purpusii* Brandegee, Zoe 5: 238. 1906. *Petatillo* (Huehuetenango).

Wet, alpine meadows, often along streams, 3,300–3,750 m.; Huehuetenango (Sierra de los Cuchumatanes). Mexico; Andes of South America.

Perennial, dioecious plants from a thick rootstock; leaves sessile, densely rosulate, subcoriaceous and when fresh, rather rigid, linear, lorate, or narrowly linear-lanceolate, mostly 2–5 cm. long, gradually narrowed to the obtuse apex, dilated and sheathing at the base, the margins coarsely dentate or lobate-dentate, sinuate, or entire; (entire or nearly so in Guatemalan plants), glabrous; scapes short, inconspicuous, usually not more than 5 mm. long, bearing 1 or 2 flowers; bracts 5–8 mm. long, clasping, rotund-ovate when expanded; calyx 7–10 mm. long, the sepals connate below, lanceolate or narrowly ovate, acuminate, prominently keeled, the margins scarious; corolla tubes slender, 1–2 cm. long, the lobes narrowly or broadly ovate, about 2 mm. long; anthers long-exserted; ovules 5–6; capsule borne on a columnar carpophore 2–3.5 cm. long; seeds usually 4–6.

These plants form close mats, often covering areas of several square meters.

Because the leaves of the Guatemalan collections are entire or only very obscurely sinuate-dentate, they more closely resemble those of the South American *P. rigida* HBK. (Nov. Gen. & Sp. II: 227, *t.* 126. 1817), especially when the rosettes are young (see *Standley 81103*), and the leaves only 1–2 cm. long. However, as all material available to me for examination is sterile, comparison of calyces and corollas could not be made. The sepals of *P. rigida* are free, and the corolla tubes are usually only 6–9 mm. long.





















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