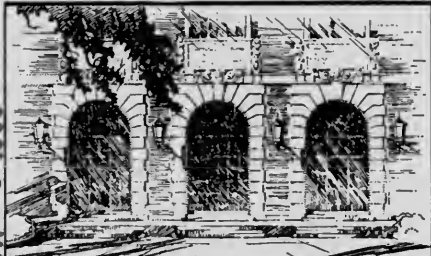




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# FLORA OF GUATEMALA

PAUL C. STANDLEY

AND

LOUIS O. WILLIAMS

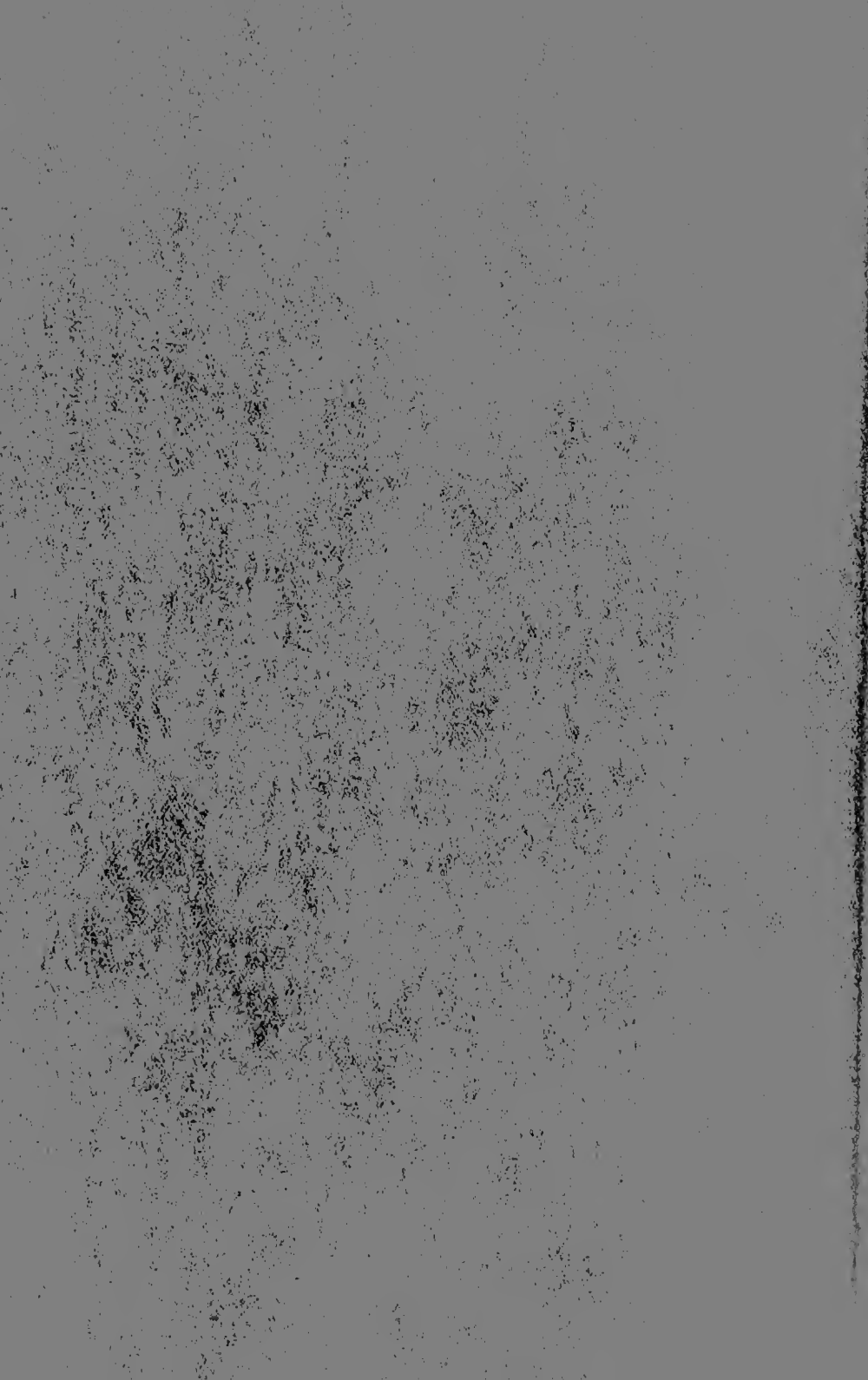
FIELDIANA: BOTANY

VOLUME 24, PART VII, NUMBER 2

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CHICAGO NATURAL HISTORY MUSEUM

JANUARY 26, 1962









FLORA OF GUATEMALA

PART VII



# FLORA OF GUATEMALA

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AND

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FIELDIANA: BOTANY

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# Flora of Guatemala<sup>1</sup>

## OPUNTIALES

The Opuntiales, as outlined by Engler, contain a single family, the Cactaceae. The family, with the possible exception of a few species of *Rhypsalis*, is entirely American. A few cacti have become established in other parts of the world. The Cactaceae occur in greatest abundance, both in kinds and individuals in the dry tropics or adjacent desert or desert-like areas in temperate regions. A few species extend well into the cool or even cold temperate regions. The center of greatest diversification is in Mexico and the adjacent southwestern United States, with a secondary center outside the wet tropics in South America.

The characters of the order are those of the single family which it contains.

## CACTACEAE. Cactus Family

Succulent, perennial plants, often of bizarre forms, mostly armed with spines, the stems various in form, plants usually terrestrial but those of the wetter tropics often epiphytic, small and herb-like or often large and shrub-like or tree-like, fleshy or the stems often hard and woody, simple or branched, branches often articulate, bearing organs called areoles which may be either small or large and tuft-like or circular and often bearing bristles and wool or hair and usually spines; leaves none except in *Pereskia* and *Peresklopsis* where they are broad, succulent and entire, the leaves in some genera represented by terete or subulate scales which are soon deciduous; spines various in arrangement and number, sometimes vaginate, often wanting; flowers perfect or rarely unisexual, regular or somewhat irregular, small or often very large, usually solitary, but sometimes borne in a specialized cap-like, terminal inflorescence called a cephalium; perianth tube none or present and greatly elongated, the segments of the limb spreading or erect and few or numerous; sepals usually grading into the petals, but the sepals and petals sometimes unlike; stamens sometimes few but usually numerous, short or elongate, sometimes borne in separated series; filaments inserted on the tube or the throat of the perianth, the anthers small, usually oblong, 2-celled; style simple, terminal, often much elongated, lobes of the stigma 2-many, generally slender; ovary inferior, 1-celled, distinct or sometimes immersed in the branch, ovules numerous; fruit baccate, often juicy and edible; seeds usually numerous; cotyledons 2, accumbent, often broad or elongate; endosperm scant or copious.

<sup>1</sup>Assisted by a grant from National Science Foundation.

Perhaps 50 genera (26, Vaupel; 124, Britton and Rose; 220, Backeberg) and some 1,500 species. Two others of the genera recognized by Britton and Rose, *Wittia* and *Weberocereus*, are found in southern Central America.

The number of genera in the Cactaceae has been a matter of considerable controversy during the past one hundred years. Bentham and Hooker, in the *Genera Plantarum* (1867), were able to "crowd" all the cacti into 13 genera. Britton and Rose, in *The Cactaceae* (1919-23), perhaps the most useful work on Cactaceae and the only one reasonably complete for Guatemala, accepted 124 genera, many of their own creation. Vaupel, in the second edition of the *Pflanzenfamilien* (1925), a few years later, accounted for the family in 26 genera. The most recent comprehensive work on the Cactaceae is Kurt Backeberg's *Die Cactaceae* (1958-61, five volumes and with perhaps one or two more to be expected) in which it is indicated that there are 220 genera (or perhaps "micromi-crogenera"?) in the family!

The generic names used in the following text are mostly those used by Britton and Rose. These names are not used because we agree with them but because Britton and Rose's publication, *The Cactaceae*, is so well known to most cactus fanciers and to botanists that the names used will be intelligible to most people who will use this work.

If most European botanists (Backeberg excepted) have erred on the side of conservatism in a generic concept for the Cactaceae, Britton and Rose and Backeberg have gone to the other extreme. Many of the genera proposed or maintained by these gentlemen are based on trivial characters. It remains for some competent systematist to give us a taxonomically sound classification of the family.

In Central America cacti are not well represented and most of those found belong to epiphytic groups rather than the terrestrial ones that prevail in desert regions. The number of species is greater in Guatemala than in any other Central American country.

Cacti are among the most fantastic and bizarre of all plants, because of their strange forms and the curious modifications of some of the normal plant organs. They attracted attention from the earliest of the European invaders of America and some of them have long been in cultivation in Europe and elsewhere. Many exotic cacti, particularly Mexican ones, are seen now and then in Guatemalan gardens; these we have not attempted to list here but we have included a few of the more common of the introduced cacti.

- Plants with normal broad leaves, scandent or shrub-like (leaves sometimes deciduous).
- Glochids present in the areoles; flowers pedicellate, often paniculate. . . . . *Pereskia*.
- Glochids none in the areoles; flowers sessile. . . . . *Pereskioopsis*.
- Plants without leaves, or the leaves reduced to small narrow scales, these soon deciduous. Plants armed with spines or some kinds unarmed.
- Areoles with glochids; young parts bearing leaves, these narrow and subulate or scale-like, soon deciduous; perianth without a tube; plants usually abundantly armed with spines.
- Petals erect; stamens longer than the petals. . . . . *Nopalea*.
- Petals spreading; stamens shorter than the petals. . . . . *Opuntia*.
- Areoles without glochids; plants without leaves; perianth with a short or much elongate tube, rarely rotate in *Rhipsalis*; plants spiny or unarmed.
- Plants unarmed, epiphytic.
- Perianth rotate, very small, less than 1 cm. long; stems terete or compressed. . . . . *Rhipsalis*.
- Perianth with an elongate tube, much more than 1 cm. long; stems various.
- Plants dichotomously branched; flowers bright red, very irregular; cultivated plants. . . . . *Zygocactus*.
- Plants irregular branched; native plants. . . . . *Epiphyllum*.
- Plants armed with small or large spines, mostly terrestrial but sometimes epiphytic.
- Plants globose or short-cylindric, small, mostly less than 20 cm. high.
- Plants with a cap-like or cushion-like cephalium at the apex. . . . . *Melocactus*.
- Plants without a cephalium. . . . . *Mammillaria*.
- Plants with much elongate stems, many times as long as thick, usually large, often vine-like or tree-like.
- Plants tree-like, large, erect, usually with few or numerous thick, erect or ascending branches, rarely simple but then tall and erect.
- Branches densely covered at the ends with long white hair-like bristles. . . . . *Cephalocereus*.
- Branches without a covering of white hair-like bristles at the ends.
- Flowers 2-several at each areole; flowers about 3 cm. long. . . . . *Myrtillocactus*.
- Flowers solitary at the areoles, larger.
- Corolla short-campanulate; fruit dry. . . . . *Pachycereus*.
- Corolla short-funnelform; fruit juicy. . . . . *Lemaireocereus*.
- Plants smaller, never tree-like, usually vine-like, often epiphytic.
- Stems with 7-12 ribs.
- Flowers short-funnelform, rose-red; cultivated plants. . . . . *Aporocactus*.
- Flowers elongate-funnelform, white; native plants.
- Spines 1 cm. long or less; flowers mostly 18-20 cm. long. . . . . *Selenicereus*.
- Spines, at least the largest ones, 3-4 cm. long; flowers 4-7 cm. long. . . . . *Nyctocereus*.
- Stems mostly with 3 angles or wings, rarely 4-5-angulate.
- Ovary and fruit covered with large foliaceous scales, their axils without spines, hairs, or bristles.

- Perianth tube elongate; flowers large, 25–30 cm. long, scales naked in the axils. . . . . *Hylocereus*.
- Perianth tube very short; flowers small, about 5 cm. long, some of the scales with tufts of short hairs in the axils. . . *Wilmattea*.
- Ovary and fruit not bearing large foliaceous scales, their axils spiny, hairy, or setiferous.
- Flowers red, open during the day. . . . . *Heliocereus*.
- Flowers white, mostly nocturnal.
- Areoles of the ovary bearing long hairs; flowers diurnal, about 28 cm. long. . . . . *Deamia*.
- Areoles of the ovary bearing short spines; flowers 10–20 cm. long.
- Perianth tube elongate, much longer than the limb; flowers 14–20 cm. long. . . . . *Acanthocereus*.
- Perianth tube much shorter than the limb; flowers about 10 cm. long. . . . . *Werckleocereus*.

### ACANTHOCEREUS Britton & Rose

Plants mostly terrestrial, the stems elongate, rather weak, articulate, at first erect, becoming clambering, trailing, or recurved, usually deeply triangulate, sometimes 4–5-angulate; areoles bearing short wool or felt and several stout spines; flowers nocturnal, funnellform, 1 at an areole, the tube rigid after anthesis, drying and persistent on the ripe fruit, rather slender, dilated above, bearing a few areoles similar to those of the branches, the areoles subtended by small scales; perianth limb somewhat shorter than the tube, widely expanded, the outer perianth segments narrowly lanceolate to linear, acuminate, green, shorter than the white inner segments; stamens shorter than the perianth, inserted all along the upper half of the throat; style very slender, divided at the apex into several linear stigma lobes; fruit spiny or naked, with a thick, dark red rind, rupturing irregularly from the apex downward, the flesh red, very juicy; seeds small, numerous, black.

Seven species are recognized by Britton and Rose, ranging from Mexico to Colombia. Only the following are known from Central America.

- Stems 8–10 cm. broad, deeply crenate; spines very stout. . . . . *A. horridus*.
- Stems 8 cm. broad or narrower, low-crenate; spines slender. . . . . *A. pentagonus*.

***Acanthocereus horridus* Britt. & Rose, Cactaceae 2: 122, f. 181. 1920. *Cereus horribilis* Berger, Kakteen 124. 1929.**

Based upon cultivated plants of Guatemalan origin, collected by Federico Eichlam, the precise locality not known; Zacapa. Mexico (Oaxaca).

Plants stout, the stems strongly triangulate, the angles wing-like, deeply undulate; areoles large, 3–6 cm. apart; spines brown or blackish when young, the radials 1–6, conic, less than 1 cm. long; central spine usually 1, sometimes 2, often very stout and elongate, sometimes 8 cm. long; flowers 18–20 cm. long, the throat 4 cm.

broad; outer perianth segments linear, brown or greenish, 6 cm. long, the inner segments 3-4 cm. long; stamens white; style thick, cream-colored; fruit 3.5 cm. long, pale red, lustrous, covered with large areoles bearing white felt, the skin thick, splitting as the fruit ripens, the pulp red.

**Acanthocereus pentagonus** (L.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 432. 1909. *Cactus pentagonus* L. Sp. Pl. 467. 1753. *Cereus pentagonus* Haworth, Syn. Pl. Succ. 180. 1812. *Pitajaya*.

Moist or dry thickets or hedges, 1,200 meters or less, most frequent at low elevations; Petén; Zacapa; Jutiapa; Santa Rosa; Retalhuleu; San Marcos; probably in most of the lowland areas. Southern Florida and Texas; eastern Mexico; southward to Panama, mostly near the coasts. West Indies; northern South America.

Stems erect or arching, often scandent, sometimes 7 meters long but usually much shorter, frequently forming dense colonies or thickets; sometimes epiphytic; joints 3-8 cm. broad, mostly triangulate but often 4-5-angulate, the angles shallowly crenate; areoles 3-5 cm. apart; spines gray, acicular or subulate, the radials 6-7 and 1-4 cm. long; central spine often solitary, longer than the radials; flowers 14-20 cm. long, the ovary and perianth tube bearing conspicuous areoles with brown felt and several subulate spines; outer perianth segments green, the inner ones white, acuminate; fruit oval, red, large, pulpy and juicy, edible, containing very numerous small black seeds.

Called "saite" and "pitahaya" in El Salvador; "numtzutzuy" (Yucatan, Maya). In Yucatan, and doubtless in other regions, the long sharp spines are sometimes employed as a substitute for pins.

Backeberg (Die Cactaceae 2: 1933-1935. 1960) uses the name *A. tetragonus* (L.) Hammelink for the plants described here, offering not very convincing reasons for so doing.

## APOROCACTUS Lemaire

Plants slender, vine-like, creeping or clambering, emitting aerial roots, the stems with mostly 7-12 ribs; flowers diurnal, pink or red, one at each areole, funnel-form, the tube of the perianth almost straight or bent above the ovary, the limb somewhat oblique; outer perianth segments linear, spreading or recurved, the inner segments broad; stamens exerted, arranged in a single, somewhat one-sided cluster, inserted all along the throat; perianth tube about equaling the narrow throat; fruit small, globose, reddish, setose; seeds few, reddish brown, obovoid.

Five species, all or most of them native in Mexico.

**Aporocactus flagelliformis** (L.) Lemaire, Ill. Hort. 7: Misc. 68. 1860. *Cactus flagelliformis* L. Sp. Pl. 467. 1753. *Cereus flagelliformis* Mill. Gard. Dict. ed. 8, no. 12. 1768.

Grown commonly in Guatemala for ornament, in pots or hanging baskets or often in the open ground, chiefly at low and middle elevations. Perhaps native in Mexico, but unknown in a wild state.

Stems at first ascending or erect, in age weak, slender, often pendent, 1-2 cm. in diameter, the branches often prostrate and creeping; ribs 10-12, low and inconspicuous, slightly tuberculate; areoles 6-8 mm. apart; radial spines 8-12, acicular, reddish brown; central spines 3-4, brownish with yellow tips; flowers 7-8 cm. long, opening for 3-4 days, deep rose-red; inner perianth segments broader than the outer ones, only slightly spreading; fruit globose, 10-12 mm. in diameter, red, bristly, with yellowish pulp.

This cactus is rather frequent in cultivation also in the United States, where it is known by the name "rat-tail cactus." The Maya name of Yucatan is reported as "*canchoh*," and the Spanish name as "*flor de látigo*."

### CEPHALOCEREUS Pfeiffer

Plants terrestrial, large and tree-like, with columnar trunks, erect, sometimes simple but usually with a few heavy branches; areoles at the ends of the stems often developing a dense mass of white wool or a pseudocephalium, or the areoles producing long woolly hairs but not forming a pseudocephalium; stems with few or numerous ribs, armed with short or elongate spines; flowers nocturnal, short-campanulate or short-funnelform, straight or curved; perianth persisting on the ripening fruit; fruit usually depressed-globose or oblong; seeds numerous, small, black, smooth or tuberculate.

About 50 species, in tropical and subtropical America. No other species are known in Central America.

*Cephalocereus Maxonii* Rose, Contr. U. S. Nat. Herb. 12: 417, t. 64. 1909. *Cereus Maxonii* Vaupel, Monatsschr. Kakteenk. 23: 23. 1913. *Pilocereus Maxonii* Berger, Kakteen 345. 1929. *Pilosocereus Maxonii* Byles & Rowley, Cact. & Succ. Journ. Gr. Brit. 19: 3, 67. 1957. *Tuno; cabeza de viejo; órgano*.

Dry, rocky plains and hillsides, often planted for hedges, 200-1,000 meters or even higher; endemic; Baja Verapaz; El Progreso (type from El Rancho, *Maxon* 3769); Zacapa; Chiquimula; Jutiapa; Quiché. Honduras.

Plants 1-3 meters high or probably even taller, simple or with a few erect branches, glaucous or bluish green, the apices of the branches covered with soft wool-like hairs 4-5 cm. long; ribs of the stem 6-8, the areoles small; spines about 10 at each areole, slender, yellowish, the central one 4 cm. long or less, the areoles bearing many long soft hairs; flowers white tinged with pink (fide Clover), 4 cm. long; ovary naked except for a few small scales; fruit about 3.5 cm. broad and almost as long; seeds brownish, reticulate.



This species is easily recognized among the segregate "genera" of *Cereus* in Guatemala by the covering of long hair-like bristles borne near the end of the stems. The cactus grows widely scattered in the lower Motagua Valley and also in the arid valley of Sacapulas, where it is usually found in association with *Lemaireocereus*. The plant is also to be found in the Comayagua Valley in Honduras and perhaps in other dry, hot valleys of the north coast of Honduras. This is perhaps the species reported from Guatemala, without locality, by Hemsley as *Cereus senilis* Salm-Dyck. This species is placed by Backeberg in a genus described in 1957, *Pilosocereus* Byles & Rowley, along with 59 other species. To suggest that before 1957 there was not a generic name proposed that can be used for 60 species of cereoid cacti seems hardly plausible. We might even suggest a look at the genus *Cereus* itself.

The ends of the stems of this cactus are often cut off and carried to distant regions by peddlers, to be used as pot plants. Those often seen in Quezaltenango perhaps come from Sacapulas or the lowlands of Huehuetenango.

### DEAMIA Britton & Rose

Plants terrestrial or usually epiphytic, sometimes clambering over rocks or pendent from them, usually closely adherent to the bark of trees by aerial roots, the stems broad, normally 3-angulate, the angles broad, thin, wing-like; spines of the areoles numerous, acicular; flowers diurnal, very large, the tube slender, elongate, the throat funnelform; inner perianth segments creamy white; stamens numerous, attached all over the throat of the perianth; scales on the ovary and perianth tube very small, bearing 3-5 long brown bristles in their axils; stigma lobes linear, entire.

The genus consists of a single species and is dedicated to Charles C. Deam, who made two important collections of plants in Guatemala, chiefly in the Motagua Valley.

**Deamia testudo** (Karw.) Britt. & Rose, *Cactaceae* 2: 213. 1920. *Cereus testudo* Karw. in *Zucc. Abh. Akad. Wiss. Muench.* 2: 682. 1837. *D. diabolica* Clover, *Bull. Torr. Bot. Club* 65: 570, *f. 5*. 1938 (type from Corozal District, British Honduras, *P. H. Gentle* 490).

Mostly on trees, at or little above sea level; Izabal; Zacapa; Retalhuleu; probably in all the Pacific coast departments. Southern Mexico; British Honduras; Honduras, and ranging southward to Colombia. Figure 30.

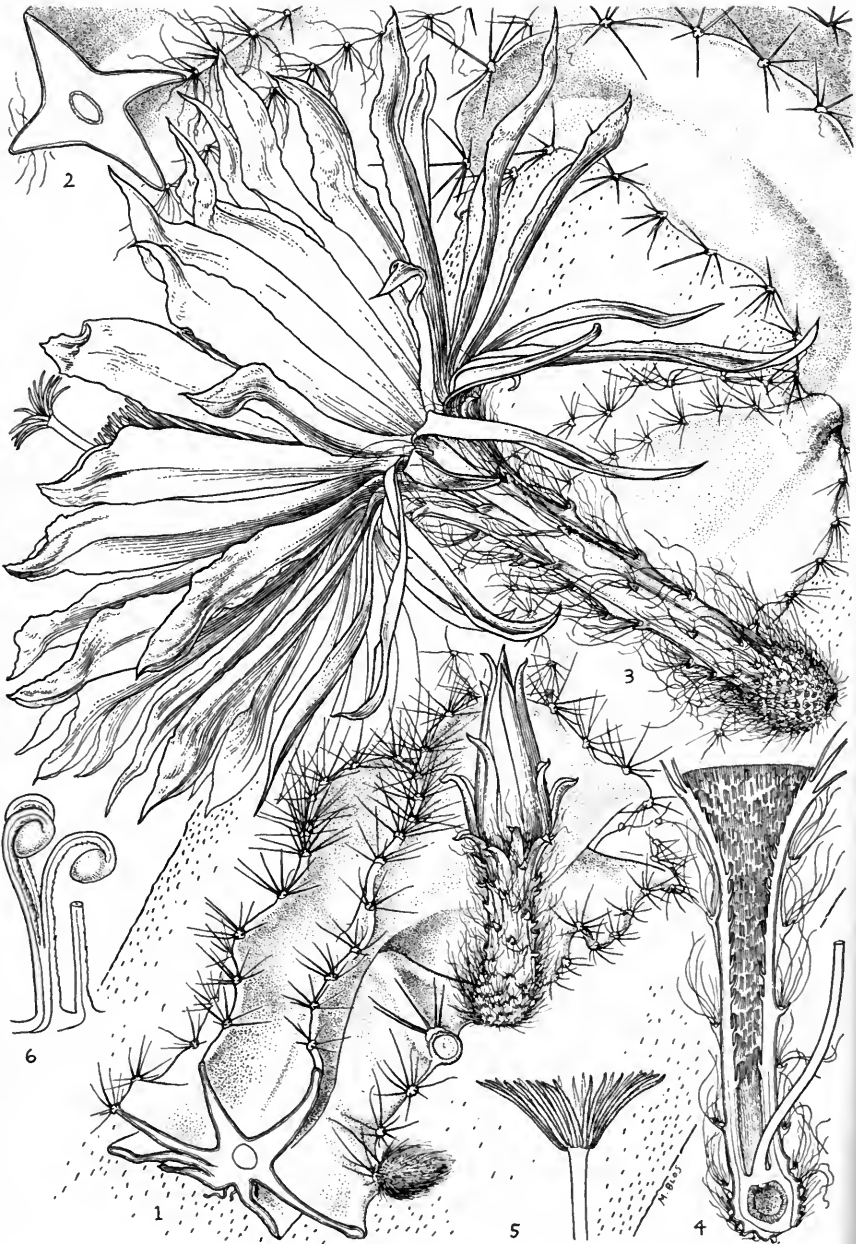


FIG. 30. *Deamia testudo*. 1, Stem appressed to tree trunk;  $\times \frac{1}{2}$ . 2, Pendent stem;  $\times \frac{1}{2}$ . 3, Flower;  $\times \frac{1}{2}$ . 4, Flower receptacle, longitudinal section;  $\times \frac{1}{2}$ . 5, Stigma;  $\times 1$ . 6, Ovules and funicles, much enlarged. Courtesy of Myron Kimnach. Drawn by Mrs. M. Bloss.

Plants usually closely attached to tree trunks or rocks by tough aerial roots, often spirally twisting about the trunks, the stems 3-10 cm. broad or even larger; ribs usually 3, very thin and wing-like; areoles 1-2 cm. apart; spines spreading, 10 or more at each areole, the larger ones 1-2 cm. long, brownish; flowers fragrant, about 28 cm. long, the slender tube about 10 cm. long; inner perianth segments linear-oblong, acuminate, 8-10 cm. long; scales of the ovary 1 mm. long or less; hairs of the areoles on the ovary and perianth tube 1-3 cm. long, brown.

When growing, this plant is easily recognized because of its distinctive habit. The broad green stems, closely attached to the trunk by stout aerial roots, are suggestive of a serpent coiled about the tree. No distinctive characters are suggested for *D. diabolica* by its author, and there is nothing in its description to indicate how it may be separated from *D. testudo*. There is no reason to assume that the genus, if it be treated as such, contains more than a single species.

---

### ECHINOCACTUS

The genus *Echinocactus* probably occurs in Guatemala, and there have been reported on apparently no good basis *E. crispatus* DC., *E. gibbosus* DC., and *E. cornigerus* DC. *E. gibbosus* is referred by Britton and Rose to the genus *Gymnocalycium*, a group confined to South America. *E. crispatus* is a species of Hidalgo, Mexico, and there is no reason for supposing that it grows in Guatemala. It is placed by Britton and Rose in the genus they treat under the weird name *Echinofossulocactus*. *E. cornigerus* they refer to *Ferocactus*, as a synonym of *F. latispinus* (Haw.) Britt. & Rose. We have observed from the train near Progreso, Guatemala (Dept. El Progreso), a small barrel cactus that may be the plant reported from the country under this name. It is, however, possible that the plants there taken to be *Echinocactus* were actually *Melocactus Ruestii*.

---

### ECHINOPSIS

One or more species of *Echinopsis*, a South American genus, sometimes are grown in Guatemala as pot plants. They are low, subglobose or cylindrical plants with numerous sharp ribs, armed with stout spines, the flowers white, with a long slender tube.

---

## EPIPHYLLUM [Hermann] Haworth

Plants mostly epiphytic, the main stems terete and ligneous, the secondary stems or branches flat, fleshy, often thin and leaf-like; leaves none; flowers medium to large, nocturnal or diurnal, fragrant or odorless; perianth divided into a tube and a limb, the tube often greatly elongated; stamens few to numerous, inserted at the top of the tube and also scattered along the throat of the tube or inserted at the top and at the base, few to many; style elongated, the stigma lobes usually free, linear and 4-10; fruit a berry, ovoid, sometimes tuberculate or ridged, juicy, pulpy and edible; seeds few to numerous, black.

Species perhaps 50 or more (*Epiphyllum*, sens. lat.). Several others occur in Mexico and Central America.

The generic concept as used here for Guatemala includes as synonyms *Bonifazia* Standl. & Steyerl., *Chiapasiasia* Britt. & Rose, *Disocactus* Lindl., *Marniera* Backeb. (*nom. subnud.*), *Phyllocactus* Link and *Trochilocactus* Lindinger (*nom. nud.*). It does not include, however, the very small-flowered species sometimes placed under one or another of these generic names.

Mr. Myron Kimmach has a monograph of *Epiphyllum* in preparation. He apparently is maintaining *E. guatemalense* Britt. & Rose [here reduced to *E. strictum* (Lem.) Britt. & Rose] and *E. Thomasianum* (Schum.) Britt. & Rose [here reduced to *E. macropterum* (Lem.) Britt. & Rose]. In addition an inadequate specimen from Guatemala (*Steyersmark* 39545) he questionably determined as *E. phyllanthus* var. *columbiense* (Webber) Backeberg. We have not included this taxon in the flora.

In Guatemala the names *pitahaya*, *pitajaya* or *pitaya* are given to most of the following species. The fruits when large and edible are called *tuna*.

Tube of the perianth abruptly recurved near the base.

Limb of the perianth 2-3 times as long as the tube; stamens about 50-65.

*E. Nelsonii*.

Limb of the perianth shorter than the tube.

Ovary glabrous; stamens about 35-45. . . . . *E. quezaltecum*.

Ovary pubescent; stamens about 13-20. . . . . *E. Eichlamii*.

Tube of the perianth not recurved, straight.

Tube of the perianth shorter than the limb; stamens 15 or fewer. . . *E. biforme*.

Tube of the perianth much longer than the limb; stamens numerous.

Ultimate branches acuminate. . . . . *E. oxypetalum*.

Ultimate branches rounded or acute at the apex.

Secondary stems deeply crenate; thick perianth tube bearing foliaceous scales. . . . . *E. crenatum*.

Secondary stems shallowly crenate to almost entire, often thin; perianth tube without foliaceous scales.

Crenations of the secondary stems oblique, the sinuses between them very broad and open; secondary stems mostly 3–4.5 cm. broad.

*E. strictum.*

Crenations of the secondary stems symmetrical, not oblique, the sinuses between them very narrow, or the secondary stems entire or nearly so and mostly 5–8 cm. broad. . . . . *E. macropterum.*

**Epiphyllum biforme** (Lindl.) G. Don in Loudon, *Encycl. Pl.* ed. 3. 1378. 1855. *Cereus biformis* Lindl. *Bot. Reg.* 29: Misc. 51. 1843. *Disocactus biformis* Lindl. *Bot. Reg.* 31: t. 9. 1845; Britt. & Rose, *Cactaceae* 4: 202, figs. 203, 204. 1923. *Paxte de palo.*

In mixed forests at about 1,300 meters; Sacatepéquez (*Donnell Smith* 2486). Honduras.

Pendent epiphytic herbs to 2 m. or perhaps longer; primary stems terete, obscurely winged or not, 4–6 mm. in diameter; secondary stems or branches flattened, to about 15 cm. long and 1.5 cm. broad, fleshy, narrowly elliptic, crenate or sinuate-dentate, areoles glabrous or nearly so; flowers borne from the areoles, about 5 cm. long, the limb about 1 cm. broad; tepals about 10, the outer ones somewhat shorter and narrower than the inner, linear, acute; inner tepals broader; stamens 10–12, slightly exserted; style exceeding the stamens; stigma lobes 4, about 4 mm. long; berry ovoid, about 1.5 cm. long.

A sterile collection from the department of Quezaltenango (*Steyermark* 33423) may belong to this species.

**Epiphyllum crenatum** (Lindl.) G. Don in Loudon, *Encycl. Pl.* ed. 3. 1378. 1855. *Cereus crenatus* Lindl. *Bot. Reg.* 30: t. 31. 1844. *Phyllocactus crenatus* Lemaire, *Hort. Univ.* 6: 87. 1845. *Pitaya; pitajaya; huele de noche.*

Moist or wet forest, sometimes in oak forest, 1,750 meters or less; reported from Petén; Izabal; Alta Verapaz; Baja Verapaz; Zacapa; Chiquimula; Jalapa; Sacatepéquez; Sololá; Chimaltenango; Quiché; Huehuetenango; doubtless in most of the central departments. Honduras, and probably extending into Mexico and other parts of Central America.

Often a large vine, climbing over medium-sized trees, the main stems terete and ligneous; branches pale green or glaucescent, stiff, often 8 cm. broad, obtuse, deeply and coarsely crenate, the crenations usually oblique, the sinuses between them broad or narrow; areoles at the base of the stem and branches sometimes bearing hairs or small bristles; flowers fragrant, white, about 20 cm. long, cream-colored or greenish white outside, the limb 10–12 cm. broad; perianth tube 10–12 cm. long, slender, bearing numerous linear scales 2–3 cm. long, the inner segments oblanceolate; filaments yellow; style white.

This species, like all or most of the others, is grown commonly for ornament in Guatemala, planted in the ground or in pots. Large

potted plants were covered with flowers in the Gran Hotel Continental in Guatemala in late April, 1941. The fruits of all the local species are large, handsomely colored, and full of deliciously flavored pulp. They are very good to eat, and much prized locally, being sometimes offered in the markets. Plants of this species are common in the central region, especially in oak forests, but the wild plants seldom have flowers, at least during the dry months.

**Epiphyllum Eichlamii** (Weingart) L. Wms. *Fieldiana*, Bot. 29: 378. 1962. *Phyllocactus Eichlamii* Weingart, *Monatsschr. Kakteenk.* 21: 5. 1911. *Disocactus Eichlamii* Britt. & Rose, *Contr. U. S. Nat. Herb.* 16: 259, t. 79. 1913; *Cactaceae* 4: 203, f. 205. 1923; Kimnach & Hutchison, *Cact. & Succ. Journ. Am.* 29: 75, f. 45. 1957. *Trochilocactus Eichlamii* Lindinger, *Beih. Bot. Centralbl.* 61: 383. 1942.

Epiphyte in mixed forest, 1,000–2,800 meters; Santa Rosa; Chimaltenango; Quezaltenango. Endemic. Figure 31.

Epiphytic herbs; stems erect or pendent, the primary terete, sometimes narrowly 2–3-angled or winged, 4–8 mm. in diameter; secondary stems or branches becoming flattened, up to 5 cm. broad (1.5–5 cm.) and 0.2–0.4 cm. thick, mostly oblanceolate to narrowly elliptic-lanceolate, crenate or sinuate-dentate, the areoles with wool or occasionally 1–2 bristles; flowers from the areoles of the secondary stems, 6–8 cm. long, the limb to 1 cm. broad; tepals 10–12 in 2 series, the outer linear or linear-lanceolate and about 2.5 cm. long, the inner broader and a bit longer; stamens about 25, mostly inserted at two levels, exerted; style exceeding the stamens; stigma lobes 5; ovary globose, somewhat floccose.

Probably one of the more common *Epiphyllums* in Guatemala.

**Epiphyllum macropterum** (Lemaire) Britt. & Rose, *Cactaceae* 4: 193, t. 17, f. 200. 1923. *Phyllocactus macropterus* Lemaire, *Ill. Hort.* 11: Misc. 73. 1864. "*Marniera macroptera*" Backeberg, *Die Cactaceae* 2: 736. 1959. *Pitahaya; galán de noche; dama de la noche.*

On rocks or trees in moist or wet forest, 1,600 meters or less; Alta Verapaz; Izabal; Chiquimula; Suchitepéquez; Sololá; Quezaltenango; San Marcos; doubtless also in numerous other departments. Honduras; Nicaragua; Costa Rica.

Plants often very large and scandent, the main stems terete and ligneous; branches thin and flexible, deep green, sometimes 10 cm. broad, the margins somewhat corneous, usually rather closely crenate, the crenations short, symmetrically rounded, low, separated by very narrow, acute sinuses, the apex of the branch obtuse, the margins sometimes almost entire; flowers about 20 cm. long, somewhat curved; scales of the ovary very small, green, with long hairs in their axils, the scales of the perianth tube 10–12 mm. long, spreading, acute; outer perianth seg-

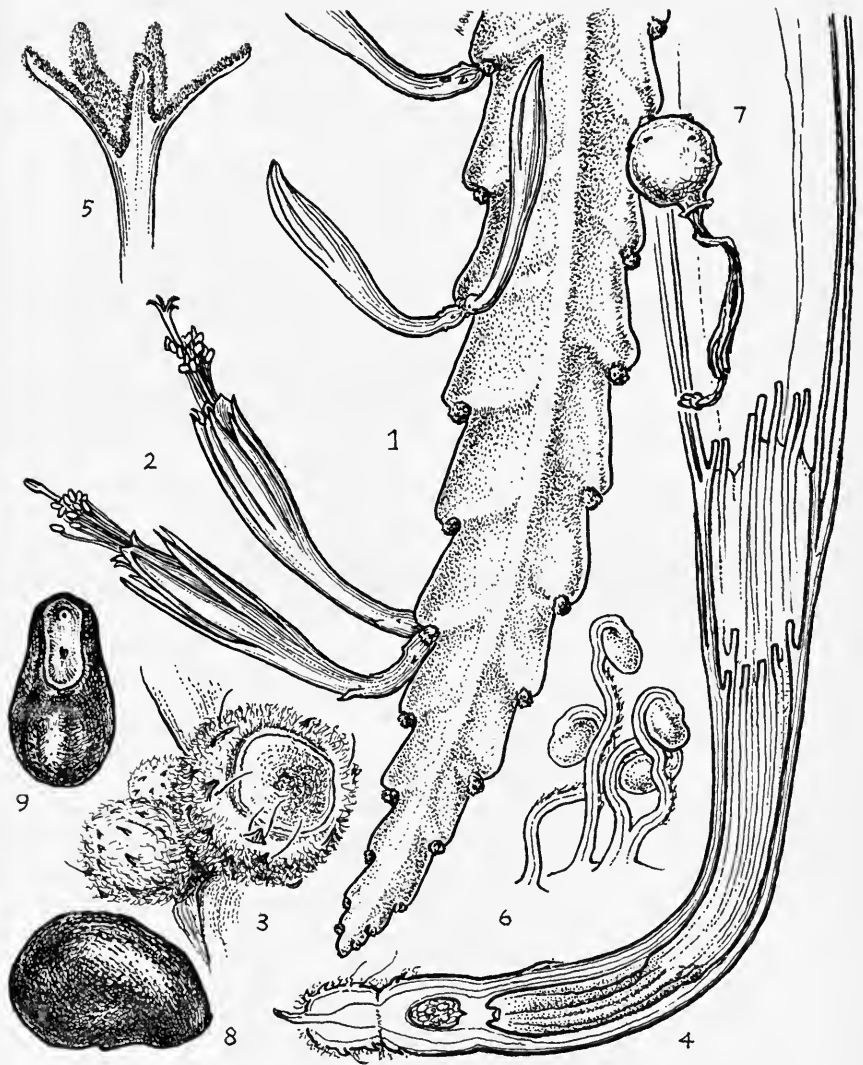


FIG. 31. *Epiphyllum Eichlamii*. 1, 2, Stems, buds and flowers;  $\times \frac{4}{5}$ . 3, Proliferous areole; much enlarged. 4, Stamen insertion, with areole shown attached to base of flower;  $\times \pm 3$ . 5, Stigma lobes; much enlarged. 6, Ovules; much enlarged. 7, Fruit;  $\times \frac{4}{5}$ . 8, 9, Seed;  $\times 16$ . Courtesy of Myron Kimmach. Drawn by Mrs. M. Bloss.

ments narrow, salmon-colored, 10 cm. long, the inner segments pure white, 8–9 cm. long, 2–3 cm. broad; stamens lemon-yellow.

This species is one of the commonest in cultivation in Guatemala. The senior author observed during two seasons a fine large plant on a trellis in the patio of doña Juana Reyes in Cobán. It flowered profusely in mid-April, and in a period of 10 days produced more than 150 flowers, while innumerable buds remained on the plant. The flowers are open only at night. It is a common practice in Guatemala to bind the tough, wide stems of *Epiphyllum* around fractures. They act as efficient bandages, hold the broken parts in place, and are popularly believed to aid in healing them.

This species is the basis of an illegitimate generic name, *Marniera*, proposed by Backeberg. Since there seems to be no need for the name it need not be properly published.

Most of the material which we have treated as *Epiphyllum macropterum* has been annotated recently as *E. Thomasianum* (Schum.) Britt. & Rose by Kimmach. The reason is not obvious and we prefer not to use the name, which we consider a synonym of *E. macropterum*, until reason for the use is published.

**Epiphyllum Nelsonii** Britt. & Rose, Contr. U. S. Nat. Herb. 16: 257. 1913. *Phyllocactus Nelsonii* Vaupel, Monatsschr. Kakteenk. 23: 116. 1913. *Chiapasia Nelsonii* Britt. & Rose, Cactaceae 4: 203, t. 206. 1923. *Disocactus Nelsonii* Lindinger, Bot. Centralbl. Beih. 61: 383. 1942; Kimmach, Cact. & Succ. Journ. Am. 30: 80, t. 1958.

Epiphytic on trees in moist forest, 1,300–1,500 meters; San Marcos. Mexico (Chiapas). Figure 32.

Pendent epiphytic plants; primary stems rounded, bearing flattened secondary stems from nodes, the secondary stems oblanceolate, ascending but soon pendent; flowers mostly from the apical part of the secondary stems, strongly upcurved on pendent stems, less so on erect stems, 9–11 cm. long, slender, the limb 5–7 cm. broad; tepals 10–13, in two series, 4–6 cm. long and 1–2 cm. broad, the outer linear-lanceolate, acute, the inner oblong-lanceolate, acute or obtuse; stamens many (50–65), mostly inserted in 2 zones, declined, exerted beyond the tepals; style 9–10 cm. long, exceeding the stamens, stigma lobes 4–7, papillose, about 8 mm. long; fruit subglobose, about 15 mm. long and nearly as broad.

This species is the basis of Britton & Rose's monotypic genus *Chiapasia*, which certainly has little to recommend it. Backeberg recently maintained the genus (Die Cactaceae 2: 761. 1959).

**Epiphyllum oxypetalum** (DC.) Haworth, Phil. Mag. 6: 109. 1829. *Cereus oxypetalus* DC. Prodr. 3: 470. 1828. *C. latifrons* Pfeiff.



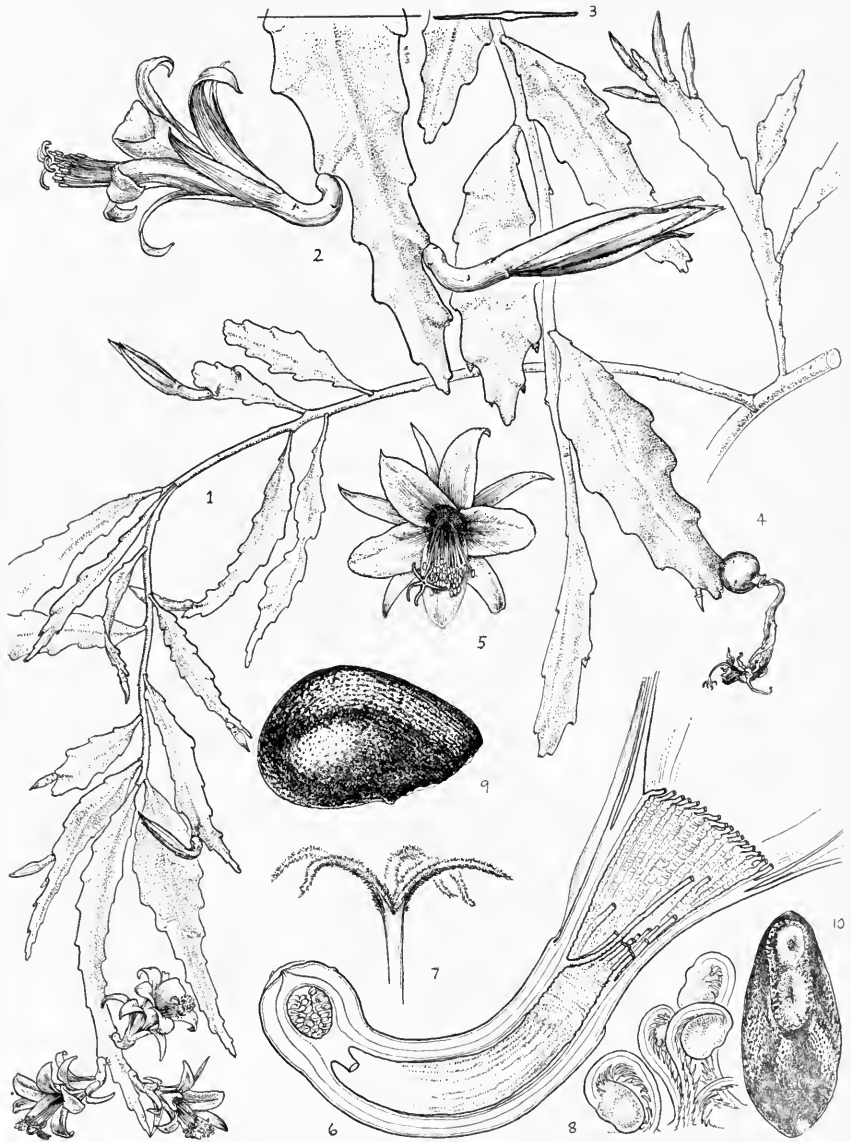


FIG. 32. *Epiphyllum Nelsonii*. 1, Flowering plant; about  $\times \frac{1}{4}$ . 2, 4 and 5, Stem, flowers and fruit; about  $\times \frac{2}{5}$ . 3, Cross section of flattened stem;  $\times \pm \frac{2}{5}$ . 6, Longitudinal section of receptacle;  $\times \pm 2$ . 7, Stigma;  $\times 2$ . 8, Funicles and ovules; much enlarged. 9 and 10, Seeds;  $\times 16$ . Courtesy of Myron Kinnach. Drawn by Mrs. M. Blos.

Enum. Cact. 125. 1837. *Phyllocactus latifrons* Link ex Walp. Repert. Bot. 2: 341. 1843. *Paxte de palo*.

On rocks or trees, 75–2,000 meters; Alta Verapaz; Suchitepéquez; Quezaltenango. Southern Mexico; El Salvador; Honduras; Costa Rica; northern South America.

Plants often several meters long and scandent, sometimes sprawling on rocks, the stems slender, ligneous, subterete; branches thin and flexible, long-acuminate, shallowly or deeply crenate, 12 cm. broad or less; flowers opening in the evening, fragrant, the tube 13–15 cm. long, reddish outside, bearing distant scales about 1 cm. long; outer perianth segments reddish or amber-colored, 8–10 cm. long, the inner segments white, oblong; stamens white; style white, the stigma lobes numerous, cream-colored, entire.

**Epiphyllum quezaltecum** (Standl. & Steyerem.) L. Wms. Fieldiana, Bot. 29: 378. 1962. *Bonifazia quezalteca* Standl. & Steyerem. Field Mus. Bot. 23: 66. 1944. *Disocactus quezaltecus* Kimmach, Cact. & Succ. Journ. Am. 31: 137, t. 1959.

Epiphytic in cool mixed forests, 1,800 meters, type from near San Martín Chile Verde and Colombo, Quezaltenango. Endemic. Figure 33.

Pendent epiphytic herbs; primary stems round, 5–6 mm. in diameter, the branches or secondary stems flattened, oblong-linear to ovate-lanceolate, 14–47 cm. long and 4–5 cm. broad, fleshy when fresh, acute or acuminate, attenuate and subterete to the base, crenate, the crenations 2–3 cm. long, somewhat oblique; areoles small, minutely felted or pilose; flowers to 9 cm. long, near the apex of secondary stems, strongly upcurved tube longer than to twice as long as the limb; tepals 10–12, the outer lanceolate, obtuse, 15–25 mm. long and 4–6 mm. broad, the inner about 20 mm. long and 6–8 mm. broad; stamens about 35–45, inserted on the tube at 2 levels, exserted, style exceeding the perianth, 5–6-lobed; fruit subglobose, to about 20 mm. long.

This species is the basis of the genus *Bonifazia* Standl. & Steyerem. and was dedicated to the family of don Guillermo Bonifaz, of Quezaltenango. Standley spent two months in their *pensión* and has many cherished memories of their gracious hospitality.

There seems little reason now to maintain the genus *Bonifazia*; in fact it is very close to *Epiphyllum Eichlamii* (Weingart) L. Wms., which Standley and Steyerem. considered then to be a synonym of *Disocactus biformis* Lindl. [= *Epiphyllum biforme* (Lindl.) G. Don].

This plant was considered by the senior author, whose experience in Guatemala has been exceeded by no other botanist, to be one of the most attractive plants of all Guatemala. The flowers, though small, are produced in great abundance, making the plant conspicuous from some distance, and they are of a lovely shade of rather pale



FIG. 33. *Epiphyllum quezaltecum*. 1, Habit;  $\times \pm \frac{1}{8}$ . 2, Secondary stems and flowers;  $\times \frac{2}{5}$ . 3, Cross sections of secondary stems;  $\times \frac{2}{5}$ . 4, Proliferous areole;  $\times 4$ . 5, Flower;  $\times \frac{4}{5}$ . 6, Longitudinal section of receptacle;  $\times 2\frac{1}{2}$ . 7, Stigma;  $\times \pm 3$ . 8, Funicles and ovules; much enlarged. 9, Fruit;  $\times \frac{2}{5}$ . 10, 11, Seeds;  $\times 16$ . Courtesy of Myron Kimnach. Drawn by Mrs. M. Bloss.

reddish purple. The plants hang loosely from the tree trunks, the flowers being abruptly reflexed at the base and pointing upward.

**Epiphyllum strictum** (Lemaire) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 259. 1913. *Phyllocactus strictus* Lemaire, Ill. Hort. 1: Misc. 107. 1854. *E. guatemalense* Britt. & Rose, l.c. 257, t. 78 (type collected in Guatemala by Federico Eichlam, the locality unknown). *E. pumilum* Britt. & Rose, l.c. 258 (type collected in Guatemala by Eichlam, the locality unknown). *P. guatemalensis* Vaupel, Monatsschr. Kakteenk. 23: 116. 1913. *P. pumilus* Vaupel, l.c. 117. *Ticrebac* (Quecchí, fide Dieseldorff).

On trees in moist or wet forest, mostly at 600 meters or less; Petén; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Suchitepéquez; Sololá; Retalhuleu. Southern Mexico; British Honduras to Panama.

Plants often 1-2 meters long or even larger, the stems slender, subterete or angulate; branches broadly linear, mostly 3-4.5 cm. broad, sometimes broader, rather thick and stiff, obtuse, remotely crenate, the crenations conspicuously oblique; tube of the flower slender, 13-15 cm. long, the few distant scales 8-12 mm. long; outer perianth segments pinkish, the inner ones white, acuminate, 6-8 cm. long; filaments white, the style pink or red, the stigma lobes yellow; fruit globose, 4-5 cm. in diameter; seeds small, black.

Called "*Santa Rita*" in Yucatan. This has been reported from British Honduras as *E. oxypetalum* (DC.) Haworth.

## HELIOCEREUS Britton & Rose

Contributed by MYRON KIMNACH<sup>1</sup>

Plants epiphytic or terrestrial, stems branching basally, ascending, procumbent, pendent or shortly scandent, slender, usually with 3-4 subacute angles, the spines stiff or hair-like. Flowers at or near the apex of the stems, single at an areole, large, remaining open several days and nights, funnelliform; receptacle (perianth tube) with small bracts subtending short wool and longer stiff or hair-like spines, the tepals (perianth segments) half as long as the receptacle to three times longer, lanceolate or oblong, red (white in one Mexican species); stamens and style declinate, reddish; fruit globose, spiny, green; seeds large, ovoid-reniform, minutely pitted, black.

This is an easily recognized genus among Guatemalan cacti because of its showy, red, spiny flowers. It is allied to *Nopalxochia*, which differs in its flat stems and nearly spineless receptacle; and to *Nyctocereus*, which has white nocturnal flowers. Several variable and rather indistinct species of the genus have been described from Mex-

<sup>1</sup> Botanical Garden, University of California, Berkeley.

ico, Guatemala, El Salvador, Honduras and Nicaragua, but their evaluation must await further field work.

***Heliocereus cinnabarinus*** (Eichl.) Britt. & Rose, Cactaceae 2: 129. 1920; Kimmach, Fieldiana, Bot. 29: 380. 1962. *Cereus cinnabarinus* Eichlam, Monatschr. Kakteenk. 20: 161. 1910 (living specimen collected by Eichlam from Volcán de Agua, a type specimen apparently not made). *H. heterodoxus* Standl. & Steyerl. Field Mus. Bot. 23: 67. 1944 (type from Guatemala, *Steyermark* 36291). *Pitahaya*.

Epiphytic or terrestrial in wet forests, 1,800–3,800 meters; Zacapa; Chiquimula; Jalapa; Guatemala; Chimaltenango; Suchitepéquez; Huehuetenango; Quezaltenango; San Marcos. Mexico (Chiapas); El Salvador.

Stems ascending when young, later usually pendent, 5–6-angled near the base, 3–4 (2–5)-angled above, to about 6 dm. long and 2 (1–8) cm. wide, the wings usually 1–1.5 cm. wide, on 2-angled stems 2.5–4 cm. wide, more or less crenate, green, the new growths often reddish, the areoles 5–10 mm. apart near base and apex of stem, on remainder of stem (1–) 3–4 cm. apart, each with a brownish to whitish wool-mass 1–4 mm. wide and near base with up to 15 brown to white, acicular, stiff spines about 1–1.5 cm. long, the spines on the remainder of the stem usually fewer, about 1 cm. long and more hair-like; flowers 12–16 cm. long, the limb about 8 cm. wide, the receptacle green, 6.5–7.5 cm. long, about 1.5 cm. wide near the base, 1 cm. wide at the middle, about 3 cm. wide at the apex, obscurely ridged, the lower bracts deltoid, the upper ones lanceolate to oblong, acute to obtuse-mucronate, 10–30 mm. long and to 4 mm. wide, each subtending a cream-colored wool-mass about 2 mm. wide and with about 15 stiff or hair-like spines which are 5–10 mm. long, white or brown, and as long and as numerous near the apex of the receptacle as at the base; tepals diverging gradually from the tube, lanceolate to oblong, usually abruptly acuminate, often aristate, 6–9 cm. long and 1–2.5 cm. wide, scarlet, often yellowish near the base.

## HYLOCEREUS Britton & Rose

Plants terrestrial or epiphytic, often scandent or the stems arching, elongate, mostly triangulate, the angles often wing-like, the branches often emitting aerial roots; areoles bearing a tuft of felt and several short spines; areoles on young growth often bearing bristles; flowers very large, nocturnal, funnelliform, the limb as broad as long and as long as the tube or longer; ovary and perianth tube bearing large elongate narrow foliaceous scales but no spines, felt, wool, or hairs; outer perianth segments similar to the scales but longer; petaloid perianth segments narrow, acute or acuminate, usually white; stamens very numerous, biseriate, equaling or shorter than the style; stigma lobes numerous, linear, simple or branched; fruit spineless but bearing several or numerous large persistent foliaceous scales, usually large and edible, juicy; seeds very numerous, small, black.

Species perhaps as many as 10 (18 recorded by Britton and Rose; 21 by Backeberg), in Mexico, Central America, West Indies, and northern South America. One or two others are known from southern Central America.

Spines 5-12 mm. long . . . . . *H. Ocamponis*.  
 Spines 2-4 mm. long . . . . . *H. undatus*.

**Hylocereus Ocamponis** (Salm-Dyck) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 429. 1909. *Cereus Ocamponis* Salm-Dyck, Cact. Hort. Dyck. 1849: 220. 1850.

Moist thickets, about 1,350 meters; Jalapa (near Jalapa, Standley 76424). Believed to be a native of Mexico.

Stems deeply 3-4-angulate, at first bright green, becoming glaucous, in age dull bluish green; ribs rather deeply undulate, the margins with a corneous border; areoles 2-4 cm. apart, borne near the base of each undulation; spines 5-8, acicular, 5-12 mm. long; flowers 25-30 cm. long and fully as broad, the outer perianth segments narrow, long-acuminate, greenish, spreading or reflexed; inner perianth segments white, oblong, acuminate; style stout, the stigma lobes linear, entire, green; ovary covered with imbricate ovate acute purple-margined scales.

The single Guatemalan collection is sterile, but it is improbable that flowers would supply any characters to substantiate further its reference to *H. Ocamponis*, which was known to Britton and Rose only from cultivated plants. Although the reference of the collection to *H. Ocamponis* is somewhat doubtful, because of the long spines it seems to represent a species distinct from *H. undatus*.

**Hylocereus undatus** (Haworth) Britt. & Rose in Britton, Fl. Bermuda 256. 1918; Cactaceae 2: 187, t. 30, f. 263. 1920. *Cereus undatus* Haworth, Phil. Mag. 7: 110. 1830. *Cereus trigonus* var. *guatemalensis* Eichlam, Monatschr. Kakteenk. 21: 68. 1911. *Hylocereus guatemalensis* Britt. & Rose, Cactaceae 2: 184, f. 261. 1920. *Pitahaya*; *pitaya*; *pitajaya dulce*.

Epiphytic or terrestrial in thickets, hedges, on rocks or rock walls, at 2,000 meters or usually much less; Petén; El Progreso; Jalapa; Zacapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Retalhuleu; Sololá; Quiché. Mexico, El Salvador and the West Indies to South America; often cultivated in other parts of the world. Figure 34.

Plants terrestrial or epiphytic, when terrestrial often with arching or recurved stems, when epiphytic more or less scandent and emitting aerial roots; ribs of the stem generally 3, broad, thin, green or glaucous green, the margins undulate,

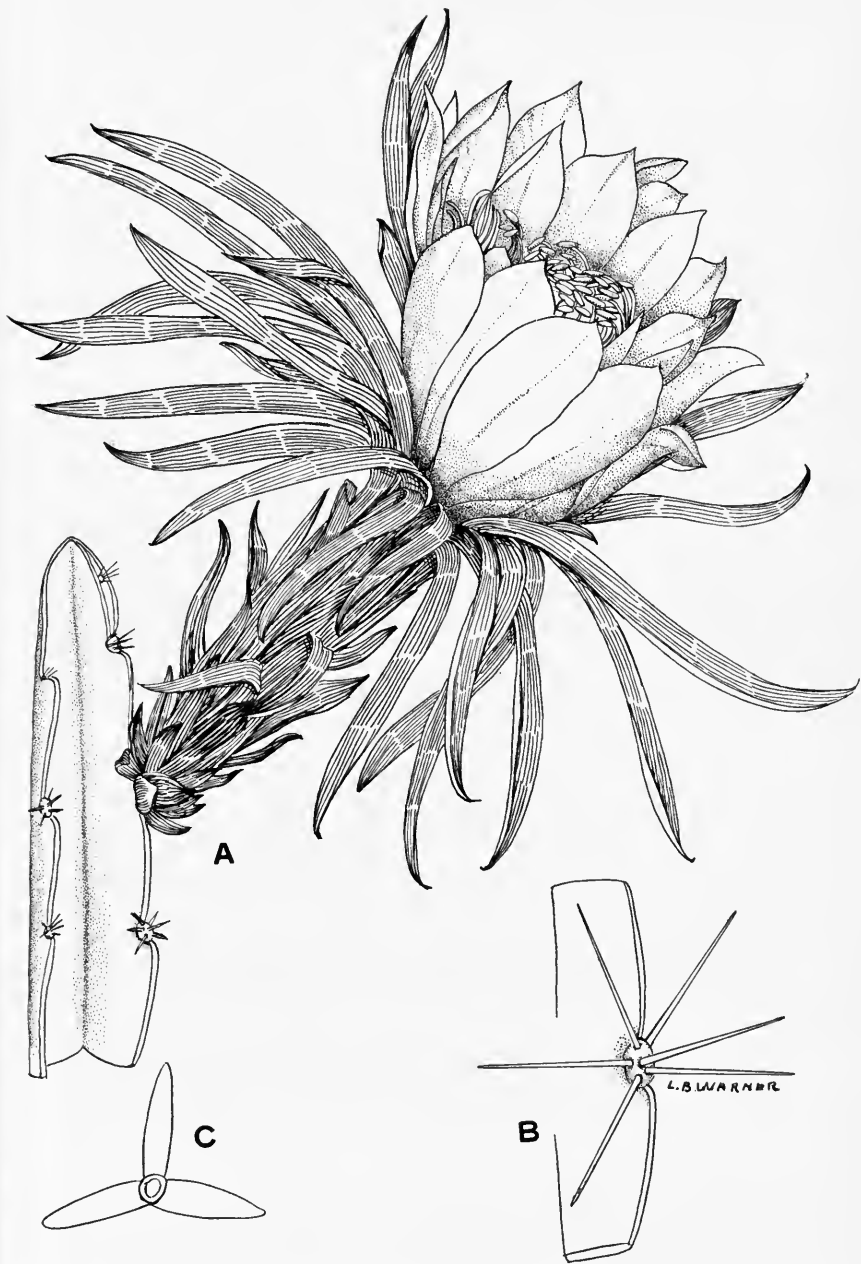


FIG. 34. *Hylocereus undatus*. A, Flower and tip of stem;  $\times \pm \frac{1}{3}$ . B, Areole;  $\times \pm 2$ . C, Cross section of stem;  $\times \frac{1}{3}$ .

corneous; areoles 2-4 cm. apart; the spines 1-4, usually subconic or more numerous and slender on young plants; flowers as much as 30 cm. long, the outer segments whitish, yellowish green, or tinged with rose, acuminate, the inner segments white, lanceolate to oblanceolate, acute or acuminate; style elongated, to 25 cm. long, usually yellow or yellowish, lobes of the stigma to 25; fruit 6-12 cm. long, usually deep red when mature, covered with large foliaceous scales; seeds small, numerous and black.

The illustration and description given and specimens seen by Britton and Rose of *H. guatemalensis* seem to show a plant that differs hardly at all from the typical forms of *H. undatus*. Maya names of Yucatan, according to Gaumer, are "chacuob," "zacuob," "uob," "uoo" and "uo." The usual Spanish name there, as elsewhere, is "pitahaya." The ripe fruit is juicy, sweet or acidulous and delicious. It is one of the most attractive fruits seen in Guatemalan markets, due to its brilliant coloring. It is used as a fruit out of hand, in the preparation of cool drinks and in coloring candy and pastry. It is cultivated occasionally in Guatemalan gardens and is common as a wild plant in the Pacific lowlands.

### LEMAIREOCEREUS Britton & Rose

Plants terrestrial, usually large and tree-like, generally with few or numerous, erect or ascending, columnar, ribbed stems, the trunk thick and massive; areoles rather large, felted, the spines usually stout and numerous; flowers generally diurnal, one at an areole, tubular-funnelform or campanulate, the short tube tardily separating with the style from the top of the ovary; stamens numerous, in many rows all along the inner surface of the throat; ovary more or less tuberculate, bracteate, the bracts with tufts of felt-like hairs in the axils; areoles at first spineless or nearly so but soon developing a cluster of spines; fruit globose or oval, irregularly bursting in age and exposing the seeds, at first very spiny, but the spines often deciduous in age, or at least easily separable; seeds numerous, very small, black.

About twenty species, ranging from Arizona to the northern coast of South America. There are other species in Mexico and Central America.

Areoles conspicuously brown-felted; central spine stouter and usually much longer than the others, normally more than 2 cm. long. . . *Lemaireocereus Eichlamii*.

Areoles not conspicuously brown-felted and much smaller; central spine relatively slender and hardly longer than the others, mostly less than 1.5 cm. long.

*Cereus Yunckeri*.

**Lemaireocereus Eichlamii** Britt. & Rose, *Cactaceae* 2: 89, f. 132. 1920. *Cereus laevigatus* var. *guatemalensis* Eichlam in Wein-gart, *Monatsschr. Kakteenk.* 22: 182. 1912 (type from Guatemala).



*L. longispinus* Britt. & Rose, l.c. *Cereus Eichlamii* Standl. in Yuncker, Field Mus. Bot. 9: 316 1940. *Ritterocereus Eichlamii* Backeberg, Cact. & Succ. Journ. Am. 23: 121. 1951. *Tuna*; *órgano*; *guanocal* (Sacapulas).

Dry, rocky scrub-forest plains and hillsides, 200–1,250 meters; Baja Verapaz; El Progreso; Zacapa; Chiquimula; Baja Verapaz; Santa Rosa; Quiché; Huehuetenango. El Salvador; probably also Honduras.

Branched organ cacti up to 6 m. or more, with a thick low trunk, usually with many thick erect or ascending branches, deep green or the younger parts somewhat glaucous; ribs 6–10; the areoles large, brown-felted, borne on the tops of the undulations; spines 4–10 at each areole, spreading or reflexed, acicular, the central spine much longer than the others, often to 8 cm. or more, gray; flowers 6–7 cm. long, white inside, dark red outside, outer perianth segments serrulate; filaments white; ovary tuberculate, each tubercle bracteolate; areoles of the ovary with brown felt but no spines.

This is apparently the abundant and characteristic plant of the plains of the lower Motagua Valley, frequently in association with other organ cacti. The plants are much used for hedges, which are one of the typical sights of many parts of Mexico and Central America. The branches are separated from the wild plants and set side by side. Their planting involves a great deal of labor, but once set the hedges are good for many years. The pulp of the fruit is very good to eat. The fruits (called *tunas*) ripen in March and April or even later, and at that season they are a common article in some of the markets.

*Cereus Yunckeri* Standl. in Yuncker, Field Mus. Bot. 9: 316, f. 7. 1940; L. Wms. Fieldiana, Bot. 29: 384. 1962.

Dry, hot valleys in scrub forest, 600–900 meters or perhaps less; Huehuetenango (*Steiermark* 51341). Honduras. *Organo*.

Much-branched organ cacti up to 10 m. tall, the trunks as much as 35 cm. in diameter toward the base, the branches erect or ascending, thick, the broadly triangular costae (on available specimens) 9, intervals broad but acute; areoles 8–15 mm. apart on the ridges, tomentum brownish, obscure or almost none; spines mostly about 7 at each areole, the central one usually longest, from about 3 to 15 mm. long, grayish. Flowers and fruits unknown.

Among the many “microgenera” currently accepted by cactus specialists this might possibly go to *Pilosocereus*. It was probably placed by Standley in the correct genus and until we know more about the plant it seems unwise to make a combination to one of the segregates.

## MAMMILLARIA Haworth

Plants small, globose or short-cylindric, tuberculate, the tubercles arranged in somewhat spiral rows, terete, angulate, or compressed, usually bearing wool or hairs and sometimes bristles, the sap milky or watery; spines in clusters at the apex of the tubercle, sometimes all alike, or the central ones very different from the radials, all straight or some of the central spines uncinatate; flowers, so far as known, diurnal, arising from the axils of old tubercles, more or less campanulate, small, variously colored but mostly pink or red; perianth segments narrow, spreading; stamens numerous, inserted on the base of the perianth tube, short, included; style about equaling the stamens, the stigma lobes linear; fruit small, usually clavate, naked, scarlet, rarely white or greenish; seeds brown or black.

Britton and Rose recognize 150 species, as *Neomammillaria*, ranging from western United States to Nicaragua. Most of them are Mexican.

Tubercles not emitting milk when cut, the milk tubes, if any, only in the stem.

*M. Ruestii.*

Tubercles emitting milk freely when cut.

Flowers yellow . . . . . *M. woburnensis.*

Flowers pink or red, or with dark red stripes.

Wool in the axils of the tubercles yellow . . . . . *M. Eichlamii.*

Wool in the axils of the tubercles white . . . . . *M. Praelii.*

**Mammillaria Eichlamii** Quehl, Monatschr. Kakteenk. 18: 65. 1908. *Neomammillaria Eichlamii* Britt. & Rose, Cactaceae 4: 94, f. 91. 1923. *Chile.*

Dry plains and hillsides, 300–1,600 meters, El Progreso; Zacapa; Baja Verapaz; described from Sabanetas (possibly Dept. Guatemala), the material collected by Federico Eichlam. Honduras.

Plants solitary or caespitose, the plant body globose or short-cylindric, 15 cm. long or less, yellowish green, the tubercles only slightly angulate, with copious milky sap; axils filled with dense, yellowish or whitish wool and longer white bristles; radial spines 7–8, ascending, white with short brown tips; central spines usually 1, sometimes 2, stouter; flower buds covered with long wool; outer perianth segments narrow, acuminate, with a dark red stripe down the middle, otherwise cream-colored, the inner segments acuminate, cream-colored or light lemon-yellow; style longer than the stamens; stigma lobes 4–6, yellow.

The local Mammillarias are common pot plants in Guatemala, especially in the cooler regions, and frequently are offered for sale by peddlers.

**Mammillaria Praelii** Muehlenpf. Allg. Gartenz. 14: 372. 1846. *M. viridis* var. *Praelii* Salm-Dyck, Cact. Hort. Dyck. 1849: 16. 1850. *M. viridis* Salm-Dyck, l.c. 116. 1850. *M. inclinis* Lemaire,

Ill. Hort. 5: Misc. 9. 1858. *Cactus Praelii* Kuntze, Rev. Gen. 261. 1891. *C. viridis* Kuntze, l.c. *Piñuela; toniboc; huevos de coyote*.

Based on plants of Guatemalan origin; we refer here with much doubt several collections from exposed limestone rocks, Huehuetenango, at 800–2,500 meters.

Plants globose or short-cylindric, light green, depressed at the apex, densely spiny, the axils of the tubercles lanate and setose; tubercles somewhat tetragonous; areoles villous; radial spines 4, forming a cross, the uppermost and lowermost much elongated; flowers rose-red or red-purple.

**Mammillaria Ruestii** Quehl, Monatsschr. Kakteenk. 15: 173. 1905. *M. Celsiana* var. *guatemalensis* Eichlam, Monatsschr. Kakteenk. 19: 59. 1909 (type collected near Guatemala by Federico Eichlam). *Corazón de piedra*.

Exposed rocky places, 700–1,600 meters; Chiquimula; Jalapa; Guatemala. Described from Honduras; Nicaragua.

Plants mostly short-cylindric, as much as 20 cm. high and 4–6 cm. in diameter, light green, almost hidden by the dense spines; axils of the tubercles lanate, at least when young; radial spines 20 or more, white, 5–6 mm. long, spreading, the central spines usually 4, sometimes 5, much stouter than the radials, pale yellow, 7–8 mm. long; flowers often almost hidden by the spines, 8 mm. long; inner perianth segments acute, pale purple or rose-red; stigma lobes 4, linear, elongate; fruit clavate, red, the seeds brown.

**Mammillaria woburnensis** Scheer, Lond. Journ. Bot. 4: 136. 1845. *Cactus woburnensis* Kuntze, Rev. Gen. 261. 1891. *M. chapinensis* Eichlam & Quehl, Monatsschr. Kakteenk. 19: 1. 1909. *Neomammillaria woburnensis* Britt. & Rose, Cactaceae 4: 100. 1923.

Dry, rocky, open slopes, 200–1,250 meters; El Progreso (based at least in part on material collected at El Rancho by Eichlam); Zacapa; Chiquimula; Jutiapa; Quiché; the species was described from material of Guatemalan origin grown in England.

Stems usually several and forming small clumps, globose or cylindric, dull green, giving off copious sap when cut; tubercles angulate, lanate in their axils; radial spines 5–9, yellowish or white; central spines 1–8, often elongate, reddish or yellow; flowers yellow, about 1 cm. long; fruit red, clavate, 2.5 cm. long or shorter; seeds minute, brown.

## MELOCACTUS Link & Otto

Plants solitary or cespitose, globose or short-cylindric, conspicuously many-costate, bearing clusters of spines on the ribs; inflorescence a compact cap-like mass of hairs and bristles, these forming a cephalium borne at the top of the plant,

this often large and sometimes elongate; flowers small, pinkish, arising from the top of the cephalium, tubular-salverform, the perianth segments few, spreading; stamens inserted near the apex of the slender perianth tube; style slender, the stigma lobes linear, few; fruit clavate, naked, usually red; seeds small, black.

The genus occurs in Mexico, Central America and the West Indies, extending to northern South America. No other species in Central America.

**Melocactus Ruestii** Schumann, Verzeichn. Kult. Kakt. 26. 1896. *Cactus Maxonii* Rose, Smithson. Misc. Coll. 50: 63. 1907. *Melocactus guatemalensis* Gürke, Monatsschr. Kakteenk. 18: 93. 1908. *M. Maxonii* Gürke, l.c. 93. *Cactus Ruestii* Britt. & Rose, Cactaceae 3: 227. 1922. *Chile*.

Dry, rocky, open or brushy plains or hills, 200–700 meters; Baja Verapaz; El Progreso and doubtless other departments. Honduras.

Plants depressed-globose, 10–15 cm. high or larger, dull blue-green, the ribs 11–15, broad-based; radial spines 7–11, spreading or recurved, pale red or rose-colored, 1–1.5 cm. long, stout and hard; central spine usually solitary, porrect or ascending; cephalium small; flowers small, deep rose-red, opening in the afternoon; fruit deep rose-red, clavate, the small seeds black and lustrous.

The plant is widely distributed in the lower Motagua Valley but is of rather sparse occurrence. Plants often are grown in pots in Guatemala, and we have seen them offered for sale by vendors around the Parque Central in Guatemala City. The fruit is sweet and edible.

The types of *Melocactus Maxonii* and *M. guatemalensis* were both collected in Guatemala; that of *M. Ruestii* in Honduras. The limited material which is available, in addition to field observation, indicates that the three names represent only a single species.

Called “*cabeza de viejo*” and “*barba de viejo*” in Honduras.

### MYRTILLOCACTUS Console

Plants large, usually with a well-defined trunk and few or numerous, erect or ascending, thick, ribbed branches, all the areoles bearing uniform spine clusters; flowers diurnal, small, several at an areole, sometimes as many as 9, with a very short perianth tube, the segments widely spreading; ovary bearing a few minute scales with tufts of wool in their axils, spineless; fruit small, globose, fleshy and edible; seeds very small, black.

Four species are described; the others are Mexican.

**Myrtillocactus Eichlamii** Britt. & Rose, Cactaceae 2: 180, f. 256. 1920.

Based upon material collected by Federico Eichlam in 1909 in Guatemala, the locality unknown, but possibly the lower Motagua Valley.

Stems strongly 6-angulate, deep green or slightly glaucous, the ribs obtuse; areoles 2 cm. apart, large, circular, with grayish wool at anthesis; radial spines 5, bulbous at the base; central spine 1, slightly longer than the radials; flower buds dark purple, the outer perianth segments greenish, with red tips; inner perianth segments about 10, creamy white, spreading at almost a right angle to the tube; stamens numerous, the style white, slightly longer than the stamens; flowers fragrant; fruit 6 mm. in diameter, globose, wine-colored, naked except for a few small scales.

This species was sent by Eichlam to Britton and Rose, who described it, and so far as we know, it has not been seen or collected by any botanist in the half century since that time. The description above is taken from the original.

**NOPALEA Salm-Dyck**

Plants shrub-like, much-branched, generally with definite short cylindrical trunks; branches (joints) compressed, thick and succulent, broad or rather narrow; glochids present in the areoles, abundant or few; spines solitary or clustered in the areoles, not vaginate, large or small; leaves small, subterete, early deciduous; areoles bearing white wool, glochids, and often spines; flowers arising in the areoles, mostly at or near the edges of the joints; sepals ovate, erect; petals red or pink, erect, appressed against the stamens and style; filaments and style slender, much exceeding the petals; ovary somewhat tuberculate, naked or armed with spines, with a very deep umbilicus; fruit a juicy berry, red, edible, usually without spines; seeds numerous, flat, covered by a hard osseous aril.

About 7 species, in Mexico and Guatemala; possibly native farther southward but probably only naturalized there.

- Joints spineless or nearly so, sometimes with a few scattered, very short spines. *N. cochenillifera.*
- Joints armed with numerous elongate spines. *N. guatemalensis.*
- Joints broadly obovate. . . . . *N. guatemalensis.*
- Joints oblong or narrowly oblong.
  - Areoles 2-2.5 cm. apart. . . . . *N. lutea.*
  - Areoles mostly 3-4 cm. apart or more remote. . . . . *N. dejecta.*

**Nopalea cochenillifera** (L.) Salm-Dyck, Cact. Hort. Dyck. 1849: 64. 1850. *Cactus cochenillifer* L. Sp. Pl. 468. 1753. *Tuna; tunal; chuh* (Poconchí); *tuno; tuno de Castilla.*

Probably not native in Guatemala, but much planted at low and middle elevations; thoroughly naturalized in many places at middle elevations, up to 1,500 meters or even higher, perhaps the relics of

former commercial plantations; often planted for hedges; Alta Verapaz; Baja Verapaz; Izabal; Zacapa; Jutiapa; Guatemala; Sacatepéquez; Chimaltenango; Suchitepéquez; Retalhuleu; Quezaltenango; Huehuetenango; probably to be found in all departments. Mexico; planted for ornament commonly in many parts of tropical America.

Plants shrub-like, commonly 2-4 meters high, the trunk sometimes 20 cm. in diameter; joints oblong-obovate, sometimes 50 cm. long, green or at first bright green; spines none, or very small ones sometimes developing on old joints; glochids numerous, caducous; leaves very small, subulate, early deciduous; flowers arising at the tops of the joints, usually numerous, about 5 cm. long; ovary subglobose, 2 cm. long, tuberculate and bearing many glochids; sepals broadly ovate, bright red, acute; petals similar to the sepals but longer, erect; stamens pink, much exerted; stigma lobes 6-7, greenish, longer than the stamens; fruit red, about 5 cm. long; seeds hard, 5 mm. long.

The Maya name in Yucatan is "*pacam*." The Nahuatl name, "*nopal*," is applied to the plant in some parts of Central America and in Mexico but is little used in Guatemala. There the name "*tuna*," given in Mexico and elsewhere to the fruit, is applied to the plant, which is often called "*tuno*" or "*tunal*," the names used commonly for all the *Opuntia* and *Nopalea* species. This species has been of great economic importance in the past, as the host of the cochineal insect, from which a handsome dye was obtained. The plants were cultivated on a large scale in Mexico, but the principal source of the dye was the Canary Islands, which in 1868 produced more than 6,000,000 pounds, valued at four million dollars. In Guatemala cochineal was grown on a smaller scale, but it is said that great areas of land about Antigua and Amatitlán were devoted to it. In the early 1880's neglected *nopales* were still to be seen about Antigua, and in 1883 as much as 184 cwt. were exported from Guatemala. The dye was much used for coloring the local textiles, and some may be produced at the present time about Zacapa, Salamá and Amatitlán. At many places in the central region there are extensive thickets of *Nopalea* on the drier hills, and they probably are the remains of former cultivated fields. The plants are grown commonly in many places for hedges. Cochineal dye was in use by the original inhabitants of Mexico and Central America, and immediately after the Conquest it was exploited by the Spaniards. It was long one of the chief articles of tribute to the crown. Today it has been almost wholly displaced by synthetic dyes. The cochineal insects were "planted" upon the branches of the plants, where they multiplied rapidly. When mature, they were brushed off into bags, then dried, and in this form they were exported. They are very small and it is

almost incredible that millions of pounds could have been collected in a single year.

***Nopalea dejecta*** Salm-Dyck, Cact. Hort. Dyck. 1849: 64. 1850.  
*Opuntia dejecta* Salm-Dyck, Hort. Dyck. 361. 1834. *Tuna*.

Moist or dry thickets, often in coastal thickets, mostly on the Pacific coastal plain, 1,350 meters or less; Santa Rosa; Retalhuleu; Huehuetenango (Cuilco); probably occurring in all or most of the Pacific departments. Southern Mexico; El Salvador.

Plants erect, rather sparsely branched, shrub-like, or sometimes a small tree of 5 meters with a definite trunk, strict, bright green; spines numerous, sometimes 4 cm. long, slender, at first pale yellow or pinkish, in age gray; joints narrow, 10–20 cm. long and 3.5–5 cm. broad or sometimes longer; flowers about 5 cm. long, the sepals obtuse; petals erect, dark red; stamens dark red, long-exserted.

The fruit, as in other species, is edible, but of inferior quality. This plant is found wild only, and almost always in medium or dense shade under low trees. It is common about Champerico.

***Nopalea guatemalensis*** Rose, Smithson. Misc. Coll. 50: 330, *tt.* 41, 42. 1907. *Tuna*.

Dry, rocky plains and hillsides, 400–900 meters; Zacapa; El Progreso (type from El Rancho, *Maxon* 3774). Possibly also in Honduras.

Plants tree-like, 5–7 meters high, or when young low and shrub-like, much-branched, with a dense crown and a definite thick trunk; joints bluish green, obovate to broadly oblong, 15–20 cm. long; areoles numerous, filled with white wool; spines 5–8 at each areole, or often very numerous, most of them soft, hair-like, and flexuous, nearly or quite porrect, unequal, white or sometimes pink, the longest 2.5–3 cm. long; leaves small, linear, reflexed; flower 5–6 cm. long; sepals ovate, the petals red or rose; fruit 4–5 cm. long, clavate, red, somewhat tuberculate, deeply umbilicate at the apex, without conspicuous glochids; seeds 4 mm. broad.

The characters by which this and some of the Mexican species are separated in the key of Britton and Rose's *The Cactaceae* do not appear very convincing.

***Nopalea lutea*** Rose, Contr. U. S. Nat. Herb. 12: 405, *t.* 58. 1909.

On sandbars or rocky hillsides, 300–1,100 meters; El Progreso (type collected near El Rancho, *Kellerman* 7046); Chiquimula; Jutiapa. Honduras; Nicaragua.

Plants tree-like, 5 meters high or less, with a short distinct trunk and several large branches; joints oblong to obovate-oblong, 10–22 cm. long, pale green and

slightly glaucous; areoles 2-2.5 cm. apart, filled with short brown wool; spines weak, yellow, acicular or bristle-like, the longest 4 cm. long; flowers 5 cm. long, the petals red, 2 cm. long; ovary with numerous prominent areoles filled with yellow bristles; fruit red, 4 cm. long; seeds 4-5 mm. in diameter.

### NYCTOCEREUS Britton & Rose

Plants erect, clambering, or procumbent, rather slender, sparsely branched or simple, the stems cylindric, ribbed, the ribs rather numerous and low; areoles each bearing a tuft of short white wool and small radiating bristles or weak spines; flowers large, white, nocturnal; ovary bearing small scales, short or long wool, and clusters of weak spines or bristles; perianth funnelform, bearing scales and tufts of weak bristles below the middle, above the middle bearing distant, narrowly lanceolate scales; inner perianth segments widely spreading, obtuse or subacute; stamens numerous, shorter than the perianth; style about equaling the stamens; fruit fleshy, scaly, with tufts of spines or bristles; seeds large, black.

Five species are recognized, based upon characters that do not appear convincing. Two other Central American ones are reported, both from Nicaragua.

*Nyctocereus guatemalensis* Britt. & Rose, Contr. U. S. Nat. Herb. 16: 240, *tt.* 70, 71. 1913. *Cereus guatemalensis* Vaupel, Monatsschr. Kakteenk. 23: 86. 1913.

Dry, brushy plains, 200-300 meters; endemic; El Progreso (type from El Rancho, *Maxon* 8510); Zacapa.

Stems erect, subscaudent, or recurved and arching, sometimes prostrate, 1-2 meters long or more, 3-6 cm. in diameter, very densely spiny; ribs 8-12, low; radial spines about 10; central spines 3-6, usually much longer than the radials, the longest ones 3-4 cm. long; flowers fragrant, white, 4-7 cm. long; ovary somewhat tuberculate, each tubercle tipped by an areole bearing a cluster of pinkish or brownish spines; outer perianth segments brownish, the inner ones lanceolate, acute; stamens much shorter than the perianth, attached all along the surface of the wide throat; style stout, 3 cm. long; fruit 2 cm. long, spiny; seeds black, lustrous, 3 mm. in diameter.

A common plant on plains about Zacapa and elsewhere in the lower Motagua Valley. This species may prove to be the same as *N. Hirschtianus* (Schum.) Britt. & Rose, described from Nicaragua.

### OPUNTIA Miller. Prickly pear

Plants low and branched from the base or often shrub-like or tree-like with definite trunks, branched, the branches (joints) usually compressed and flattened, succulent, sometimes cylindric or globose, often with a woody skeleton; areoles axillary, bearing spines, barbate bristles (glochids), hairs, flowers, and sometimes glands; leaves small, terete, caducous; spines solitary or fasciculate, terete or com-



pressed, vaginate or naked, variously colored; glochids usually numerous, borne above the spines; flowers mostly 1 at an areole; ovary inferior, 1-celled, many-ovulate, bearing scale-like leaves, the areoles often with spines and glochids; sepals green or colored, grading into the petals; petals mostly red or yellow, sometimes green, spreading; stamens much shorter than the petals, sensitive; style thick, the stigma lobes short; fruit baccate, dry or juicy, often edible, spiny or naked; seeds covered with a hard osseous aril, whitish, compressed; embryo curved; cotyledons 2, large.

Species about 240, all American and most numerous in Mexico, but distributed from southern Canada to Patagonia. Probably a few species besides those listed here are found in other parts of Central America, but the plants are not plentiful in southern Central America except in restricted areas. This is the largest genus of the Cactaceae, but many of the species are poorly understood and separated by no very definite characters, and the real number of species is decidedly uncertain. It is evident from their key to the groups and species that Britton and Rose had no very clear idea of the relationships of many of the species, and perhaps the genus can never be divided clearly into groups and specific units. Backeberg, *Die Cactaceae* 1: 119-628. 1958, gives more than 350 species belonging to *Opuntia* and the segregate opuntoid genera. The work is not so useful as that of Britton and Rose.

Some of the species of *Opuntia* recorded from Guatemala are none too well marked. While all *Opuntias* are native to the Americas, some were introduced into Spain and other parts of the Mediterranean region soon after the time of discovery. Some have become thoroughly naturalized there and are now as much a part of the landscape as they are in Mexico and Guatemala. *Opuntias* were introduced into Australia and soon became a terrible pest there, ruining large areas of cultivated land. Biological control in recent years has reduced the number of plants in Australia almost to the vanishing point. In their native homes *Opuntias* usually are not troublesome. While abundant in many areas, they can be destroyed by cutting and burning, and show little tendency to spread. Furthermore, in some areas, mostly in Mexico, they are of great economic importance. The plants are, of course, very offensive where they are abundant, sometimes forming impenetrable thickets, for the longer spines can inflict severe wounds that heal slowly. If the species is one in which the spines are encased in a loose sheath, this remains in the flesh when the spine is removed, often causing festering wounds. More troublesome than the spines are the innumerable short bristle-like glochids, which adhere in great numbers to the skin

if a plant is brushed carelessly. In some regions of the southwestern United States the plants have been found to be good forage for stock in time of drought. The spines may be burned off with a blow torch, but if cattle are starving for lack of grass, they will not hesitate to eat the joints, spines and all. In Mexico the young, tender joints are peeled to remove all the spines and glochids, then cooked and eaten as a vegetable. They may be eaten thus in Guatemala, but we have not observed any use made of them. Very often the plants are grown in Guatemala as hedges, a purpose for which they are fairly effective, although stock will push through them. There are many miles of *Opuntia* hedges in the Occidente, especially in the highlands about Quezaltenango. Sometimes the "tunos" are planted along the tops of adobe walls, thus keeping out at least human marauders, an effect sometimes obtained equally well by setting broken bottles or other glassware along the walls.

In parts of Mexico *tunas* are an important food for man at their harvest time, constituting for some weeks a large part of the diet. The best fruits are large, handsomely colored, and full of richly colored, red juice of agreeable flavor, with rather abundant pulp. The glochids and spines can be removed with a brush when the fruit is ripe. There always is some danger of getting glochids in the mouth, but persons habituated to eating the fruit seem to pay little attention to them. The pulp and juice are used in Mexico commonly for coloring food, also for preparing sirups and a sort of marmalade called "queso de tuna," which may be bought at almost any season of the year. *Tunas* are little eaten in Guatemala, principally because fruit of most local plants is inferior in quality. In many wild species the fruit is almost dry and in no way edible. The seeds are numerous and large, hard and quite indigestible, and if eaten with the pulp, as they often are, they cause constipation. It is well known that some Indians of southern California and Baja California, at least in times when food was scarce, collected the hard seeds after they had passed through the body, ground them into a coarse meal, and re-used them as food. There may well be in Guatemala some species of *Opuntia* not listed here, particularly among the cultivated plants, whether grown for ornament or for their fruit. Many of the cultivated plants are spineless or nearly so, and such a form is not enumerated on the following pages. They may be *O. Ficus-indica* (L.) Mill., a species whose native habitat is unknown, but which is found in cultivation in many parts of tropical America. The term "nopal" is of Nahuatl origin, but the word "tuna" is said to come from the

Antilles. Two Indian names are recorded for the plants from Guatemala, "*nuxtil*" (Baja Verapaz) and "*noxtié*" (Quiché); the Quecchí name is "*tun*," a corruption of the Mexican "*tuna*."

Joints of the stems subterete, small, 3-7 cm. long; flowers lemon-yellow, drying red. . . . . *O. pubescens*.

Joints strongly compressed, flat.

Joints puberulent or pubescent.

Plants low and spreading, mostly 50 cm. high or less; joints small, mostly 5-7 cm. broad. . . . . *O. decumbens*.

Plants large, 1-2 meters high; joints 9-16 cm. broad.

Joints rounded obovate. . . . . *O. Guilanchi*.

Joints mostly oblong or obovate-oblong. . . . . *O. tomentella*.

Joints glabrous.

Spines very slender and usually short, mostly about 1 cm. long, sometimes 2 cm. long. . . . . *O. guatemalensis*.

Spines mostly stout or very stout, chiefly 2-5 cm. long or even larger.

Large spines generally only 1-2 at an areole, relatively slender, mostly 3 cm. long or shorter. . . . . *O. Eichlamii*.

Large spines generally 3 or more at a node, stout, mostly 3-6 cm. long.

*O. Deamii*.

***Opuntia Deamii*** Rose, Contr. U. S. Nat. Herb. 13: 309, *t.* 65. 1911; Britt. & Rose, Cactaceae 1: 187, *f.* 229. 1919.

On open rocky hillsides or in moist or dry, oak forest, 1,000-1,700 meters; endemic; Baja Verapaz; Jalapa; El Progreso; Guatemala (type from Fiscal, *Deam* 6228).

Plants erect, about a meter high, sparsely branched, green or bright green, glabrous, often or usually with a very short, cylindric trunk; joints mostly very large, obovate or oblong-obovate, 25-35 cm. long, as much as 20 cm. broad; areoles rather remote, commonly 4-5 cm. apart, relatively small; spines 2-6, generally 4, white or dull yellow, stout, somewhat compressed, spreading or porrect, 3-6 cm. long; flowers about 7 cm. long, reddish; fruit oblong, 6 cm. long, naked except for a few spines near the apex, wine-red inside and outside; seeds small, 3 mm. broad.

***Opuntia decumbens*** Salm-Dyck, Hort. Dyck. 361. 1834. *Tuno; lengua de vaca; arpón*.

On dry, brushy, often rocky plains or hillsides, sometimes in oak forest, 200-700 meters; El Progreso; Zacapa; Chiquimula; Jalapa; Jutiapa. Western and southern Mexico.

Plants erect or usually spreading, 50 cm. high or less; joints few or numerous, 10-20 cm. long, obovate or rounded-obovate, finely, softly, and inconspicuously pubescent, grass-green; areoles small or rather large, bearing yellowish wool and very numerous yellow glochids; spines sometimes wanting, usually solitary, sometimes numerous, slender or rather stout, 5.5 cm. long or shorter, yellow or

gray; flowers small, about 4 cm. long; petals deep yellow; fruit deep purple, very juicy; seeds 4 mm. broad.

A common plant at many localities in the dry Oriente, sometimes forming large colonies among shrubbery or in open places.

**Opuntia Eichlamii** Rose, Contr. U. S. Nat. Herb. 13: 310, *t.* 66. 1911; Britt. & Rose, Cactaceae 1: 187, *f.* 230. 1919. *Tuna; tuno.*

Chiefly on dry brushy hillsides or in dry or moist thickets, often planted to form hedges, 250–2,200 meters; endemic; El Progreso; Zacapa; Jutiapa; Guatemala (type collected near Guatemala, on the road to Mixco, *Federico Eichlam*); Huehuetenango; Quezaltenango.

Plants tree-like when fully grown and often 5 meters high or more, many of the plants, however, only a meter high or even less, glabrous, the large branches few; joints often very numerous, 15–20 cm. long or frequently smaller, broadly obovate to orbicular, somewhat glaucous or bright green; areoles small, commonly 3–3.5 cm. apart; larger spines 4–6 or fewer, very unequal, pinkish at first, becoming white, or sometimes blackish in age, 3 cm. long or shorter, spreading, the largest ones somewhat compressed; glochids brown; flowers 3.5 cm. long, the petals red; stigma lobes 8–11, bright green; fruit 4 cm. long, strongly tuberculate, scarcely edible.

This is a common plant in the central region, doubtless occurring also in Sacatepéquez and Chimaltenango and in some of the other central and western departments. Generally the plants are about a meter high, and it is only under favorable conditions that they become tree-like. It is suspected that most of the tree-like plants have been destroyed, since they are a pest and would not be permitted to remain about dwellings or cultivated ground. It is altogether possible that more than a single species is represented by the Guatemalan material we have referred here. It is presumably this species that is planted so commonly for hedges about Quezaltenango, and it is frequent in Huehuetenango and elsewhere in the Occidente. It is also the arborescent *Opuntia* so plentiful on the dry, rocky hills along the road between Guatemala and Amatitlán.

**Opuntia guatemalensis** Britt. & Rose, Cactaceae 1: 218, *f.* 285. 1919. *Tuna; tuno.*

Dry, rocky plains and hillsides, often in thickets, 2,300 meters or less; endemic; type collected by Glover B. Wilcox in 1909 in some unknown part of Guatemala, probably along the Pacific coast; Zacapa; Jutiapa; Santa Rosa; Huehuetenango; Quezaltenango.

Plants erect or low and spreading, about 60 cm. high, glabrous; joints few or rather numerous, often lustrous, green or pale green, sometimes with purplish

blotches below the areoles; areoles small, filled with brown wool; spines 1-3 at each areole, small and inconspicuous, terete, acicular, white with a blackish tip when young, in age gray, generally deflexed, commonly 1 cm. long or shorter but sometimes 2 cm. long; flower buds reddish; flowers small, the petals lemon-yellow, 2.5 cm. long; stigma lobes cream-colored; fruit subglobose, deep red, very juicy, edible; seeds 4 mm. in diameter.

**Opuntia Guilanchi** Griffiths, Rept. Mo. Bot. Gard. 19: 265. 1908.

Dry slopes, 2,300-2,500 meters; San Marcos (near Tajumulco, *Steyermark* 36555). Mexico (Zacatecas).

Plants shrub-like, 1.5-2 meters high, often with a short distinct trunk, grayish green; joints broadly obovate or rounded-obovate, 20-25 cm. long, 14-16 cm. broad, finely but inconspicuously pubescent; areoles rather large; spines 2-3 at an areole, slightly compressed, at first whitish, becoming yellowish, 2.5 cm. long or shorter; glochids pale yellow; fruit subglobose, 4 cm. in diameter, finely pubescent, green turning rose, the pulp rose-red.

The Guatemalan locality is far remote from the Mexican range of the species, but such a range is not improbable or inconsistent in this genus, in which too many species seem to have been separated on little else than their "widely different ranges." The specific name is taken from a Mexican vernacular name of the fruit.

**Opuntia pubescens** Wendland in Pfeiffer, Enum. Cact. 149. 1837. *Aceituno*.

In thickets, about 1,350 meters; Baja Verapaz; Huehuetenango. Mexico.

Plants erect and 60-90 cm. high, often much lower, much-branched; joints easily detached, subterete, glabrous or pubescent, 3-7 cm. long; spines numerous, short, brick-brown or buff-brown; flowers lemon-yellow, drying red; filaments greenish; style white, the stigma lobes cream-colored; fruit small, only 2-2.5 cm. long, red, somewhat spiny; seeds 3 mm. in diameter.

The spines are barbed, and thus the joints easily become attached to passing animals or objects and are transported from one locality to another. In Guatemala, however, the species is apparently rare and local.

**Opuntia tomentella** Berger, Monatsschr. Kakteenk. 22: 147. 1912; see also Federico Eichlam, Monatsschr. Kakteenk. 20: 81. 1910. *Tuna; tuna de monte*.

Pastures, plains, or open hillsides, sometimes in oak forest, 1,300-2,300 meters; endemic; Jalapa; Guatemala (type collected by Federico

Eichlam, probably between Guatemala and Mixco); Sacatepéquez; Quezaltenango; Huehuetenango.

Plants shrub-like, about a meter high, often with a short trunk; joints few or numerous, obovate or oblong-obovate, 20–30 cm. long, 9–15 cm. broad, light green, often somewhat lustrous, puberulent; areoles 1.5–3 cm. apart, small; spines 1–2, acicular, white or yellowish, mostly 7–10 mm. long, porrect, sometimes wanting; glochids few; flowers numerous, orange-red, 5–6 cm. long; petals obovate; filaments yellowish green; style rose-colored, the stigma lobes white; ovary somewhat tomentose, armed with numerous black glochids; fruit oblong, red within and outside, acid, scarcely edible.

Eichlam states that the plant often is infested with cochineal insects.

### PACHYCEREUS Britton & Rose

Plants usually very large and tree-like, with few or numerous thick heavy branches and a definite trunk, the branches ribbed, armed with clusters of stout spines; flowers diurnal, with a rather short tube, the outer perianth segments short, spatulate; stamens numerous, included, inserted along the throat of the perianth; style included; ovary and perianth tube covered with small scales, these bearing felt and bristles in their axils; fruits large, bur-like, dry, usually densely covered with clusters of deciduous spines and bristles; seeds large, black.

About 10 species; all the others are Mexican.

**Pachycereus lepidanthus** (Eichlam) Britt. & Rose, Cactaceae 2: 76. 1920. *Cereus lepidanthus* Eichlam, Monatschr. Kakteenk. 19: 177. 1909.

Based on material collected by Federico Eichlam near El Rancho, Chiquimula; El Progreso.

Plants simple or with a few stout branches, light green, the ribs 7–9, rather low, separated by broad rounded intervals; areoles 1 cm. apart, small; radial spines about 10, slender, 1.5 cm. long or the longer ones sometimes 5 cm. long; central spines stouter, somewhat flattened, 3–6 cm. long; flowers 7 cm. long, 2.5 cm. broad; perianth segments 3–4-seriate, 2.5 cm. long, 8 mm. broad, red below, sepia-brown above, persistent on the fruit; ovary and perianth tube covered with membranous scales; fruit dry.

### PERESKIA Miller

Shrubs or trees, often scandent, branched and bearing normal green fleshy entire leaves; spines binate or fasciculate in the leaf axils, neither vaginate nor barbate; glochids none; leaves alternate, deciduous in age; flowers solitary, corymbose or paniculate, rotate, white, red or yellow; stamens numerous; stigma lobes linear; fruit globose or very broadly turbinate, red or yellow, often bearing small leaves, fleshy and juicy; seeds black, lustrous.



FIG. 35. *Pereskia aculeata*. Fruiting branch; somewhat reduced.

Species about 20, in tropical America. Some of the species are used commonly as stocks on which to graft other cultivated cacti. The fruits are eaten in some regions but are not very good; we have no information to the effect that they are eaten in Central America.

Plants scandent; branches with a pair of short recurved spines in each areole.

*P. aculeata.*

Plants erect shrubs or trees.

Spines long and straight . . . . . *P. autumnalis.*

Spines acicular . . . . . *P. Conzattii.*

**Pereskia aculeata** Mill. Gard. Dict. ed. 8. 1768. *Cactus Pereskia* L. Sp. Pl. 469. 1753. *P. Pereskia* Karst. Deutsch. Fl. 888. 1882.

Often planted for ornament, especially in patios. Probably native of West Indies and tropical South America, but cultivated in other regions. Figure 35.

A large slender vine, sometimes 10 meters long; spines of the older stems solitary or 2-3 together, slender, straight; spines of the leaf axils binate or ternate, 2-4 mm. long, strongly recurved; leaves short-petiolate, lanceolate to oblong-elliptic, mostly less than 10 cm. long, acute or acuminate, acute or obtuse at the base; flowers paniculate or corymbose, white, pale yellow or tinged with pink, 2.5-4.5 cm. broad; ovary bearing small leaves and often also spines; fruit smooth at maturity, subglobose, 1.5-2 cm. in diameter or somewhat larger; seeds black, 4-5 mm. broad.

The leaves are cooked and eaten in some parts of tropical America. The finest vine we have seen in Guatemala was one in the patio of the hotel in Cuilapa. Its owner said that a friend had presented it to her as a yellow *Bougainvillea!* In Chiapas (Mexico) the common name *Buganvilla blanca* is reported.

**Pereskia autumnalis** (Eichlam) Rose, Contr. U. S. Nat. Herb. 12: 399, *tt.* 52-54. 1909. *Pereskiopsis autumnalis* Eichlam, Monatsschr. Kakteenk. 19: 22. 1909. *Rhodocactus autumnalis* F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 96. 1935. *Manzanote; matial.*

Abundant in the lower Motagua Valley, on dry rocky plains and hillsides, also in the Oriente, 200-900 meters; Baja Verapaz; Zacapa; El Progreso; Jutiapa; Guatemala (Fiscal and lower); probably in all the departments of the Oriente. El Salvador; Honduras; Nicaragua.

A large shrub or a tree as much as 9 meters high, the trunk low and thick, often 40 cm. or more in diameter, very spiny, the crown more or less rounded and spreading, often very dense; younger branches reddish brown; spines in the leaf axils usually solitary, sometimes ternate, slender, 3-4 cm. long, rarely 16



cm. long; leaves thick and fleshy, oblong to orbicular, 2-8 cm. long, rounded to subacute at the apex and apiculate, rounded or obtuse at the base; flowers solitary near the ends of the branches, short-pedunculate; ovary covered with leaf-like scales; flowers 4-5 cm. broad, orange-red; stamens numerous; fruit globose, 4-5 cm. in diameter, glabrous, bright yellow; seeds black, lustrous, 4 mm. long.

Sometimes called "*mateare*" in El Salvador and Nicaragua. The name "*manzanote*" is the prevalent one in the lower Motagua Valley, but in Jutiapa the tree is called "*matial*." Los Manzanotes is an *aldea* of Zacapa, Manzanotal is a *caserío* of El Progreso, and both names probably are very appropriate ones. This is one of the most abundant trees about Zacapa, forming stands of great extent on the plains, in association with spiny Leguminosae and other shrubs and trees. At a short distance the *Pereskia* trees remind one strongly of apple trees, being about the same size and form, and the resemblance is even greater when the *manzanote* trees are covered with the yellow fruits, as they are in late April, when the trees are mostly devoid of leaves. The thick trunks are densely covered with long stout spines. The trees are quite useless except as hedge plants. We have not noted *Pereskia* hedges in Guatemala, but in El Salvador there are many miles of them; some of the country roads are shut in on both sides with them. They are certainly successful for this purpose, so far as obstructing large animals is concerned, but the hedges are dangerous to man and probably also to domestic animals. The minute irritating glochids, which can do great damage to the eyes, are produced in myriads, and when there is a breath of wind these are scattered through the air. The fruits may be edible in theory, but no one would risk the glochids that cover them. No domestic animals eat the plant, and even the wood is unsuitable for fuel, because in handling it one will become covered with the glochids, which cause intense itching and irritation of the skin. The trees are conspicuous and somewhat ornamental when covered with their abundant orange or orange-red flowers, about October.

***Pereskia Konzattii* Britt. & Rose, Cactaceae 1: 24. 1919.**

Dry, hot plains at low elevations; Mexico and probably Guatemala (*Eichlam*, without locality).

Tree 8-10 m. tall; bark of stems and branches brown and smooth; leaves orbicular to obovate, acute, 1-2.5 cm. long; areoles small, with short white wool and a few long hairs; spines 2-6 on young branches, 10-20 on main stem, acicular, 2-2.5 cm. long, at first yellowish brown, dark brown in age; flowers not known; ovary bearing small scales; fruit naked, pyriform, more or less stalked at the base, 3-4 cm. long; seeds black, glossy, 3 mm. long, with a small white hylum.

**PERESKIOPSIS** Britton & Rose

Shrubs or small trees, the older trunks consisting of a solid woody cylinder covered with bark and resembling ordinary dicotyledonous tree trunks, the branches sometimes elongate and more or less pendent or subsacandent; areoles circular, usually with spines and also bearing hairs, wool, and glochids; leaves broad and flat, entire, unarmed; flowers similar to those of *Opuntia*, yellow or red; ovary sessile, usually with leaves at the areoles; fruit red, juicy; seeds very hard, osseous, few, covered with matted hairs.

About 10 species in tropical America, mostly Mexican. Only the following is known from Central America.

**Pereskiosis Kellermanii** Rose, *Smithson. Misc. Coll.* 50: 332. 1907.

In dry, often rocky thickets, 200–1,250 meters; endemic; Zacapa; Chiquimula; Quiché; type from Trapichito (probably in the Department of Guatemala), *Kellerman* 6025. Honduras.

Stems glabrous, sometimes as much as 5 meters long and scandent, about 2 cm. in diameter; spines slender, acicular, brown, several or only 1, sometimes absent, the glochids numerous, brown; young branches green and fleshy, the older ones sometimes red; areoles on young stems bearing many long white hairs, brown glochids, and often several brown spines; spines on older branches usually solitary, almost black, and 2–3 cm. long; leaves fleshy, glabrous, lustrous, elliptic to oblong-elliptic or suborbicular, acute or subacute, narrowed to the base, sessile; flowers unknown; fruit red, glabrous, 3–6 cm. long, bearing small leaves, the areoles with numerous brown glochids; seeds covered with matted hairs.

Specimens collected by Eichlam in Guatemala were placed by Rose in *Pereskia Conzattii* Britt. & Rose. The material (U. S. Nat. Mus.) is sterile but could belong to this species.

**RHIPSALIS** Gaertner

Slender epiphytes, usually pendent from the branches of trees, often much branched and forming dense clumps; stems terete, angulate, or complanate and leaf-like; leaves none or represented by minute bracts; areoles borne on the margins in flat-stemmed plants, along the ridges or irregularly scattered in other forms, small, usually bearing hairs, wool, bristles, and flowers, never spines; flowers small, usually solitary, nocturnal or diurnal; perianth segments distinct, few, sometimes only 5, usually spreading, sometimes reflexed; stamens few or numerous, slender, erect, inserted in 1–2 rows on the outer margin of the disc; style erect, the stigma lobes 3 or more, usually slender and spreading; ovary small, sometimes depressed or sunken in the stem; fruit globose or oblong, juicy, white or colored, generally naked, sometimes bearing a few scales; seeds small, few or numerous.

A genus of about 50 or perhaps more not very clearly defined species, all American and tropical with the exception of a few species

which are to be found from West Africa across to Madagascar, and on islands of the Indian Ocean as far as Ceylon. These may have been transported from America by birds or other agents.

Other species are described from Mexico and Central America.

*Rhipsalis micrantha* and *R. ramulosa* are similar vegetatively to species of *Epiphyllum*. The latter has recently been placed in a segregate of *Epiphyllum* but would seem to go better into *Rhipsalis*.

Stems compressed and often leaf-like, 8 mm. broad or broader, sometimes trigonous.

Stems mostly 1.5–3 cm. broad. . . . . *R. ramulosa*.

Stems mostly less than 1 cm. broad. . . . . *R. micrantha*.

Stems terete, usually less than 4 mm. in diameter.

Areoles filled with dense masses of tawny hairs 2–3 mm. long . . . *R. Bartlettii*.

Areoles naked or when young bearing a few white bristles. . . . . *R. Cassutha*.

**Rhipsalis Bartlettii** Clover, Bull. Torr. Bot. Club 65: 567, f. 6, 7. 1938.

Known in Guatemala only from the type, Uaxactún, Petén, *Bartlett*. Mexico (Veracruz).

Plants pendent, as much as 2 meters long, the branches slender, dichotomous or sometimes verticillate, light green, the terminal joints sometimes less than 1 mm. in diameter; areoles prominent, filled with dense masses of tawny hairs 2–3 mm. long; flowering areoles not lanate, the ovary sunken in the stem; fruit white, globose, 3–4 mm. in diameter; seeds black, reniform, less than 1 mm. long, reticulate and furrowed.

We have seen no material of this species, but it is probably a synonym of *R. Cassutha*; the dense masses of hairs that are supposed to characterize the "species" may be of the nature of insect galls, such as have been found in other species of *Rhipsalis*.

**Rhipsalis Cassutha** Gaertn. Fruct. & Sem. 1: 137. 1788. *Tatache* (Petén, Maya); *bejuco de quebradura*.

On branches of trees, 600 meters or less; Petén; Alta Verapaz; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; Huehuetenango; probably in all the lowland departments. Southern Florida; Mexico; British Honduras to Panama; West Indies; South America; Ceylon; tropical Africa.

Plants often forming dense masses a meter long or more, much-branched; stems fleshy, terete, when young bearing several white bristles in the areoles, naked when old, mostly 2–4 mm. in diameter, rather pale green, the branches generally in pairs but often verticillate; flowers lateral, solitary, white; petals

2 mm. long or somewhat longer; fruit naked, white or pink, translucent, ripening in only a few days after flowering, globose, 5 mm. or less in diameter.

In cultivation often called "mistletoe cactus," the white berries and naked stems suggesting some of the Loranthaceae. The plant is often grown in hanging baskets in Guatemala. When wild it grows most plentifully on large trees, drooping in great masses from the highest branches. The flowers persist for several days. At mid-day they are almost rotate, but they close in late afternoon. Said to be used in fractures of bones of men and horses, hence *bejuco de quebradura*.

**Rhipsalis micrantha** (HBK.) DC. Prodr. 3: 476. 1828. *Cactus micranthus* HBK. Nov. Gen. et Sp. 6: 65. 1823. *R. Tonduzii* Weber, Dict. Hort. Bois. 1046. 1898. *Pitahaya*.

Epiphyte in forest, 1,000–1,300 meters, San Marcos (Volcán Tajumulco, *Steyermark* 37591). Costa Rica to Peru.

Pendent epiphytic plants, much-branched; primary stems terete or with 2, sometimes 3 narrow wings or angles; secondary stems or branches flat, with 2 or sometimes 3 wings or angles, up to 1 cm. broad, the secondary stems occasionally borne in groups of 3; areoles 2–4 cm. apart on the wings, with or without short bristles or scales; flowers small, white, 5–7 mm. long including the ovary; tepals 2–3 mm. long, linear-oblong, obtuse; fruit a globose, pulpy berry to about 10 mm. long.

The available material of this species is inadequate. The incomplete description is drawn from the Guatemalan material cited.

**Rhipsalis ramulosa** (Salm-Dyck) Pfeiffer, Enum. Cact. 130. 1837. *Cereus ramulosus* Salm-Dyck, Hort. Dyck. 340. 1834. *R. coriacea* Polak. Linnaea 41: 562. 1877. *Disocactus ramulosus* Kimnach, Cact. & Succ. Journ. Am. 33: 14, t. 1961. *Guacamayo*.

Epiphytic in moist forest, from near sea level to about 1,500 meters; Petén; Alta Verapaz; Escuintla; Suchitepéquez; Sololá; Huehuetenango; San Marcos. West Indies; Mexico; British Honduras, Central America and Panama; south to Brazil and Bolivia. Figure 36.

Pendent epiphytes, branched, a meter long or more; stem terete, slender, somewhat woody; branches or secondary stems flat and leaf-like, up to 15 cm. long and to 4 cm. broad, remotely crenate; areoles about 1.5 cm. apart and without bristles when mature; flowers relatively small, single at the areoles, to about 12 mm. long; tepals 10 or fewer, to about 15 mm. long, the outer ones oblong, the inner lanceolate; stamens 12–30, inserted in a single area at the top of the receptacle, exerted; style exceeding the stamens or about the same length, stigma 3–4-lobed; fruit baccate, ovoid, up to 8 mm. long.

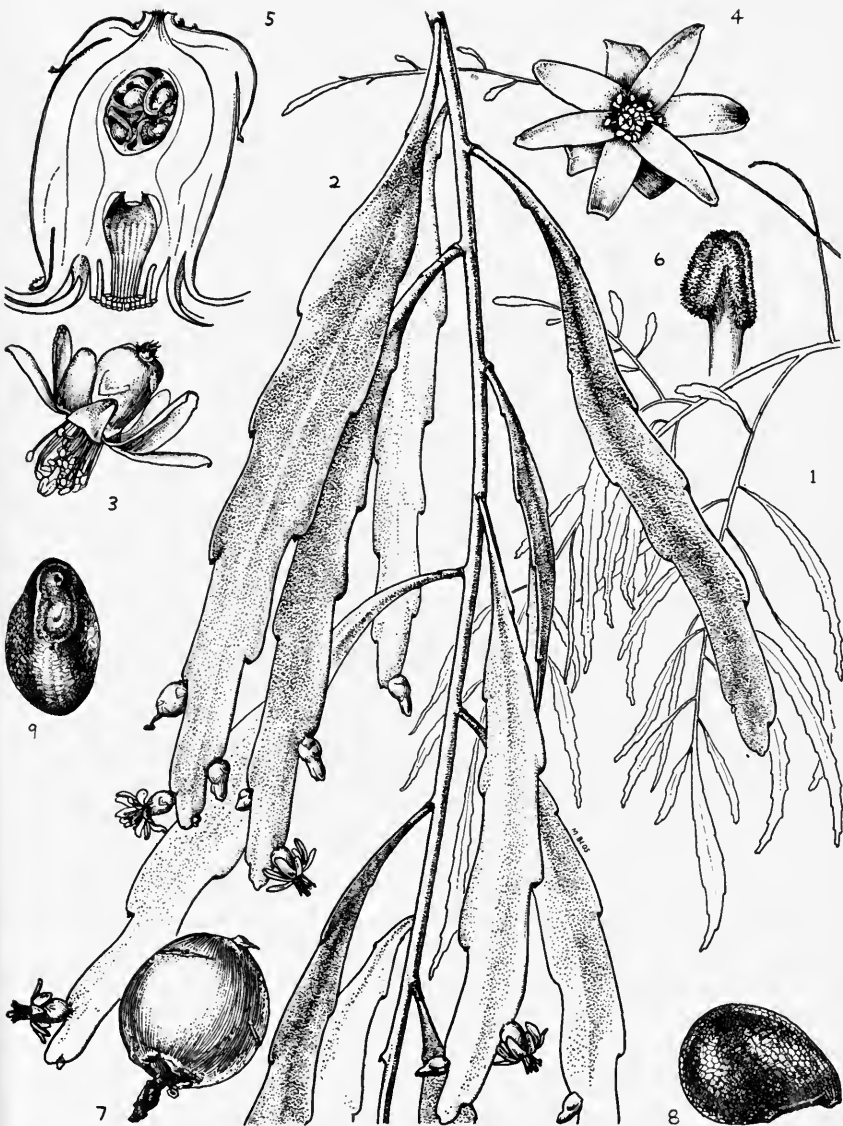


FIG. 36. *Rhipsalis ramulosa*. 1, Habit;  $\times \pm \frac{1}{8}$ . 2, Stems with buds, flowers and immature fruits;  $\times \frac{1}{6}$ . 3 and 4, Flower from side and front;  $\times \pm 2\frac{1}{2}$ . 5, Longitudinal section of receptacle;  $\times 6$ . 6, Stigma;  $\times 12$ . 7, Fruit;  $\times \pm 2\frac{1}{2}$ . 8, 9, Seeds;  $\times 16$ . Courtesy of Myron Kimmach. Drawn by Mrs. M. Bloss.

## SELENICEREUS Britton &amp; Rose

Plants slender, trailing or scandent, the stems elongate, ribbed, with generally 7-10 ribs, often with aerial roots; areoles small, sometimes elevated on small knobs, usually bearing small spines; flowers large, often very large, nocturnal, the perianth tube elongate, often somewhat curved; scales of the ovary and perianth tube small, usually with long felt, hairs, and bristles in their axils; upper scales and outer perianth segments similar, narrow, the inner perianth segments broad, white, usually entire; stamens numerous, in 2 separated clusters, one cluster forming a circle at the top of the tube, the other scattered over the long slender throat, the filaments much elongate, weak; style elongate, thick, often hollow, the stigma lobes numerous, slender, entire; fruit large, reddish, covered with clusters of deciduous spines, bristles, and hairs.

A small "genus" of perhaps a half dozen not very distinct species (Britton & Rose enumerate 16 and Backeberg lists 24!). It is questionable that the two species enumerated below are distinct.

Hairs of the flower areoles ferruginous or fulvous . . . . . *S. grandiflorus*.  
Hairs of the flower areoles bright white. . . . . *S. hondurensis*.

**Selenicereus grandiflorus** (L.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 430. 1909; Cactaceae 2: 197, t. 33. 1920. *Cactus grandiflorus* L. Sp. Pl. 467. 1753. *Cereus grandiflorus* Mill. Gard. Dict. ed. 8, no. 11. 1768.

Thought to be grown as an ornamental and perhaps escaped in the country; native in the West Indies.

Plants usually terrestrial but sometimes epiphytic, the stems often much elongate and scandent, about 2.5 cm. in diameter, green or bluish green; ribs usually 7-8, sometimes fewer, low, separated by broad rounded intervals; spines acicular, 1 cm. long or less, brown or yellowish brown, in age grayish, intermixed with numerous whitish hairs; flower buds densely covered with brown or fulvous hairs; flowers about 18 cm. long, the outer perianth segments narrow, salmon-colored, the inner segments white, acute, entire; style often longer than the inner perianth segments; fruit ovoid or subglobose, whitish or pink, juicy, about 8 cm. long.

This is the plant most often known in cultivation under the name "night-blooming Cereus." It long has been a favorite cactus for cultivation in the United States. In the tropics it often grows luxuriantly, covering walls and small trees.

**Selenicereus hondurensis** (Schum.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 430. 1909; Cactaceae 2: 199, f. 275. 1920. *Cereus hondurensis* Schum. in Weingart, Monatsschr. Kakteenk. 14: 147. 1904. *Pitajaya*.

On trees or rocks, near sea level, Izabal. Honduras.

Stems scandent or clambering, 1.5 cm. in diameter, green; ribs 7-10, low; areoles 6-10 mm. apart; spines rather short, 5-7 mm. long, stout, usually surrounded by much longer, white hairs or bristles, these most conspicuous on young branches; flowers 20 cm. long or larger; outermost perianth segments linear, brownish, acuminate, yellow, the inner segments pure white, 10 cm. long, 1-1.5 cm. broad; scales of the ovary and perianth tube linear, bearing numerous long bristly hairs in the axils.

There are in our collections several specimens and photographs of *Selenicereus hondurensis*. We are not sure how these may be distinguished from *S. grandiflorus*, to which probably most of the species of *Selenicereus* might be reduced.

### WERCKLEOCEREUS Britton & Rose

Plants epiphytic, scandent, the stems triangulate, emitting numerous aerial roots; areoles bearing short bristles or very weak spines and a tuft of felt; flowers short-funnelform, the tube rather broad; ovary and perianth tube bearing many areoles, each with several almost black, acicular spines and a tuft of short black felt, subtended by minute scales; outer perianth segments lanceolate, subacute, narrow, the inner segments broader; stamens numerous; style about equaling the longer stamens, the stigma lobes several, linear; fruit globose, its areoles spiny.

Two species are recorded for the genus, the other from Costa Rica. The genus is dedicated to Carlos Wercklé (see Standley: *Carlos Wercklé*, in *Science* 63: 221-223. 1926), who lived for many years in Costa Rica, devoting the greater part of his life to the study of the flora of that country.

**Werckleocereus glaber** (Eichlam) Britt. & Rose, *Addisonia* 2: 13, t. 47. 1917; *Cactaceae* 2: 216, t. 39. 1920. *Cereus glaber* Eichlam, *Monatsschr. Kakteenk.* 20: 150. 1910 (described from cultivated plants obtained from the Pacific coast of Guatemala); Sacatepéquez.

Stems slender, triangulate, about 2 cm. thick, pale green and slightly glaucous, scandent by aerial roots; ribs somewhat nodose, the areoles borne on the upper part of the elevation, small, 3-4 cm. apart; spines 2-4 at each areole, 1-3 mm. long, acicular but with enlarged bases; flowers 10 cm. long or more, the ovary and perianth tube bearing clusters of yellow or brown, acicular spines; inner perianth segments white, oblanceolate, acute, somewhat serrate; style pale yellow, the stigma lobes white.

### WILMATTEA Britton & Rose

Plants usually epiphytic, scandent, very slender, the stems emitting aerial roots, armed with few very small spines, 3-angulate; flowers small for the group, generally solitary at the areoles, nocturnal, with a narrow limb and a very short

tube; ovary covered with ovate imbricate reddish scales, each subtending a small areole filled with felt and sometimes 1 or more bristles; filaments and style short.

The genus consists of a single species named for Mrs. T. D. A. Cockerell (Wilmatte P. Cockerell), who made a collection of plants in Guatemala.

**Wilmattea minutiflora** Britt. & Rose, *Cactaceae* 2: 195, t. 32, f. 272. 1920. *Hylocereus minutiflorus* Britt. & Rose, *Contr. U. S. Nat. Herb.* 16: 240, t. 69. 1913. *Cereus minutiflorus* Vaupel, *Monatsschr. Kakteenk.* 23: 86. 1913.

At or little above sea level; Izabal (type collected near Lake Izabal, *R. H. Peters*). British Honduras; Atlantic coast of Honduras. Figure 37.

Plants slender, as much as 9 m. long, the stems 2.5 cm. or usually much less in diameter, deep green, the angles acute, the areoles 2-4 cm. apart; spines usually 1-3, minute, brownish; flowers about 5 cm. long, very fragrant, the tube 1 cm. long or less; outer perianth segments linear, red on the costa and apex, 3-4 cm. long, the inner segments very narrow, white, acute; stamens white, 1 cm. long, inserted at the base of the inner perianth segments; scales of the ovary oblong to ovate, purple or greenish at the base; style white, 2 cm. long, the lobes white.

The specific name is a most inappropriate one, since a flower two inches long can scarcely be considered minute.

### ZYGOCACTUS Schumann. Christmas cactus

Plants epiphytic, small, the stems dichotomously much-branched, compressed, divided into short joints; flowers terminal, irregular; ovary terete, smooth, bearing minute scales above; perianth tube abruptly bent just above the ovary; stamens slender, white, arranged in 2 groups; style slender, purple, as long as the stamens, the stigma lobes linear, purple, erect, adherent to one another; fruit purple, turgid, terete, pulpy, the skin thin; seeds dark brown or almost black, lustrous.

The genus consists of a single species, and perhaps is not really distinct from *Epiphyllum*.

**Zygocactus truncatus** (Haw.) Schum. in *Mart. Fl. Bras.* 4, pt. 2: 224. 1890. *Epiphyllum truncatum* Haworth, *Suppl. Pl. Succ.* 85. 1819.

Native of the mountains of Rio de Janeiro, Brazil, but cultivated as a pot plant in tropical and temperate regions; common as a house plant in Guatemala.

Plants lustrous dark green, the joints about 3 cm. long, sharply serrate, with 2 conspicuous teeth at the truncate apex; terminal areole filled with brown wool





FIG. 37. *Wilmattea minutiflora*. 1, Stems with buds and flower;  $\times 1$ . 2, Flower;  $\times 1$ . 3, Flower, longitudinal section;  $\times 1$ . 4, Floral bract and areole;  $\times 4$ . 5, Nectaries and stamen bases;  $\times 3$ . 6, Stigma;  $\times 2$ . 7, Ovules and funicles; greatly enlarged. Courtesy of Myron Kinnach. Drawn by Mrs. M. Blos.

and bristles; flowers 6-7 cm. long, the tube 2 cm. long; inner perianth segments bright red or white, oblong, obtuse to acute, reflexed; fruit obovoid, 1.5-2 cm. long.

This is one of the best of all cacti for house culture since it grows luxuriantly and in the United States generally blooms freely about Christmas; hence the common name in use for it.

## MYRTIFLORAE

The Myrtiflorae is a large order divided by Engler and Diels (*Syllabus der Pflanzenfamilien*, ed. 11, 1936) into 23 families. Ten of these families occur in Guatemala, two of them introduced and eight with native species. The Myrtaceae and the Melastomaceae are the two largest families in Guatemala as they are throughout most of the rest of the American tropics. The representatives of the families of this order in Guatemala are mostly woody. There are many fine large forest trees in the order; many of the deep green seashore forests, the mangroves, belong here. Plants of economic importance are found in several of these families: fruits in the Myrtaceae and Punicaceae; exotic nuts in the Lecythidaceae; tans and dyes of considerable importance in the Rhizophoraceae; timbers of some importance in the Combretaceae, and woods used locally for construction or fuel in most of the families. Ornamentals are also found in most of these families.

Leaves usually opposite but sometimes alternate, simple. There is a tendency from perigyny to epigyny in the order. The flowers are cyclic and the development of a hypanthium (calyx tube) upon which the stamens and petals usually are inserted, is diagnostic; the hypanthium sometimes is completely adnate to the ovary.

## THYMELAEACEAE

Trees or shrubs, rarely herbs, the bark often separating into meshed fibers; leaves opposite or alternate, entire, mostly penninerved; stipules none; flowers perfect or by abortion polygamous or unisexual, regular, capitate, umbellate, short-racemose, or rarely solitary, the inflorescences pedunculate or sessile, terminal or axillary; perianth inferior, usually with a slender tube, the limb 4-5-lobate, the segments imbricate, spreading in anthesis, equal or the 2 inner ones slightly smaller; scales as many as the perianth lobes or twice as many, affixed within the tube; stamens as many or twice as many as the perianth segments, affixed at the middle of the tube or higher, the filaments filiform, short; anthers erect or dorsifixed near the base, 2-celled, the cells parallel, dehiscent by longitudinal slits; hypogynous disk annular, cupular, composed of 4-5 scales, or none; ovary sessile or short-stipitate,

entire, 1-celled or 2-celled; style short or elongate, usually eccentric in the 1-celled ovary, central in the 2-celled ovary, the stigma terminal, capitate or subdiscoid; ovules 1 in each cell, laterally attached near the apex of the cell, anatropous, pendulous; fruit indehiscent, nut-like, drupaceous, or baccate; seed pendulous or laterally affixed, usually with crustaceous testa; endosperm copious and carnos, or sometimes scant or none; embryo straight, the cotyledons carnos, the radicle short, superior.

About 40 genera, mostly in Australia and South Africa, but several occur in South America, and one in the United States and Canada. No other genus is found in Mexico or Central America, but *Schoenobiblus* occurs in Panama.

### DAPHNOPSIS Martius & Zuccarini

*Reference:* Lorin I. Nevling, Jr., A revision of the genus *Daphnopsis*, Ann. Mo. Bot. Gard. 46: 257-363, illus. 1960.

Dioecious shrubs or small trees; leaves alternate, exstipulate, membranaceous or subcoriaceous; inflorescences axillary or terminal, racemose, umbellate, sometimes fasciculate or rarely the flowers solitary; flowers tetramerous, perigynous, unisexual; calyx usually urceolate or campanulate, the lobes equal or not, imbricate; petals 8, 4 or none, often connate into a papilliform or squamiform ring in the throat of the calyx tube; stamens in staminate flowers 8, inserted in two series on the calyx tube, the upper series opposite the calyx lobes, the lower alternate with them, sessile, subsessile or with short filaments, introrse; pistillate flowers usually smaller than the staminate, with 4 or 8 or no staminodia, pistil 1, superior and borne on a gynophore, with a single pendulous ovule; style terminal; fruit a small drupe.

Species 46, according to Nevling. Others are known from Mexico and Central America. The genus is limited to tropical America.

Two sides of leaves very unlike in color; sericeous-pubescent below.

*D. monocephala.*

Two sides of leaves essentially concolorous; glabrous below or if pubescent then the two sides concolorous.

Secondary peduncle deciduous with the flowers, the peduncle terminated with a ball-like torus. . . . . *D. americana.*

Secondary peduncles persistent on the torus of the primary peduncle.

Adult leaves pubescent beneath. . . . . *D. malacophylla.*

Adult leaves glabrous or nearly so.

Leaf blades small, 3-5.5 (-11) cm. long, somewhat narrowed to an obtuse tip. . . . . *D. ficina.*

Leaf blades large, 7-25 cm. long, very acute or acuminate.

Leaf blades oblong-elliptic, mostly 8-11 cm. long; umbellate inflorescences mostly 5-7-flowered. . . . . *D. Tuerckheimiana.*

Leaf blades mostly 17-25 cm. long, narrowly oblong-oblancheolate; umbellate inflorescences usually more than 7-flowered. . . . . *D. radiata.*

***Daphnopsis americana*** (Mill.) J. R. Johnston, Contr. Gray Herb. 34: 242. 1909. *Laurus americana* Mill. Gard. Dict. ed. 8, Laurus 10. 1768. *Daphne Bonplandiana* Kunth, Syn. Pl. Aequin. 1: 447. 1922. *Daphnopsis Lindenii* Meissn. in DC. Prodr. 14: 523. 1857. *D. Bonplandiana* Standl. Contr. U. S. Nat. Herb. 23: 1013. 1924. *D. americana* ssp. *guatemalensis* Nevling, Ann. Mo. Bot. Gard. 46: 312. 1960. *Coralillo*; *coralillo blanco*; *camamán*; *capulincito*; *chaca-chác*.

Moist, wet or dry thickets or scrub forest; Zacapa; Jutiapa; Santa Rosa; Guatemala; Escuintla; Huehuetenango. Mexico.

Shrubs or trees to 10 m., the branches reddish, glabrous or nearly so; leaves elliptic, lanceolate or oblanceolate, acute or acuminate, coriaceous, shining, glabrous, 5–15 cm. long, 1–4 cm. broad, cuneate to the base into a short petiole 1 cm. or less long, nerves inconspicuous, 15–20 pairs, veins many, prominulous; inflorescence umbellate, the flowers sessile on the torus or nearly so and dehiscent from it, pubescent when young; calyx of pistillate flowers obconic, about 2 mm. long, those of staminate flowers longer; fruit about 1 cm. long.

There is some question as to the proper name for the tree here described. Nevling's *D. americana* ssp. *americana* contains at least two "units": one has broad obovate leaves which would seem to accord with Miller's description; the other is difficult to distinguish from Nevling's subspecies *guatemalensis*, as also from *D. Bonplandiana* and *D. Lindenii*. We have seen no authentic material of *Laurus americana* Mill. and apparently Nevling had not.

***Daphnopsis ficina*** Standl. & Steyerl. Field Mus. Bot. 22: 254. 1940 (type from Dept. Guatemala, *García Salas* 1442). *Chilillo*.

Wet forest or cloud forest; Jalapa; Zacapa; Baja Verapaz; Guatemala; Quiché. Mexico (Chiapas).

Shrubs or small trees to 5 m. tall, the young branches reddish, sparsely pubescent or glabrous; leaves small, elliptic to oblong-elliptic, acute or acuminate, rarely obtuse, contracted or decurrent into a short petiole at the base, blades 3–11 cm. long, 1–4 cm. broad, glabrous above, sparsely pubescent or glabrous below, nerves and veins prominent on both sides; inflorescences terminal or lateral, sericeous when young, umbelliform; calyx tube of pistillate flowers urceolate, 1.5–3 mm. long, that of staminate flowers narrower, sericeous; fruit subglobose, nearly glabrous, about 1 cm. long.

Nevling maintains this species in his monograph, yet it looks suspiciously like *D. Tuerckheimiana* Donn.-Sm.

***Daphnopsis malacophylla*** Standl. & Steyerl. Field Mus. Bot. 23: 68. 1944 (type from Huehuetenango, *Steyermark* 49104).

Wet, cool cloud forest, 1,500–3,000 meters; endemic; Huehuetenango.

A shrub or tree 4.5–6 meters high, the branches ferruginous, the young ones densely hirtellous or short-hirsute with fulvous, spreading or ascending hairs; leaves chartaceous, on petioles 4–8 mm. long, oblong-elliptic or oblong-obovate, 7–16 cm. long, 2.5–6.5 cm. broad, acute or acuminate with an obtuse tip, acute at the base, sparsely pilose above with slender, spreading or subappressed hairs, in age glabrate, densely and softly pilose beneath with spreading or subappressed hairs, the lateral nerves about 7 pairs, irregular, divergent at a rather wide angle, the veins prominulous, laxly reticulate; peduncles terminal and extra-axillary, 1.5–4.5 cm. long, densely hirtellous, the umbels dense, many-flowered, the short pedicels 3 mm. long or less; staminate perianth 6 mm. long, appressed-hirtellous, the lobes scarcely 1 mm. long; pistillate perianth 5 mm. long, strigose, the lobes rounded-ovate, spreading; style short-exserted; fruit ovoid, 7 mm. long, sparsely strigose, acute.

***Daphnopsis monocephala*** Donn.-Sm. Bot. Gaz. 47: 261. 1909 (type from El Progreso, *Kellerman* 5714). *D. retifera* Standl. & Steyerl. Field Mus. Bot. 22: 254. 1940 (type from Jutiapa, *Steyerl* 31758).

Moist or dry, brushy slopes or plains, 650–1,100 meters; endemic; El Progreso; Chiquimula; Jutiapa; Guatemala.

A shrub 1.5–3 meters high, the branches stout, densely covered with long and short, subappressed or spreading, brownish or fulvous hairs; leaves short-petiolate, the petioles stout, 5–8 cm. long, often marginate to the base, the two sides distinctly bicolored, the blades subcoriaceous, elliptic-oblong to lance-oblong or oblanceolate-oblong, 7–17 cm. long, 2–6.5 cm. broad, very obtuse or rounded at the apex, usually somewhat narrowed toward the apex, cuneate-attenuate to the base, glabrous and lustrous above, pale beneath, when young densely sericeous with very long hairs, in age densely and softly short-pilose with chiefly spreading hairs, the lateral nerves about 8 pairs, very oblique, the veins prominent, closely and conspicuously reticulate; peduncles subterminal, solitary, simple, 2–3 cm. long, the flowers all sessile or nearly so; staminate perianth with a tube 4.5 mm. long, the lobes 1.5 mm. long.

This is doubtless the best marked of all the North American species of the genus.

***Daphnopsis radiata*** Donn.-Sm. Bot. Gaz. 14: 30. 1889 (type from Alta Verapaz, *Tuerckheim* 1163). *D. Selerorum* Gilg, Verh. Bot. Ver. Brandenb. 48: 153. 1917 (type from Guatemala, *Seler* 2866).

Damp or wet, mixed forests, 900–2,000 meters, endemic; Alta Verapaz; Quezaltenango; Huehuetenango. Figure 38.

Diocious shrubs or small trees to 8 m., the young branches sparsely pubescent or usually glabrous; leaves elliptic, elliptic-lanceolate or elliptic-oblanceolate,

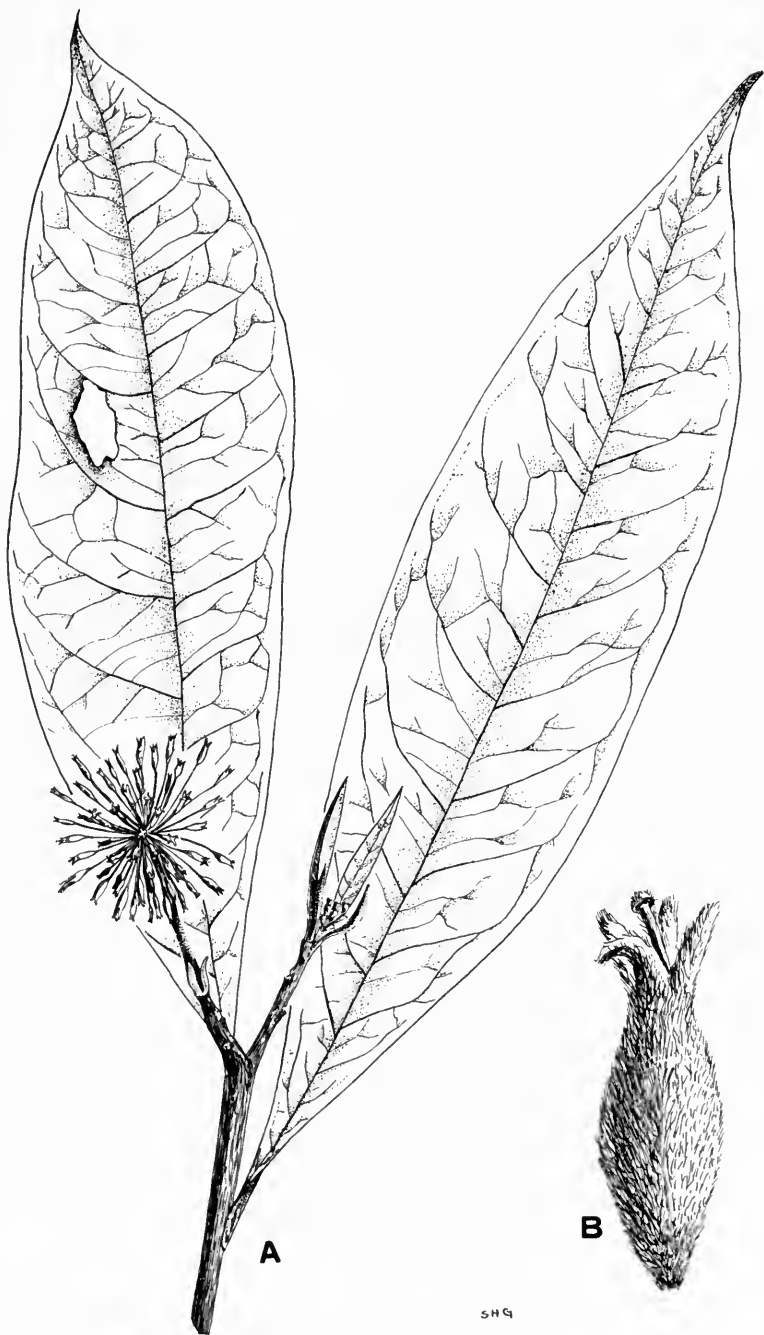


FIG. 38. *Daphnopsis radiata*. A, Habit;  $\times \frac{1}{2}$ . B, Pistillate flower;  $\times 5$ .

acuminate, cuneate to the base into a short petiole, obscurely pulvinate or usually entirely glabrous, 7-25 cm. long and 2-10 cm. broad; inflorescence terminal or usually so, umbellate, pubescent to somewhat canescent; peduncle of pistillate inflorescence to 6 cm. long, or usually shorter, of the staminate about the same, secondary peduncles as much as 1 cm. long, flower dehiscent at apex of secondary peduncle; calyx tube of pistillate flowers urceolate, 4-4.5 mm. long, sparsely sericeous outside, the tube of staminate flowers narrow, about 6 mm. long; ovary ovoid, glabrous or slightly pubescent, the style about 2.5 mm. long, as long as or exceeding the calyx; fruit ovoid, 7-9 mm. long.

Nevling has maintained *D. radiata* and *D. Selerorum* as distinct species but we find no difference in them. *D. malacophylla*, placed by Nevling as a synonym of *D. Selerorum*, seems to be as distinct as most species in this difficult genus.

**Daphnopsis Tuerckheimiana** Donn.-Sm. Bot. Gaz. 16: 13. 1891 (type from Pansamá, *Tuerckheim* 1039).

Wet mixed forests, 1,200-2,500 meters, endemic; Alta Verapaz; Zacapa.

A shrub of 1.5 meters or a small tree, the branches sparsely sericeous at first; leaves short-petiolate, subcoriaceous, glabrous or when young sparsely sericeous beneath, mostly oblong-elliptic and 8-11 cm. long, 2.5-4 cm. broad, acute or acuminate, acute at the base; umbellate inflorescences lateral and terminal, mostly 5-7-flowered, the staminate secondary peduncles short, the pistillate 7 mm. long or less, sericeous; staminate perianth 7-8 mm. long, the lobes short; fruit black, with thin flesh, glabrous, ovoid, 7 mm. long, short-rostrate at the obtuse apex.

*Daphnopsis flavida* Lundell (Phytologia 2: 3. 1941), described from *Matuda* 4159, which was collected on Mount Ovando in Mexico near the Guatemalan border, probably belongs here as a synonymous name.

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## ELAEAGNACEAE

The family Elaeagnaceae is represented by a few species in North America, but none are native in tropical America. *Elaeagnus philippinensis* Perr., native of the Philippine Islands, has been planted at Bananera, Izabal and perhaps elsewhere. It is a shrub or small tree with alternate short-petiolate entire leaves which are green and glabrous on the upper surface, covered beneath with a dense coat of whitish and brown, closely appressed scales.

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## LYTHRACEAE. Loosestrife Family

*Reference:* E. Koehne, Lythraceae, Pflanzenreich IV. 216. 1903.

Annual or perennial herbs, shrubs, or trees; leaves generally opposite, rarely verticillate or scattered, entire; stipules none, or 2-10 or more and subulate, rarely 2 and inserted with the leaves; flowers actinomorphic or rarely zygomorphic, usually perfect, 3-16-parted, mostly 4-6-parted, axillary and solitary or cymose, rarely paniculate, in *Cuphea* mostly extra-axillary or interpetiolar; pedicels mostly bibracteolate; calyx broad or tubular, the lobes in bud usually valvate, appendages often alternate with the lobes; petals inserted in the throat of the calyx between the lobes, regular or zygomorphic, often crumpled in bud, sometimes fugacious, rarely none; stamens inserted at different heights on the calyx tube (hypanthium), as many as the calyx lobes, or fewer, or more numerous; anthers generally dorsifixed; ovary free, sometimes stipitate, completely or incompletely 2-6-celled, a hypogynous disk sometimes present; style simple or none; stigma small, capitate or punctiform, rarely 2-lobate; ovules numerous or sometimes only 2, anatropous, ascending; fruit capsular, dehiscent or indehiscent, dry; embryo straight, without endosperm, the cotyledons flat or rarely convolute, often auriculate-cordate.

About 22 genera and 450 species or more, most numerous in tropical regions. Other genera represented in Central America are *Heimia* and *Grislea*, the former of which should be found in Guatemala.

Calyx tubular, slightly curved or else calcarate or gibbous at the base; herbs or small shrubs; flowers usually zygomorphic. . . . . *Cuphea*.

Calyx not tubular or, if so, neither calcarate nor gibbous at the base.

Leaves conspicuously dotted with small black glands; shrubs. . . . . *Adenaria*.

Leaves not black-dotted.

Plants herbaceous, rarely somewhat suffrutescent at the base.

Calyx tubular. . . . . *Lythrum*.

Calyx campanulate or hemispheric.

Capsule septicidally dehiscent; leaves acute at the base. . . . . *Rotala*.

Capsule irregularly ruptured; leaves auriculate at the base. . . . . *Ammannia*.

Plants woody throughout, trees or large shrubs.

Flowers 12-16-parted; calyx about 3 cm. long; native trees. . . . . *Lafoensia*.

Flowers 4-7-parted; calyx much smaller; cultivated trees or large shrubs.

Stamens 8; leaves opposite. . . . . *Lawsonia*.

Stamens 15-many; leaves alternate. . . . . *Lagerstroemia*.

## ADENARIA HBK.

Shrubs or small trees, black-glandular throughout, the young branches 4-angulate; flowers mostly 4-parted, small, imperfectly unisexual, the inflorescences axillary, umbelliform, the outer pedicels bracteolate at the base; calyx turbinate, in fruit semiglobose, not nerved, villous within above the stamens, the lobes equaling or shorter than the tube, without appendages; petals white or pale yellowish; stamens 7-12, equal or unequal; ovary turbinate-globose, stipitate or rarely sessile, generally 2-celled, usually hirtellous at the apex; style filiform, the stigma large, 2-lobate; fruit indehiscent, 2-celled, subcoriaceous; seeds cuneate-obovoid.

The genus consists of a single species.



**Adenaria floribunda** HBK. Nov. Gen. & Sp. 6: 188, *t.* 549. 1823.

Dry or moist thickets, 600 meters or less; Santa Rosa (near El Molino); Retalhuleu (between Nueva Linda and Champerico). West Indies; southern Mexico; Honduras; Nicaragua; Costa Rica; Panama; widely distributed in South America.

A shrub or small tree, 4.5 meters high or less, often densely branched, the branches slender, puberulent; leaves short-petiolate, membranaceous, oblong-lanceolate or ovate-oblong, 5-12 cm. long, long-acuminate to acute, rounded to subacute at the base, green above, glabrous, paler beneath, puberulent on the nerves, densely black-punctate; flowers white, densely puberulent, densely black-punctate; calyx 3 mm. long; petals longer than the calyx; stamens long-exserted; capsule 4 mm. in diameter.

In some parts of Central America, particularly in the Canal Zone where it is known as "*fruta de pavo*," this is a common shrub in second growth, but in Guatemala it seems to be very rare.

### AMMANNIA L.

Annuals, glabrous or nearly so, the stems more or less 4-angulate; leaves opposite, narrow, sessile; flowers very small, axillary or cymose; calyx campanulate to globose or ovoid, 4-angulate, 4-dentate, often with small appendages in the sinuses; petals 4, deciduous; stamens 4-8, inserted on the calyx tube, the filaments short or elongate; ovary enclosed in the calyx tube, subglobose, 2-4-celled, rupturing irregularly.

Species about 20, mostly in tropical regions. Only the following are known in Central America. *Ammannia latifolia* L. is known in Panama.

Flowers pedicellate, in small axillary cymes . . . . . *A. auriculata*.  
Flowers sessile or nearly so, 2-3 together in the leaf axils . . . . . *A. coccinea*.

**Ammannia auriculata** Willd. Hort. Berol. 1: 7, *t.* 7. 1803.

Muddy margin of a small waterhole, 200 meters; Zacapa. Central and southern United States; Mexico; El Salvador; Honduras; Cuba; South America; Asia; Africa.

Plants erect, 5-25 cm. high, often widely branched; leaves sessile, linear-lanceolate or oblong, acute or subacute, auriculate at the base, 1-3.5 cm. long; flowers in small axillary short-pedunculate few-flowered cymes, the pedicels 1-3 cm. long; calyx green, 2 mm. long; petals small, purple; stamens exserted; capsule usually enclosed in the persistent calyx.

**Ammannia coccinea** Rottb. Pl. Hort. Havn. Descr. 7. 1773.

Wet open soil at or little above sea level; Petén; British Honduras. Eastern and central United States; Mexico; Honduras; Pan-

ama; West Indies; South America; also on several island groups in Oceania. Possibly adventive in Iran.

Plants erect, glabrous, 15-40 cm. tall, often much branched below, somewhat succulent; leaves linear-lanceolate, 2.5-7 cm. long, 2-6 mm. broad, acute or acuminate, dilated and auriculate-clasping at the base; flowers 1-5 in each leaf axil, sessile or nearly so; calyx 2 mm. long; petals small, purple, fugacious; style elongate and slender.

### CUPHEA Adanson

Annual or perennial herbs, rarely shrubs; leaves opposite or rarely verticillate; flowers zygomorphic, 6-parted, small or large, the flowers racemose, the racemes often leafy, the flowers often appearing to be all axillary, alternate or opposite, rarely verticillate; bractlets 2 or none; calyx tubular, often calcarate at the base; petals 6, rarely 2 or none, very rarely 4; stamens 11, rarely 9 or 6; ovary sessile, usually with a basal, dorsal or rarely cupuliform disk, or the disk sometimes absent; ovules numerous or few, often 3, very rarely only 2; capsule finally dehiscent and the calyx cleft by the emergent reflexed placentae; seeds lentiform, usually narrowly winged.

Species about 200, all American and nearly all tropical. A very few additional ones are found in southern Central America. The genus is better represented in Guatemala than in any other part of Central America, and Mexico has 75 species or more. There is one other species in Guatemala but the material is not adequate for description.

Flowers small, the calyx less than 1 cm. long.

Leaves linear or oblanceolate; plants stiffly erect, suffrutescent, almost always growing on rocks in the edges of streams.

Leaves linear; pedicels much shorter than the subtending leaves.

*C. hyssopifolia.*

Leaves mostly oblanceolate.

Pedicels almost as long as or longer than the adjacent leaves; stems and leaves pubescent to glabrous.....*C. utriculosa.*

Pedicels much shorter than the adjacent leaves; stems and leaves hispidulous.....*C. calophylla.*

Leaves broader than oblanceolate, usually much broader, never linear.

Leaves long petiolate; plants herbaceous, annual.....*C. secundiflora.*

Leaves sessile or on very short petioles; annual or perennial, sometimes ligneous.

Calyx glabrous, gland-dotted.....*C. mimuloides.*

Calyx pubescent, usually hispidulous, at least on the nerves.

Leaf blades acute at the base.

Plants herbaceous or essentially so, sometimes suffrutescent at the base.....*C. carthagenensis.*

Plants ligneous throughout.

Calyx sparsely hispidulous, otherwise glabrous; leaves glabrous except on the margins.....*C. flavisetula.*

- Calyx glandular-hispidulous and puberulent; leaves pubescent on both surfaces. . . . . *C. decandra*.
- Leaf blades obtuse or rounded at the base.
- Leaves glabrous on the upper surface; plants suffrutescent. . . . . *C. calophylla*.
- Leaves hispidulous on the upper surface; slender annuals.
- Stamens about equaling the calyx tube. . . . . *C. Wrightii*.
- Stamens much shorter than the calyx tube.
- Leaves sessile or nearly so. . . . . *C. micrantha*.
- Leaves petiolate. . . . . *C. Seleri*.
- Flowers large, the calyx more than 1 cm. long, often much longer.
- Petals purple or violaceous, sometimes almost black, sometimes very dark red but drying purple.
- Stems usually hirsute with long spreading hairs. . . . . *C. aequipetala*.
- Stems puberulent or hirtellous with short hairs.
- Interior wings of the calyx retrorse-hirtellous; petals 2. . . . . *C. cyanea*.
- Interior wings of the calyx glabrous; petals usually 6. . . . . *C. pinetorum*.
- Petals scarlet or bright red, retaining this color when dried, rarely none.
- Flowers all or partly in terminal bracteate racemes. . . . . *C. infundibulum*.
- Flowers never racemose, borne in the axils or near the axils of large leaves.
- Calyx bright red; petals none or minute. . . . . *C. Heydei*.
- Calyx green throughout or nearly so; petals usually present and conspicuous.
- Appendages of the calyx conspicuously aristate. . . . . *C. aristata*.
- Appendages of the calyx not aristate.
- Leaves pilose on the upper surface with spreading hairs. . . . . *C. Nelsonii*.
- Leaves scabrous or glabrate on the upper surface.
- Calyx and stems with a dense covering of uniform short spreading viscid hairs. . . . . *C. sanguinea*.
- Calyx thinly hispid with long spreading hairs, often also scabrous or strigose, sometimes with very long hairs near the base only; stems scabrous or thinly hispid.
- Pedicels axillary or arising between the internodes; leaf blades mostly obtuse or rounded at the base. . . . . *C. axilliflora*.
- Pedicels inserted between the petioles (not in axils); leaf blades mostly long attenuate at the base. . . . . *C. appendiculata*.

**Cuphea aequipetala** Cav. Icon. Pl. 4: 57, t. 382, f. 2. 1797.

*C. aequipetala* var. *laevicaulis* Koehne, Bot. Jahrb. 2: 411. 1882. *C. aequipetala* var. *hispida* Koehne, l.c. *Granadita*; *coralillo*; *clarincillo*; *pegajosa* (fide Aguilar).

Dry to wet soil, fields, thickets, or pine-oak forest, sometimes in hedges or cultivated ground, 1,500–2,500 meters; Alta Verapaz; Baja Verapaz; Jalapa; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Quiché; Huehuetenango. Mexico; Honduras.

Plants perennial, generally from a hard woody root, usually much branched, stems a meter long or less, generally prostrate or procumbent, sometimes sprawling over small shrubs, usually densely hispid with long spreading purplish hairs, sometimes glabrate; leaves sessile or nearly so, ovate or lance-ovate, mostly 1–3 cm. long and 5–15 mm. broad, acute to obtuse at the apex, rounded or acute at the base, glabrate or scabrous above, sometimes sparsely hispid, hispid or glabrous beneath with spreading hairs; flowers axillary, on pedicels 1–5 mm. long, the pedicels bracteolate at the apex; calyx 13–23 mm. long, purple or purplish, sparsely hispid; appendages small and inconspicuous; petals deep purple or rose-purple, half as long as the calyx or longer; stamens exserted.

**Cuphea appendiculata** Benth. Pl. Hartweg. 61. 1839.

Moist thickets or cliffs, sometimes in pine forest, 1,000–2,300 meters; Chiquimula; Sololá; Quezaltenango. Southern Mexico.

A shrub 1.5 meters high or less, usually sparsely branched, the branches rather slender, when young thinly hispid with spreading yellowish hairs, soon glabrate, sometimes also strigillose; leaves short-petiolate, lanceolate or ovate-lanceolate, 5–14 cm. long, 1.5–4.5 cm. broad, narrowly long-acuminate, usually long-attenuate to the base, scabrous above and sometimes with a few spreading hairs, hispidulous beneath on the veins, elsewhere scaberulous or glabrous; flowers subtended by large leaves, the pedicels 2–4 mm. long, bracteolate above the middle; calyx 27–33 mm. long, green, strigillose or scabrous and usually also hispid with pale hairs; appendages linear; petals bright red, 7–9 mm. long, obovate; disk almost semicupular; ovules 8.

**Cuphea aristata** Hemsl. Diagn. Pl. Mex. 51. 1880.

Moist or wet, pine or mixed forest, 800–1,500 meters; Petén (Camp 35, British Honduras boundary); Zacapa (Sierra de las Minas); type from the Motagua Valley, *Salvin & Godman*, probably from Sierra de las Minas. British Honduras.

A slender shrub a meter high or less, the stems puberulent; leaves on very short petioles, oblong-lanceolate, 3–4.5 cm. long, attenuate-acuminate, rounded to attenuate at the base, rough on the upper surface and slightly scaberulous, paler beneath and glabrous or sparsely hispidulous; pedicels interpetiolar, solitary, 3–10 mm. long, bracteolate at the apex; calyx 20–30 mm. long, greenish, very sparsely setulose and also scaberulous; appendages conspicuously 1–2-aristate; petals scarlet, the 2 dorsal ones 15–17 mm. long, the 4 ventral ones 4–5 mm. long; stamens exserted.

This has been reported from British Honduras as *C. axilliflora* Koehne.

**Cuphea axilliflora** Koehne, Pflanzenreich IV. 216: 170. 1903.  
*C. appendiculata* var. *axilliflora* Koehne, Bot. Jahrb. 2: 412. 1882.

Mostly in wet pine forest, 1,250–1,450 meters; Huehuetenango; Alta Verapaz (type from Cobán, *Tuerckheim* 172); Quiché. British Honduras.

Plants herbaceous or frutescent, 1–2 meters high, erect or often subscandent or sprawling over shrubs, the stems strigose or sometimes hispidulous with yellowish hairs; leaves short-petiolate, ovate or oblong-ovate, 5–10 cm. long, 2.5–5 cm. broad, acuminate, usually rounded at the base but sometimes acute, scabrous above and very rough to the touch, scabrous beneath and sometimes hispidulous on the veins; floral leaves little smaller than the others, the pedicels 4–8 mm. long, bracteolate at the apex; calyx 28–33 mm. long, greenish, strigose or scaberulous and sometimes also hirsute with eglandular yellowish hairs; appendages lanceolate or oblong; petals flame-red, about 10 mm. long, broadly obovate, the 4 ventral ones sometimes rudimentary and subulate; disk very thick, subglobose, deflexed; stamens exserted; ovules 11.

**Cuphea calophylla** Cham. & Schlecht. *Linnaea* 2: 361. 1827. *C. microstyla* Koehne in Mart. Fl. Bras. 13, pt. 2: 224. 1877 (type from Guatemala, Skinner). *C. calophylla* var. *orthodisca* Koehne, Bot. Jahrb. 2: 138. 1881. *C. calophylla* var. *microstyla* Koehne, l.c. 139.

Reported by Koehne as collected in Guatemala by Bernoulli and by Skinner, the localities not indicated. Southern Mexico; British Honduras to Panama; southward to Brazil.

Plants perennial, usually erect and rigid, commonly much branched and 35 cm. high or less, often suffrutescent below, the older stems ferruginous, the young ones puberulent and usually also hispidulous; leaves numerous, sessile or nearly so, ovate-oblong to lanceolate, 1–5 cm. long, acute, usually rounded or very obtuse at the base, thinly hispidulous or glabrate above, hispidulous beneath and sometimes strigose or scabrous; flowers mostly at the ends of the branches, the floral leaves generally much reduced, the pedicels 2–6 mm. long, bracteolate at the apex; calyx 6 mm. long, hispidulous, the teeth subequal; petals purple or violet; stamens included; ovules mostly 6–8.

Called “hog weed” and “hog bush” in British Honduras. The plant often invades cultivated ground, and because of the large roots and the tough hard stems, it is difficult to eradicate. It is rather strange that there are no Guatemalan specimens at hand of this weedy plant, which is common almost throughout the Atlantic lowlands of Central America. There can be no doubt that it does grow in Guatemala.

**Cuphea carthagenensis** (Jacq.) Macbride, Field Mus. Bot. 8: 124. 1930. *Lythrum carthagenense* Jacq. Stirp. Amer. Hist. 148. 1763. *C. balsamona* Cham. & Schlecht. *Linnaea* 2: 363. 1827. *Pica-mano* (fide Aguilar); *caqui mesbé* (Alta Verapaz); *chichibé* (Petén).

Mostly in moist or wet soil, meadows, thickets, open banks, sandbars along streams, often a weed around dwellings or in waste and cultivated ground, 1,800 meters or less; Petén; Alta Verapaz; Baja Verapaz; Izabal; El Progreso; Zacapa; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Chimaltenango; Quiché; Huehuetenango; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Mexico; British Honduras to El Salvador and Panama; West Indies; South America. Introduced in Hawaii.

Plants essentially annual but probably persisting for a longer time, commonly erect and 50 cm. high or less, rarely suffrutescent, often much branched, the stems puberulent and more or less glandular-pilose; leaves short-petiolate, obovate to ovate or lance-oblong, 2-5 cm. long, acute or obtuse, generally acute at the base, more or less scabrous on both surfaces and rough to the touch, often sparsely hispidulous, when young sometimes strigose; flowers small and inconspicuous, usually subtended by large leaves, the pedicels very short, bracteolate at the apex; calyx 4.5-6 mm. long, sparsely hispidulous or sometimes glabrous in age, pale green; petals small, pale purple; stamens 11, included; ovules 4-8.

This is a very common and variable weedy plant almost throughout Central America except at high elevations.

**Cuphea cyanea** DC. Prodr. 3: 85. 1828. *C. cyanea* var. *hirtella* Koehne, Bot. Jahrb. 2: 417. 1882. *Clarincillo*.

Moist or dry thickets or pine-oak forest, 1,900-3,700 meters; Jalapa; Chimaltenango; Sololá; Huehuetenango. Central and southern Mexico.

A slender shrub 1-1.5 meters high, the stems pubescent or hispidulous; leaves on petioles 1.5 cm. long or less, ovate or oblong-ovate, 2-8 cm. long, 1-5 cm. broad, acuminate or long-acuminate, usually rounded or subcordate at the base, scabrous on both surfaces and sometimes hispidulous; inflorescence often paniculate, the leaves all small and bract-like, the pedicels 10 mm. long or less, bracteolate near the apex; calyx 16-23 mm. long, red and yellow, viscid-hispidulous, the spur usually large and well developed; petals purple, spatulate or obovate; stamens short-exserted; ovules 5-6.

**Cuphea decandra** Ait. Hort. Kew. ed. 2. 3: 3, 151. 1811. *Lythrum ciliatum* Swartz, Prodr. Veg. Ind. Occ. 76. 1788. *C. ciliata* Koehne, Bot. Jahrb. 1: 454. 1881, not *C. ciliata* Ruiz & Pavón, 1794.

A species of the Greater Antilles and Colombia, represented in continental North America by the following variety:

**Cuphea decandra** var. **Purpusii** (Brandeg.) Bacigalupi, Contr. Gray Herb. 95: 9. 1931. *C. Purpusii* Brandeg. Univ. Calif. Publ. Bot. 4: 378. 1913.

At 270 meters; Alta Verapaz (Chamá, *Harry Johnson* 521). Southern Mexico.

A slender shrub 20–40 cm. high, woody throughout or nearly so, usually much branched, the branches densely glandular-hirtellous, brownish; leaves on very short petioles, obovate or oblong, 1.5–4 cm. long, acute or obtuse, acute at the base, pubescent on both surfaces, usually densely so; floral leaves much reduced and bract-like, the flowers in distinct racemes, the pedicels 2–5 mm. long, not bracteolate; calyx 7–11 mm. long, glandular-hirtellous and puberulent; petals purple or lavender, oblong, the ventral ones 4–5 mm. long, the dorsal ones slightly smaller; stamens not exserted, the style in age short-exserted; ovules 10–20.

**Cuphea flavisetula** Bacigalupi, *Contr. Gray Herb.* 95: 8. 1931.

Dry open rocky slopes, or often in pine forest, sometimes on serpentine or on rocks in the edges of streams, 1,400–2,500 meters; Jalapa; Huehuetenango. Western and southern Mexico; Honduras.

An often densely branched shrub, woody throughout or nearly so, 30–60 cm. high, sometimes procumbent, the stems puberulent and sometimes hispidulous, in age often almost wholly glabrous; leaves sessile or nearly so, lance-elliptic to elliptic or broadly obovate, mostly 1–2 cm. long, acute to rounded at the apex, acute at the base, hispid-ciliate; flowers in terminal racemes, the floral leaves reduced and bract-like, the pedicels not bracteolate; calyx 7–8 mm. long, hispidulous with yellowish hairs; petals oblanceolate, the 2 largest 2.5 mm. long; stamens 9, subserted; ovules 12–18.

**Cuphea Heydei** Koehne ex Donn.-Sm. *Bot. Gaz.* 19: 256. 1894.

Dry or moist forest, 1,800–2,100 meters; endemic; Quiché (type from Nebaj, *Heyde & Lux* 4480).

An erect shrub a meter high, or the stems sometimes elongate and trailing, rooting at the nodes, as much as 3.5 meters long, reddish, when young densely hirsute; leaves short-petiolate, elliptic or lanceolate, mostly 5–9 cm. long and 2–3.5 cm. broad, narrowly long-acuminate, acute or attenuate at the base, glabrous above or nearly so, paler beneath and sparsely hispid or almost glabrous; flowers few, the floral leaves scarcely reduced, the pedicels 1–2 cm. long, bracteolate at the apex; calyx scarlet, 22–28 mm. long, sparsely hispid; stamens exserted; petals none or minute; ovules 9–14.

The species is known from three collections, all made at Nebaj. An attractive plant, perhaps worthy of cultivation.

**Cuphea hyssopifolia** HBK. *Nov. Gen. & Sp.* 6: 199. 1823. *C. hyssopifolia* f. *subrevoluta* Koehne, *Bot. Jahrb.* 2: 153. 1881 (type from Cobán, *Tuerckheim* 17). *Hierba de burrioncillo* (fide Aguilar).

Usually on rocks in the edges of swift streams, sometimes in wet forest, 1,500 meters or less; Alta Verapaz; Izabal; Quiché; Huehuetenango. Mexico; Honduras. Figure 39.



FIG. 39. *Cuphea hyssopifolia*. A, Habit;  $\times 1$ . B, Flowers, one partially dissected;  $\times \pm 2$ .

An erect shrub 25–50 cm. high, usually with very numerous suberect slender branches, the stems pubescent and sometimes appressed-hispidulous; leaves sessile, crowded, linear or nearly so, 1–3 cm. long, suberect or spreading, glabrous or with a few scattered hairs on the costa, 1-nerved; floral leaves not reduced, the pedicels 2–7 mm. long, bracteolate at the apex; calyx glabrous or with a few scattered short hairs, 6–8 mm. long; petals pale purple or white; ovules 5–8.

This is one of several Central American plants, species of *Cuphea*, *Aster*, *Eupatorium*, *Lindenia* and a few other groups, whose habitat



is almost wholly confined to large rocks along the edges of usually swift streams. These rocks project above the mean level of the stream, but during times of heavy rain the plants often are covered by rushing water. Most of these plants, obviously, have tough stems that are able to withstand the debris carried by the often rapid currents of water.

**Cuphea infundibulum** Koehne in Mart. Fl. Bras. 13, pt. 2: 236. 1877.

In forest, or on brushy rocky slopes, 800–1,900 meters; Chiquimula; Huehuetenango. Mexico; Costa Rica; Panama.

An erect shrub or herb, usually a meter high or less, the slender stems strigose or scabrous, often also glandular-hirsute; leaves short-petiolate, lanceolate to ovate-oblong or ovate, 5–15 cm. long, 1.5–6 cm. broad, generally acuminate at each end, strigose-scabrous, sometimes densely strigose when young, sometimes hispidulous beneath on the veins; flowers mostly in terminal paniculate racemes, the floral leaves usually reduced to small bracts, the pedicels 2–4 mm. long, bracteolate above the middle; calyx 2–3 cm. long, green or tinged above with red, strigose and more or less hirsute; petals bright red; disk semicupular; ovules about 7.

**Cuphea micrantha** HBK. Nov. Gen. & Sp. 6: 196. 1823. At 750 meters; Santa Rosa (Río de los Esclavos, *Heyde & Lux* 3764). Honduras; Greater Antilles; South America.

Plants 40 cm. high or less, the stems pubescent and glandular-hirsute; leaves oblong or lance-linear, 1.5–6.5 cm. long, acute or acuminate, acute to rounded at the base, hispid; floral leaves little reduced, the pedicels 1–2.5 mm. long, bracteolate at the apex; calyx 4–7 mm. long, hispidulous; petals violaceous or purple, cuneate-oblong.

*Cuphea Valerii* Standl. & L. Wms. from Honduras is a synonym of this species. Closely allied to *C. carthagenensis*.

**Cuphea mimuloides** Cham. & Schlecht. Linnaea 5: 570. 1830. *Maja hypericoides* Klotzsch in Schomb. Fl. & Faun. Guian. 1191. 1848, without diagnosis. *C. mimuloides* var. *guianensis* Koehne in Engl. Bot. Jahrb. 1: 446. 1881. *C. mimuloides* var. *hypericoides* Koehne, Pflanzenreich IV. 216: 101. 1903.

In bogs or wet places, 900–1,400 meters; Jutiapa. Mexico; British Honduras; Honduras; West Indies; northern South America.

A slender erect annual, usually about 20 cm. tall, sometimes to 50 cm., branched, the stems glabrous or sparsely puberulent; leaves short-petiolate or subsessile, ovate-oblong to narrowly oblong or oblanceolate, 1–2 cm. long, obtuse, acute or attenuate at the base, glabrous or nearly so; floral leaves reduced, the slender pedicels 5–9 mm. long, spreading; calyx 4–7 mm. long, glabrous or minutely

glandular, distended in age by the capsule; petals 1.5–2 mm. long, white to pink; stamens scarcely equaling the calyx, the style included; ovules about 100.

**Cuphea Nelsonii** Rose, Contr. U. S. Nat. Herb. 5: 137, t. 15. 1897.

Moist forest, 1,600–2,500 meters; endemic; Alta Verapaz; Baja Verapaz; El Progreso; Huehuetenango (type collected between Jacaltenango and San Martín, *E. W. Nelson* 3600).

Erect and suffrutescent, 1.5 meters high or less, or sometimes larger and subscaudent, the stems ferruginous, densely viscid-hirsute; leaves short-petiolate, lanceolate to ovate, 3–6 cm. long, acute or acuminate, obtuse or acute at the base, rather densely scabrous and hirsute on both surfaces; flowers few, the floral leaves greatly reduced, the pedicels bracteolate at the apex; calyx 20–30 mm. long, greenish, densely pilose with long spreading purplish hairs; petals bright red; stamens exserted.

Koehne gives the habitat of the species erroneously as Mexico.

**Cuphea pinetorum** Benth. Pl. Hartweg. 74. 1839. *C. Hookeriana* Walp. Repert. Sp. Nov. 2: 107. 1843. *Pititos morados*; *pegajosa rosada*; *leoncillo*; *boca de murciélago*; *clavo rojo* (fide Aguilar).

Moist or dry thickets or forest, common in pine-oak forest, 1,000–2,400 meters; Alta Verapaz; El Progreso; Zacapa; Jalapa; Chiquimula; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Quiché; Huehuetenango; Totonicapán; Quezaltenango (type from San Ramón, *Hartweg* 529); San Marcos. Central Mexico; Honduras; Nicaragua. Figure 40.

Plants perennial, slender, usually erect and a meter high or less, the stems brittle, usually sparsely branched, sometimes suffrutescent below but essentially herbaceous, scabrous; leaves sessile, mostly lanceolate or linear-lanceolate, 3–11 cm. long, long-attenuate, acute or rounded at the base, scabrous; floral leaves reduced to linear bracts, the inflorescence thus terminal and racemose, the pedicels 4–7 mm. long, interpetiolar, bracteolate below the apex; calyx 17–20 mm. long or sometimes shorter, pinkish, viscid-hirtellous, the spur very short or well developed; petals from nearly white to dark red or almost black, the dorsal ones half as long as the calyx or longer, the others much reduced; stamens exserted; ovules 13–17.

Koehne treated *C. Hookeriana* as distinct from *C. pinetorum*, reporting both species from Guatemala. He separated the two on the basis of the size and shape of the smaller petals, certainly not a practical character, and one that probably has no systematic importance, especially since, when kept distinct, the two species have the same ranges. In spite of its rather large flowers, this is not an attractive plant, being rather harsh and faded in appearance. The petals are

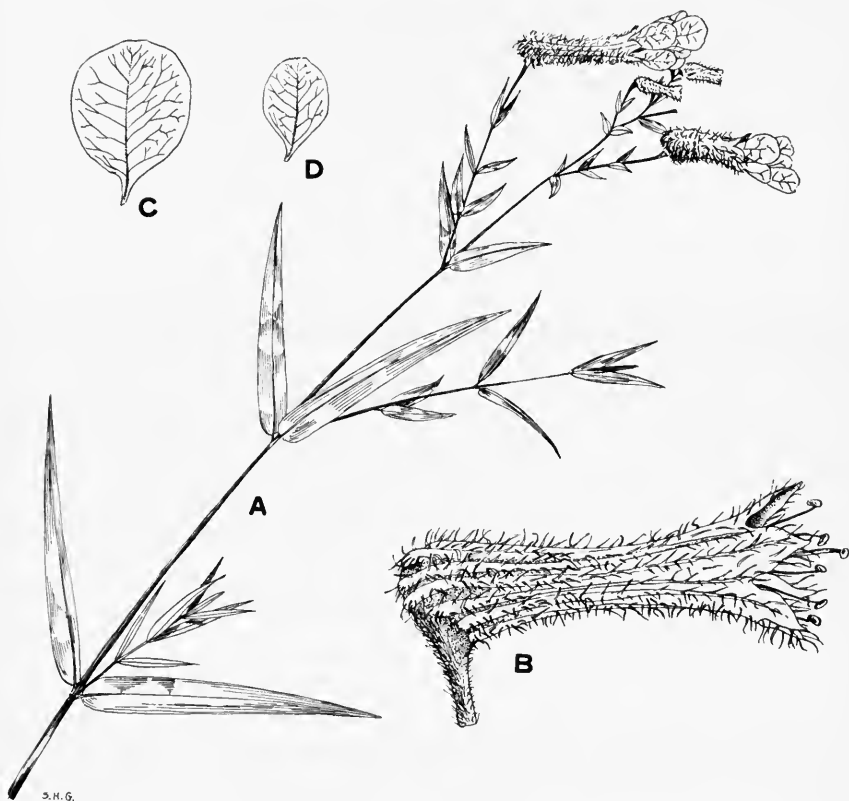


FIG. 40. *Cuphea pinetorum*. A, Terminal part of a plant;  $\times 1$ . B, Receptacle showing attachment and exerted series of stamens;  $\times 3$ . C, Large petal. D, Small petal.

often almost black. This is a characteristic species of mixed pine-oak forest in the mountains of Guatemala, abundant in many regions and quite variable.

*Cuphea platycentra* Lemaire, sometimes called "cigarette plant," and in Guatemala "cigarrito," is planted occasionally in gardens for ornament. It is a suffrutescent or herbaceous, almost glabrous plant native of southern Mexico; the calyx is bright red and about 2 cm. long.

*Cuphea sanguinea* Koehne, Bull. Herb. Boiss. 7: 565. 1899. *Chocshán* (Huehuetenango).

In moist thickets or open forest, mostly in pine forest, 1,200–3,000 meters; endemic; Huehuetenango (type collected above Jacal-

tenango, *Seler* 2629); San Marcos (volcanoes of Tajumulco and Tacaná).

Plants herbaceous or suffrutescent, erect and about a meter high, or the stems sometimes supported on other vegetation and as much as 3 meters long, densely viscid-hispidulous with reddish or purple hairs; leaves on petioles 4–7 mm. long, ovate to ovate-oblong, 3–7 cm. long, 2–3.5 cm. broad, acuminate, rounded or obtuse at the base, very scabrous above, scabrous beneath or along the nerves densely short-hirtellous; floral leaves little if at all reduced, the pedicels 4 mm. long, bracteolate; calyx 20–25 mm. long, greenish, densely viscid-hirtellous; petals bright red, 12 mm. long; stamens short-exserted.

***Cuphea secundiflora*** Sessé & Moc. ex DC. Prodr. 3: 84. 1828. *C. leptopoda* Hemsl. Diagn. Pl. Mex. 52. 1880 (type collected between Esquipulas and Jupilingo, Chiquimula, *Bernoulli* 747).

At about 900–1,300 meters; Chiquimula; Santa Rosa; Quiché; Huehuetenango. To central Mexico.

Annual, erect, 30–40 cm. high, soft-stemmed, little branched, the stems pubescent and glandular-hirtellous with pale hairs; lower petioles 1–3.5 cm. long, the upper ones shorter; leaf blades ovate or lance-ovate, 3.5–7 cm. long, 2–3.5 cm. broad, acute or short-acuminate, acute at the base, thin, rather densely scabrous, sparsely setulose above; inflorescences terminal, spike-like or head-like, the flowers sometimes secund, the branchlets short, 1–few-flowered, the pedicels very short; calyx hispidulous, green, 6–7 mm. long; 2 dorsal petals deep purple, cuneate-oblong, the 4 ventral petals much smaller or absent; stamens and style included.

***Cuphea Seleri*** Koehne, Bull. Herb. Boiss. 7: 565. 1899.

Known only from the type, Uxacanal, Huehuetenango, *C. & E. Seler* 2841.

Stems about 20 cm. long, simple, densely glandular-hirtellous; leaves on petioles 5–8 mm. long, ovate, about 3 cm. long and 1.5 cm. broad, narrowed to the subobtuse apex, rounded at the base, minutely strigillose, more or less setulose above and beneath along the nerves; inflorescence simple; calyx 7–8 mm. long, hispidulous; petals probably purple, the 4 ventral ones about one-third as wide as the 2 dorsal ones and very acute; disk almost horizontal.

***Cuphea utriculosa*** Koehne in Mart. Fl. Bras. 13, pt. 2: 452. 1877. *C. utriculosa* var. *panamensis* Koehne, l.c. *C. utriculosa* var. *Donnell-Smithii* Koehne, Bot. Gaz. 18: 203. 1893. *Parsonsia utriculosa* Standl. Contr. U. S. Nat. Herb. 23: 1017. 1924 (type from Sololá, *Shannon* 403). *Nido de anguila* (fide Aguilar).

Almost always on large rocks in or at the edge of swift streams, 1,500 meters or lower; Petén; El Progreso; Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Sacatepéquez; Guatemala; Chi-

maltenango; Quiché; Huehuetenango; Suchitepéquez; Retalhuleu. Mexico; British Honduras to Panama.

Plants perennial, stiff and tough, erect, usually 30–40 cm. high, densely branched above; branches suberect, ferruginous, suffrutescent below, pubescent or glandular-hirtellous, sometimes glabrate; leaves very numerous, sessile or subsessile, oblanceolate or linear, 1–3.5 cm. long, 3–7 mm. broad, obtuse or subacute, attenuate to the base, glabrous, sometimes glandular-ciliate; floral leaves usually much smaller than the lower ones, the flowers usually numerous, the slender pedicels 6–15 mm. long, not bracteolate; calyx 4–7 mm. long, usually glabrous, greenish; petals pale purple, obovate or cuneate-oblong, the ventral ones 3–4 mm. long; stamens included, the style sometimes exerted; ovules 25–75.

The species varies greatly in quality and quantity of pubescence.

### **Cuphea Wrightii** Gray, Pl. Wright. 2: 56. 1853.

Moist or rather dry thickets, open banks, fields, often on rocky or grassy slopes in pine-oak forest, 800–2,800 meters; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Huehuetenango. Southwestern United States; Mexico; Honduras; Costa Rica; Panama.

An erect annual, usually branched, 10–40 cm. high, the stems slender, glandular-hispidulous with mostly purplish hairs, usually also pubescent, sometimes retrorse-pilose below; leaves small, on petioles 6–14 mm. long, lanceolate to oblong or ovate, 1.5–4 cm. long, 5–25 mm. broad, narrowed to the subacute apex, rounded to acute at the base, strigose-scabrous and sparsely hispidulous, rarely glabrate; floral leaves similar to the others but mostly much smaller, the branchlets 1–few-flowered, the pedicels 2–7 mm. long, bracteolate near the apex; calyx 5–6 mm. long, greenish, hirsute with short purplish hairs; petals purple, the 2 dorsal ones obovate or almost orbicular, the ventral ones much smaller, cuneate-oblong; stamens not exerted; style short-exserted in age.

Closely allied to *Cuphea carthagenensis*.

## HEIMIA

**Heimia salicifolia** (HBK.) Link should occur in the Pacific foothills of Guatemala. It is common and widely distributed in Mexico, and has been collected at San Vicente, El Salvador. It is a low glabrous shrub with linear or narrowly lanceolate leaves and rather large and showy, bright yellow, axillary flowers.

## LAFOENSIA Vandelli

Glabrous trees or shrubs; leaves opposite, coriaceous, lustrous, penninerved, produced into a broad acumen with an obtuse, often deflexed tip bearing at the apex a conspicuous subterminal pore; flowers large, 8–16-parted, racemose or

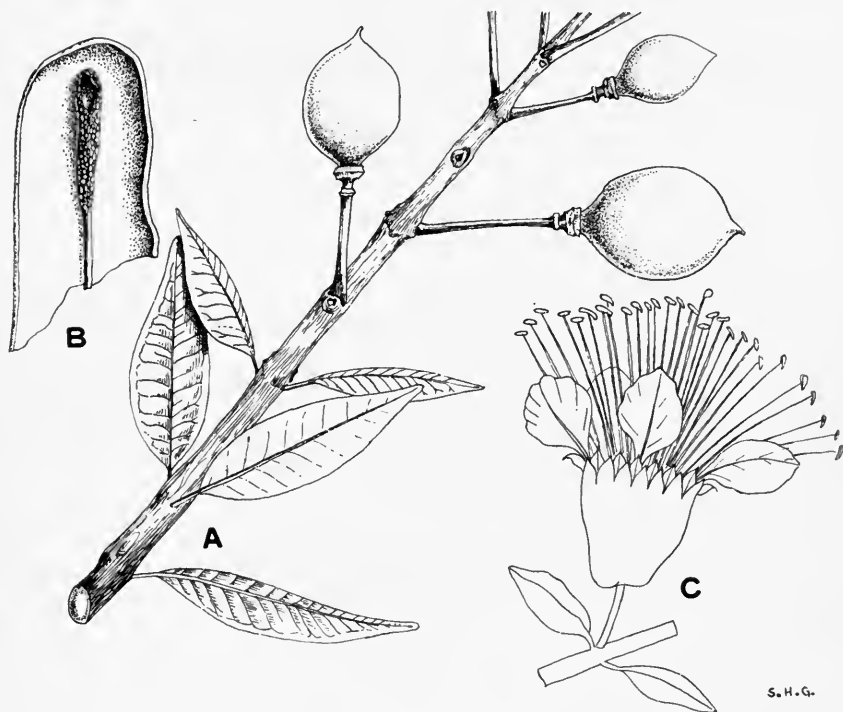


FIG. 41. *Lafoensia puniceifolia*. A, Fruiting branch;  $\times \frac{1}{2}$ . B, Under surface of leaf tip showing pore;  $\times 5$ . C, Copy of Sessé and Mociño's sketch of a flower for their *L. mexicana*;  $\times 1$ .

subpaniculate, the bracts foliaceous but smaller than the leaves; bractlets large, covering the buds; calyx campanulate or semiglobose, coriaceous, the limb plicate, the lobes caudate, implicate; appendages of the calyx none; petals large, erose; stamens 16-32 and uniseriate, inserted at or below the middle of the tube, long-exserted, spirally contorted in bud; anthers narrowly oblong or linear, recurved; ovary sessile or stipitate, the placenta globose or disciform; ovules numerous; style very long, the stigma subcapitate; fruit capsular, hard and woody, 1-celled, loculicidally 2-4-valvate; seeds complanate, broadly winged.

Ten species, in tropical America. Only one reaches North America.

*Lafoensia puniceifolia* DC. Mém. Soc. Phys. Genève 3, pt. 2: 86, t. 1. 1826. *Palo de culebra*.

Moist forest, 600-1,300 meters; Jalapa; Santa Rosa; Huehuetenango. Southern Mexico; El Salvador; Costa Rica; Panama; northern and western South America. Figure 41.

A tree of 12-24 meters, the young branchlets obscurely tetragonous; leaves on petioles 3-6 mm. long, coriaceous, usually yellow-green when dried, lustrous, oblong or lanceolate, 5-11 cm. long, obtuse or acuminate, acute at the base or obtuse, the nerves many pairs, conspicuously elevated beneath; inflorescence racemose or subpaniculate, the pedicels 2-3.5 cm. long; flowers 12-16-parted; calyx campanulate, 2.5-3 cm. long, rounded at the base; petals yellowish green or yellow, turning red in age, 3-3.5 cm. long; filaments as much as 12 cm. long, the style 13 cm. long; capsule broadly ovoid or ellipsoid-ovoid, apiculate, 3-5 cm. long, terete; seeds, with the wing, oblong, about 3 cm. long and 1 cm. broad.

Called "*trompillo*" and "*cuyapo*" in El Salvador. The tree is common in Guatemala at some places along the road from Cuilapa to Chiquimulilla. In this genus the heartwood is bright greenish yellow or olive, of high luster, hard and heavy or moderately so, rather fine in texture; it is not difficult to work, taking a smooth finish and high polish. It is used for miscellaneous purposes in some regions but has little or no commercial importance. In Brazil the bark serves as the source of a yellow dye.

### LAGERSTROEMIA L. Crape myrtle

Trees or shrubs, the leaves generally alternate; stipules binate, minute, deciduous; flowers often large and showy, mostly 5-8-parted, racemose or cymose and often paniculate, the bracts and bractlets small or minute, the pedicels articulate at the insertion of the bractlets; calyx semiglobose or turbinate, coriaceous, terete or costate, the lobes usually caudate; calyx appendages none or very small; petals usually unguiculate; stamens 15-200, in 1-many series, the anthers broadly elliptic or orbicular; ovary globose, or elongate at the apex, glabrous or tomentose, 3-6-celled, the ovules numerous; style slightly exceeding the longest stamens, the stigma scarcely thicker than the style; capsule ellipsoid or oblong, ligneous, 3-6-valvate; testa of the seeds produced at the base into an appendage, produced above into a wing.

About 30 species, in eastern and southern Asia and Australia.

*Lagerstroemia indica* L. Sp. Pl. ed. 2. 734. 1762. *Jupiter; astronómica*.

Planted commonly for ornament at low and middle elevations, rarely above 1,500 meters. Native of eastern and southern Asia, but grown as an ornamental plant in most warm regions.

A shrub or small tree, the bark smooth, gray, the young branchlets tetragonous, glabrous; leaves sessile or short-petiolate, oblong-elliptic to rounded, 2-7 cm. long, acute to rounded at the base, short-acuminate to emarginate at the apex, subcoriaceous, glabrous or nearly so, often hirtellous beneath on the costa; flowers white, pink, or purple, usually 6-parted, the panicles 5-20 cm. long, many-flowered, the branches usually short-hirtellous, the pedicels 3-15 mm. long; calyx 7-10 mm. long, glabrous, the lobes erect; petals 12-20 mm. long; stamens 36-42; capsule ellipsoid-globose, 9-13 mm. long, half included in the calyx.

Crape myrtle is a popular garden shrub in the lower parts of Guatemala. Although it seldom or never is planted in the higher mountains, it could be grown there, since in the United States it withstands the winter as far north as the Potomac Valley.

### LAWSONIA L. Henna

Glabrous shrubs or small trees, the branchlets often indurate and spinescent, the young branchlets tetragonous; leaves small, opposite, short-petiolate, penninerved; stipules conic, minute, whitish; flowers 4-parted, in terminal pyramidal panicles, small, the pedicels bracteolate at the base or middle; calyx broadly turbinate, subcoriaceous, terete, the lobes slightly longer than the tube, ovate-triangular, without appendages; petals short-unguiculate, reniform, corrugate; stamens 8, the filaments thick, subulate, exserted; ovary sessile, 2-4-celled, the style stout; fruit globose, indehiscent or irregularly ruptured; seeds thick, trigonous-pyramidal, the testa spongy at the apex.

The genus consists of a single species.

**Lawsonia inermis** L. Sp. Pl. 349. 1753. *L. alba* Lam. Encycl. 3: 106. 1789. *Reseda*; *ricidró*n (Petén, fide Lundell).

Planted commonly for ornament at low and middle elevations and as high as 2,100 meters, or probably higher; often growing in hedges where apparently not planted by man, and more or less naturalized in some regions, especially on the Pacific plains. Native probably in eastern Africa and Asia; now grown for ornament or for its sweet-scented flowers in most tropical regions.

A low tree, usually 6 meters high or less, with somewhat spreading crown; leaves oblong or obovate, 1-2.5 cm. long, mucronate-acuminate, narrowed at the base; panicles mostly 5-20 cm. long; calyx 3-5 mm. long; petals 4-6 mm. long, pale yellow; fruit 4-6 mm. long.

Henna is not a handsome tree, and in Central America apparently it is planted because of the agreeable fragrance of the otherwise unattractive flowers. The odor is similar to that of mignonette. In the Orient the leaves are much used for staining the nails, hands, and feet yellow, and also for dyeing the hair and beard. If a paste of the leaves is applied to the hair or beard, it soon produces a bright red color, which is much admired by some classes of Mohammedans. If after this treatment an indigo paste is applied, the hair becomes jet black. The plant yields a dull red dye for cloth. A perfume often is extracted from the flowers. No use is made of the plant in Central America, although the use of henna upon women's hair is not unknown there.



## LYTHRUM L. Loosestrife

Annual or perennial herbs with slender, often wiry stems; leaves small, opposite, verticillate, or alternate; flowers usually small, mostly 4–6-parted, sometimes obscurely zygomorphous, often dimorphous, solitary in the leaf axils or forming terminal spikes or racemes; calyx tubular, usually with evident appendages; stamens 4–12, the ventral ones usually inserted much higher than the dorsal ones; ovary sessile or nearly so, the style generally developed; capsule 2-valvate, the valves often 2-lobate, cartilaginous or submembranaceous; seeds 8—many, small.

About 24 species, widely distributed in temperate and warm regions. Only the following are found in Central America. The species are poorly marked, for the most part. Those of Mexico and Central America—and of the rest of North America for that matter—are not well understood; they are in need of thorough revision.

Calyx about 6 mm. long, or shorter . . . . . *L. acinifolium*.  
 Calyx 8–12 mm. long . . . . . *L. vulneraria*.

**Lythrum acinifolium** Sessé & Mociño ex Koehne, Bot. Jahrb. 1: 322. 1881. *L. acinifolium* Sessé & Moc. ex DC. Prodr. 3: 81. 1828, in syn.

Wet forest or thickets or on open wet banks, 2,200 meters or less; Petén; Baja Verapaz; Quiché; Huehuetenango. Mexico.

Plants erect, 1–2 meters high, herbaceous or somewhat woody, often much branched, the stems slender, the older ones brown; leaves opposite, subsessile, oblong or elliptic-oblong, 1–3 cm. long, obtuse, at the base rounded or obtuse; flowers solitary in the leaf axils (as in other Guatemalan species), the calyx 4–6 mm. long; petals purple; annulus at the base of the ovary very narrow; style much exceeding the stamens.

Perhaps not distinct from the following species.

**Lythrum vulneraria** Schrank, Pl. Rar. Hort. Monac. t. 27. 1819. *L. Kennedyanum* HBK. Nov. Gen. & Sp. 6: 194. 1823. *Clavo de tierra* (fide Aguilar).

Moist or wet thickets, sometimes along streams, 1,400–2,000 meters; Alta Verapaz; Sacatepéquez; Quiché; Huehuetenango. Central and southern Mexico. Figure 42.

Plants erect, a meter high or less, or sometimes procumbent, the stems usually several, simple or branched above, brown; leaves oblong or ovate-oblong, sessile, 1–3 mm. long, 3–15 mm. broad, obtuse, rounded or cordate at the base; pedicels 1–3 mm. long, bracteolate at the base; calyx 8–12 mm. long, purplish; flowers dimorphous, the dolichostylous ones with stamens two-thirds as long as the calyx, the style conspicuously exerted, the brachystylous ones with stamens about reaching the apex of the calyx, the style reaching only to the middle of the calyx; petals purple, sometimes 1 cm. long.



FIG. 42. *Lythrum vulneraria*. A, Portion of stem;  $\times 1\frac{1}{2}$ . B, Leaves and flower;  $\times 3$ . C, Flower dissected;  $\times 5$ .

There are included here specimens collected by Salvin and by Donnell-Smith that were determined as *L. maritima* HBK. by the monographer, Koehne.

### ROOTALA L.

Annual or perennial herbs, growing in wet soil or in water, glabrous; leaves opposite or verticillate, rarely alternate, sessile or subsessile; flowers regular, 3-6-parted, sometimes dimorphous, small, solitary in the leaf axils, usually sessile, sometimes in terminal spikes or racemes, 2-bracteolate; calyx campanulate, 3-6-lobate, usually not nerved, with or without appendages; petals persistent or caducous, sometimes none; stamens 1-6, inserted upon the calyx lobes; ovary sessile or substipitate, incompletely 2-4-celled, the ovules few or numerous; style elongate or none; capsule septicidally 2-4-valvate, cartilaginous, the walls densely transverse-striate; seeds minute.

Species about 20, chiefly in tropical regions of both hemispheres, mostly in tropical Asia and Africa, only 3 in America.

- Calyx not appendaged.....*R. mexicana*.  
 Calyx with tooth-like appendages between the teeth.  
     Appendages equaling or shorter than the calyx teeth.....*R. ramosior*.  
     Appendages 3 times as long as the calyx teeth.....*R. dentifera*.

***Rotala dentifera*** (Gray) Koehne, Bot. Jahrb. 1: 161. 1880.  
*Ammannia dentifera* Gray, Pl. Wright. 2:55. 1853.

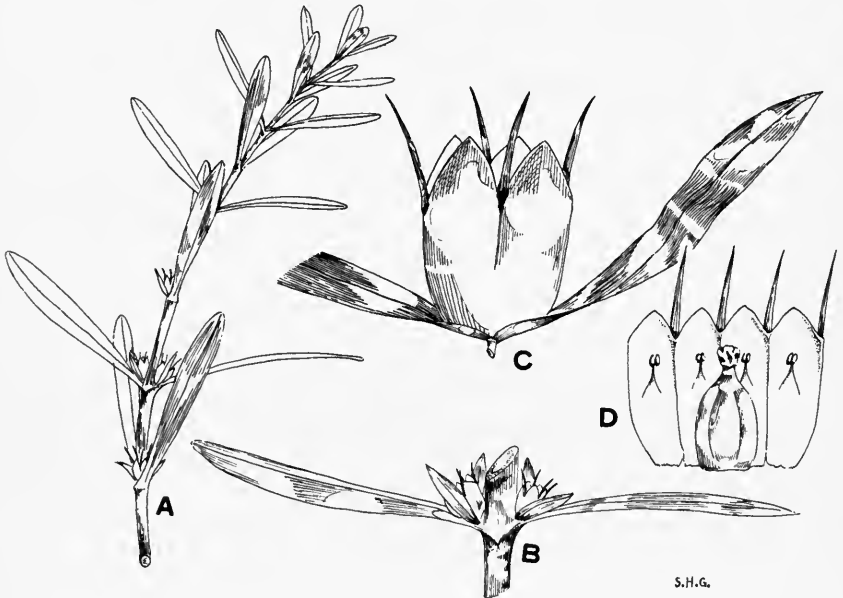


FIG. 43. *Rotala dentifera*. A, Branch;  $\times 1$ . B, Inflorescence and leaves;  $\times 1\frac{1}{2}$ . C and D, Hypanthium, natural position and dissected;  $\times 5$ .

Wet banks or meadows, often about seasonal ponds, 250 meters or less; Izabal; Zacapa; Retalhuleu. Mexico; British Honduras; El Salvador; Nicaragua; Panama. Figure 43.

Plants annual or perhaps sometimes more enduring, erect or procumbent, often much branched from the base, somewhat succulent, the stems 40 cm. long or less; leaves opposite, oblanceolate or linear-oblanceolate, 1-4 cm. long, 3-7 mm. broad, obtuse, attenuate to the base, sessile or short-petiolate, 1-nerved; bractlets mostly longer than the calyx; calyx about 3-4 mm. long, the appendages twice as long as the teeth or usually longer; petals pink, little longer than the calyx teeth; capsule almost wholly enclosed in the calyx.

***Rotala mexicana*** Cham. & Schlecht. Linnaea 5: 567. 1830.

In water in marshy meadows or on mud, 900–1,800 meters; Chi-quimula; Jutiapa. Mexico; Honduras; Panama; Cuba; South America; Africa and Asia.

Plants repent or aquatic and partly or wholly submerged, the stems very slender, branched; leaves in whorls of 3–5 or sometimes opposite, linear, 3–13 mm. long, or the emersed leaves lanceolate or oblong, obtuse; flowers usually 4–5-parted, the bractlets equaling or shorter than the calyx; calyx scarcely 1 mm. long, in fruit semiglobose; stamens 2–3; capsule globose, 2–3-valvate.

**Rotala ramosior** (L.) Koehne in Mart. Fl. Bras. 13, pt. 2: 194. 1877. *Ammannia ramosior* L. Sp. Pl. 120. 1753.

In marshes or ditches, often at the edges of swamps or on sandy stream beds, 200–1,000 meters; Zacapa; Jutiapa; Retalhuleu; Quiché. United States; Mexico; El Salvador; Honduras; Nicaragua; Panama; West Indies; South America; Philippine Islands.

Plants annual or perhaps sometimes more enduring, erect or procumbent, often much branched, the stems mostly 30 cm. long or shorter; leaves opposite, oblanceolate or linear-oblanceolate, 1–4 cm. long, obtuse, 1-nerved, attenuate to the sessile or subsessile base; bractlets equaling or shorter than the calyx; calyx in anthesis 2.5–3 mm. long, in fruit 4–5 mm. long, the appendages equaling or shorter than the teeth; petals equaling or slightly longer than the teeth, pink or white; capsule 3–4-valvate.

## PUNICACEAE. Pomegranate Family

Shrubs or small trees, the branchlets subterete, often spinescent; leaves opposite or subopposite, often fasciculate, entire; flowers perfect and regular, short-pedicellate, axillary, solitary or subfasciculate, large, red; calyx persistent, thick-coriaceous, the tube adnate below to the ovary, turbinate, ampliate above the ovary, 5–7-lobate; petals 5–7, inserted in the throat of the calyx, lanceolate, corrugate; stamens very numerous, inserted in numerous series in the calyx throat, the filaments filiform, incurved, the anthers ovate, versatile; ovary inferior, many-celled, the cells biserially superposed; style filiform, flexuous, swollen at the base, the stigma capitate; ovules multiseriately crowded on the placentae, these adnate to the septa and to the walls of the cells; fruit baccate, inferior, globose, large, crowned by the persistent calyx limb, the cells many-seeded, the septa membranaceous; seeds large, angulate, the testa coriaceous, imbedded in juicy pulp; cotyledons foliaceous, spirally convolute, biariculate at the base, the radicle very short.

A single genus.

## PUNICA L. Pomegranate

The genus consists of a single species. The generic name is derived from the Latin *punicus*, that is, Carthaginian, in reference to ancient Carthage, the present-day Tunis.

**Punica Granatum** L. *Granado* (the plant); *granada* (fruit); *granad* (Quecchí).

Native of the Mediterranean region, but cultivated for its fruit in most tropical and subtropical regions, or even in warm-temperate lands. Planted commonly in Guatemala, at almost all elevations except the highest, but only in small quantities.

A shrub or small tree, 6 meters high or less, usually branched from the ground, sometimes with a short trunk, the bark thin, brownish gray; leaves short-petiolate, elliptic to oblong or oblanceolate, 2-6 cm. long, obtuse, attenuate at the base, glabrous; petals obovate to suborbicular, 1.5-2.5 cm. long, bright red; fruit 5-10 cm. in diameter, the pulp white or pink.

The pomegranate apparently is little esteemed in Central America, being unable to compete in quality with numerous excellent tropical and temperate fruits. The many large seeds are an objectionable feature. The wood is hard, close-grained, and light yellow. It has been used as a substitute for boxwood (*Buxus*) in making engravings. The bark and the rind of the fruit are astringent, and in some regions are utilized for tanning and dyeing leather. The bark of the stem and root—its active properties due to an alkaloid pelletierine—is an efficient vermifuge, especially in the case of tapeworms. The large flowers are brilliantly colored and decorative. The pomegranate is by no means an exclusively tropical plant, for it survives winter in the United States as far north as Washington, D.C., although probably it does not produce fruit at that latitude.

#### LECYTHIDACEAE. Brazil-nut Family

*References:* H. Pittier, The Lecythidaceae of Central America, Contr. U. S. Nat. Herb. 26: 1-14, *tt.* 1-12. 1927. Reinhard Knuth, Lecythidaceae, Pflanzenreich IV. 219a: 1-146. 1939.

Large shrubs or trees, often very tall; leaves alternate, often very large, simple, without stipules, pinnately nerved; flowers usually large and showy, perfect, solitary or racemose; sepals 2-5; petals 4-6, adnate to the stamen tube, imbricate in bud, sometimes none; stamens numerous, united at the base, curved in bud; anthers versatile, dehiscent by longitudinal slits; disk within the stamens, annular; ovary inferior, 2-20-celled, with 2 or more inverted ovules in each cell; style simple; fruit baccate and indehiscent or a pyxis, then often ligneous and opening by an apical lid; seeds large or very large, often oily.

About 15 genera in tropical America, mostly in Amazonian South America. Six genera are known from southern Central America, chiefly in Panama. Most important member of the family is the Brazil-nut, *Bertholletia excelsa* Humb. & Bonpl., well known for its

richly flavored nuts, which sometimes reach the shops of Guatemala and other parts of Central America. The tree is a native of the Amazonian forests and is cultivated at Lancetilla, in Honduras, and perhaps elsewhere in Central America.

### GRIAS L.

Medium-sized trees, usually with few thick branches; leaves very large, narrow, generally crowded at the ends of the branches, entire or sinuate-dentate; flowers large, borne on the trunk, pedicellate or sessile, fasciculate; calyx tube turbinate, not produced above the ovary, the limb cupular or cyathiform, at first subentire, finally irregularly cleft into 2-4 lobes; petals usually 4, spreading; stamens very numerous, inserted in numerous series on a thick subcupular disk, the inner ones smaller, the filaments thick, connivent and involute; anthers small, the cells distinct; ovary 4-celled; style none or short and conic, the 4 stigmas cruciately radiate; ovules 2-4 in each cell, pendulous; fruit fleshy, more or less ovoid, crowned by the calyx limb; seeds usually 1, pendulous, with a thick testa.

About 10 species in tropical America. The wood is yellow, of medium weight and density, rather coarse-textured, easy to work, not durable. Apparently little or no use is made of it.

Calyx lobes 5 mm. long; leaves with apex rounded or acuminate, margins not glandular.....*G. integrifolia*.

Calyx lobes 3-4 mm. long; leaves long-acuminate with glandular margins.  
*G. Gentlei*.

**Grias Gentlei** Lundell, *Wrightia* 2: 122. 1961. *Bombowood*; *wild mammy*.

Known only from the type collection from British Honduras, *Gentle* 5194.

"Tree, 20 cm. in diam., glabrous. Leaves large, sessile, narrowly oblanceolate, up to 80 cm. long, 20 cm. wide, with glands along the subentire margin, these becoming reddish-black with age; apex attenuate-acuminate, base attenuate and cuneate with age, essentially spatulate, the midrib thick and prominent on both surfaces, the lateral nerves 20 to 30. Flowers usually 3 to 7, fasciculate on old wood, the basal bracts ovate-deltoid, 2 to 3 mm. long, acute. Pedicels, including hypanthium, scarcely 1 cm. long, glabrous. Calyx entire, or essentially so in bud, splitting at anthesis into two or more segments 3 to 4 mm. long. Petals 4, sometimes 5, thick, glabrous, pellucid-punctate, inaequilateral, asymmetrically elliptical, up to 18 mm. long, 12 mm. wide, rounded at apex. Androecium about 8 mm. long, the stamens numerous, the anthers about 0.5 mm. long, longitudinally dehiscent, scarcely thicker than the filaments. Ovary 4-celled, stigma 4-lobed."

We have not seen material of this species. Dr. Lundell, whose description appears above, separates it from *G. integrifolia* on the basis of its "smaller calyx and receptacle, long acuminate leaf blades and glandular margins, fewer leaf veins."

**Grias integrifolia** (Standl.) Knuth, Pflanzenreich IV. 219a: 30. 1939. *Gustavia integrifolia* Standl. Field Mus. Bot. 4: 240. 1929.

Wet mixed forest, often in wooded swamps, at or little above sea level; Izabal. Mexico; British Honduras; Honduras; Nicaragua (type from Bragman's Bluff, *Englesing* 225).

A tree 4-10 meters, with few thick branches, or sometimes unbranched, the trunk 15 cm. or more in diameter; bark light brown or greenish gray, rather smooth, separating in thin flakes; plants glabrous throughout, the young branches very thick, densely leafy at the ends; leaves huge, sometimes a meter long and 35 cm. broad, oblong-oblongate or somewhat spatulate, acuminate or almost rounded and abruptly acuminate, long-attenuate to the base, sessile or nearly so, entire or obscurely undulate, subcoriaceous, the lateral nerves as many as 40 pairs; inflorescences short, umbelliform, 3-5-flowered, the pedicels 1 cm. long; flowers 3 cm. broad, the receptacle turbinate, 5 mm. long; calyx lobes 2, broadly rounded at the apex, 5 mm. long; petals 4, creamy white, obovate-oblong; fruits large, yellowish green, fleshy.

Called "genip" in British Honduras; "jagüillo," "irayol" (Honduras); "morro cimarrón" (Oaxaca). It is rather strange that in British Honduras and Honduras the tree is associated or confused with *Genipa*, and in Oaxaca with *Crescentia*, neither of which it much resembles. The tree is a conspicuous one because of its great bunches of huge leaves. The youngest ones often or usually are deep purplish red. It is stated that the Lecythidaceae do not have stipules. In this tree the new leaves are subtended by stipule-like, deep red organs that are oblong or lance-oblong, as much as 15 cm. long, and caducous. If these are not stipules, we do not know what they should be called. The North American trees of this genus are represented by few specimens, and the status of the various species is rather uncertain. It is not yet established that *G. integrifolia* is distinct from *G. Fendleri* Seem. of Panama and Costa Rica, or they from *G. cauliflora* L. of Jamaica. This tree is common in the swampy forests of the north coast of Guatemala.

## RHIZOPHORACEAE. Mangrove Family

Trees or shrubs, usually glabrous, the branchlets terete; leaves opposite and stipulate, rarely alternate and without stipules, petiolate, coriaceous, entire, serrulate, or sinuate-crenate; stipules interpetiolar, often elongate, caducous; flowers mostly perfect, axillary, cymose, paniculate, spicate, or racemose, rarely congested or solitary, small or large, bibracteolate or ebracteolate; calyx tube more or less adnate to the ovary, rarely free, the limb produced beyond the ovary and cleft into 3-14 lobes, these valvate and persistent; petals as many as the calyx segments and usually shorter, inserted at the base of the calyx limb, mostly concave or involute and embracing the stamens, sessile or unguiculate, emarginate,

bifid, or lacerate at the apex, rarely entire, convolute or inflexed in bud; stamens 2-4 times as many as the petals or rarely of the same number, inserted on the margin or base of a perigynous or epigynous disk, the lobes of the disk sometimes produced as staminodia; filaments short or elongate, sometimes capillary; anthers short or elongate, basifixed or dorsifixed, 2-celled, longitudinally dehiscent; ovary usually inferior, 2-5-celled, rarely 6- or 3-celled, or the septa obscure and the ovary 1-celled; style simple, the stigma simple or lobate; ovules usually 2 (rarely 4 or more) and collateral in each cell, attached to the axis above its middle; fruit usually coriaceous, crowned by the persistent calyx limb, indehiscent or sometimes tardily and septicidally dehiscent, 1-celled and 1-seeded or 2-5-celled and with 1-seeded cells; seeds pendulous, the endosperm carnose or none, with or without an aril, the testa coriaceous or membranaceous.

About 15 genera, with few species, widely distributed in tropical regions; only the following genera in North America.

Calyx 4-parted; fruit 1-seeded; leaves very thick, obtuse.....*Rhizophora*.

Calyx campanulate, 4-5-lobate; fruit 3-seeded; leaves relatively thin, usually acuminate.....*Cassipourea*.

### CASSIPOUREA Aublet

Shrubs or trees, glabrous or nearly so; leaves opposite, subcoriaceous or almost membranaceous, entire or sinuate-crenate or dentate, penninerved; stipules short, caducous; flowers axillary, solitary or fasciculate, pedunculate or subsessile, whitish; calyx ebracteolate, campanulate, shallowly 4-5-lobate, the lobes triangular, erect, valvate; petals 4-5, inserted at the base of a cupular crenate disk, spatulate, unguiculate, fimbriate-lacerate at the apex; stamens 15-30, the filaments filiform, the anthers oblong; ovary globose or ovoid, free, sessile, 3-4-celled, the style filiform, the stigma 3-4-lobate; ovules 2 in each cell, pendulous; fruit ovoid, fleshy-coriaceous, tardily 3-4-valvate, the cells 1-seeded; seeds pendulous, arillate, the testa coriaceous; endosperm carnose, the embryo straight, the cotyledons plane.

Species perhaps 50 in tropical regions of America, Africa, Asia and Australia; no other species in Central America.

*Cassipourea guianensis* Aubl. Hist. Pl. Guian. Fr. 1: 529, *t.* 211. 1775; L. Wms. Fieldiana, Bot. 29: 369. 1961. *Legnotis elliptica* Sw. Prodr. 84. 1788. *Cassipourea elliptica* Poir. Encycl. suppl. 2, 131. 1811. *C. podantha* Standl. Field Mus. Bot. 4: 241. 1929 (type from Panama). *C. macrodonta* Standl. l.c. 242 (type from Panama). *C. belizensis* Lundell, Bull. Torr. Bot. Club 66: 598. 1939 (type from British Honduras, *Gentle* 2749).

Wet forest from sea level up to some 2,000 meters; Izabal; Suchitpéquez. Mexico; Central America except El Salvador; Panama; West Indies; South America to Brazil and Peru. Figure 44.

A shrub or tree, sometimes 18 m. tall with a trunk 35-45 cm. in diameter but usually lower, the branchlets strigillose or glabrate; leaves on petioles 6-8



mm. long, oblong-elliptic to lance-oblong, rarely rather broadly elliptic or ovate-elliptic, mostly 8–12 cm. long and 3.5–4.5 cm. broad, gradually or abruptly acuminate or long-acuminate, gradually or abruptly narrowed at the base and acute, at first sparsely strigillose but in age glabrous, entire or obsoletely sinuate-serrate, the lateral nerves slender, 6–7 pairs; pedicels solitary or fasciculate and few,

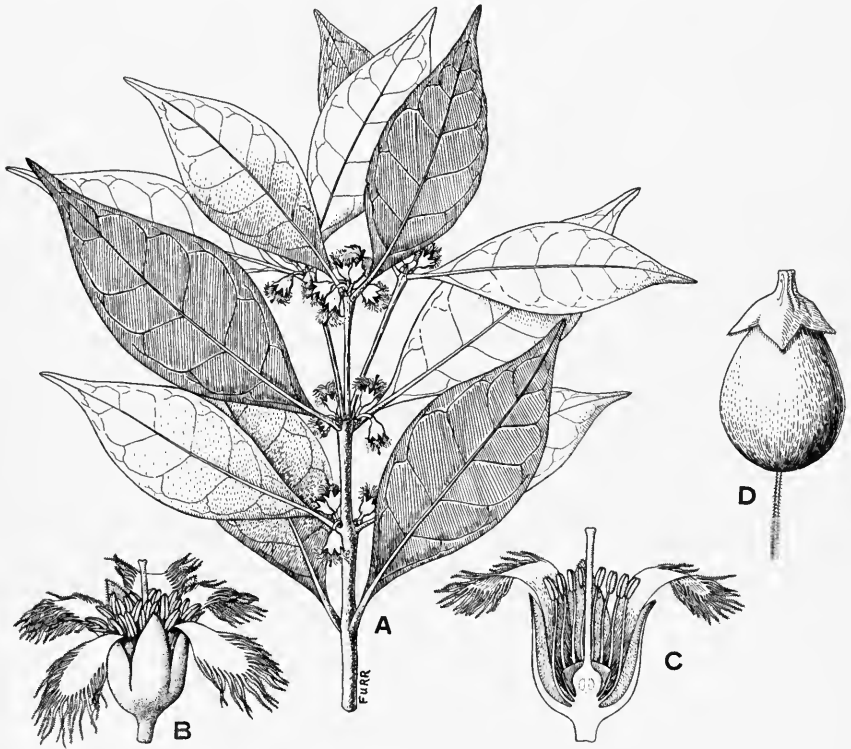


FIG. 44. *Cassipourea guianensis*. A, Habit;  $\times \frac{1}{2}$ . B, Flower;  $\times 4$ . C, Flower partly dissected;  $\times 5$ . D, Fruit;  $\times 4$ .

sessile to 3–4 mm. long, strigillose; calyx glabrous, 3.5–4 mm. long, abruptly contracted at the base into a short thick stipe, the lobes acute, sericeous within; petals white, densely short-pilose, deeply lacinate; ovary sericeous or glabrate; style sericeous, exerted from the calyx; fruit oval or obovoid, 7–8 mm. long, rounded at the apex, glabrate.

Called “waterwood” in British Honduras and “goatwood” in Panama. The thick sapwood is yellowish, the heartwood pale brown; moderately hard, heavy, tough, strong, splintery, and rather fine-textured; finishes smoothly and is fairly durable. In British Honduras it is used for railway crossties and house frames.

## RHIZOPHORA L. Mangrove

*Reference:* F. M. Salvoza, *Rhizophora*, Nat. & Appl. Sci. Bull. Univ. Philippines 5: 179-237. 1936.

Glabrous trees with thick branchlets; leaves opposite, petiolate, thick-coriaceous, entire; stipules large, interpetiolar, caducous; peduncles axillary, dichotomously or trichotomously branched, few-flowered, the flowers large, coriaceous, sessile or pedicellate; calyx subtended by 2 bractlets, these connate into a cupule, the calyx tube short, adnate at the base to the ovary, the limb 4-parted, the lobes lanceolate, valvate; petals 4, inserted at the base of a fleshy entire disk; stamens 8-12, inserted with the petals, the filaments short; anthers elongate, acuminate, connivent, at first multilocellate, finally bivalvate; ovary semi-inferior, 2-celled, produced above the calyx as a fleshy cone; style conic at the base, subulate, the stigma bidentate; ovules 2 in each cell; fruit coriaceous, ovoid or obconic, surrounded above the base by the reflexed calyx limb, 1-celled, 1-seeded; seed pendulous, without endosperm, the radicle elongate-clavate, perforating the apex of the fruit upon the tree and then falling upright into the mud.

Perhaps three or more species widely distributed along tropical seashores of the world. One other, *R. samoensis* (Hochr.) Salvoza, is said to occur from Mexico to perhaps Ecuador or beyond along the Pacific coast of America, then out into Oceania. We have not been able to distinguish it among our material. Still another species is recorded from Panama, *R. Harrisonii* Leechman (*R. brevistyla* Salvoza).

**Rhizophora Mangle** L. Sp. Pl. 443. 1753. *Mangle; mangle colorado.*

Abundant along both seacoasts, at least in many localities, often forming very dense and extensive stands, usually in association with *Conocarpus*, *Laguncularia*, and *Avicennia*. Southern Florida; from Baja California and Tamaulipas southward in Mexico, and along the whole Central American coast; West Indies; South America; Oceania. Figure 45.

A tree, sometimes 25 meters tall but usually smaller, the trunk rarely a meter in diameter, the bark thin, brownish gray, shallowly furrowed, red within; leaves petiolate, very thick and leathery, obovate or elliptic, 5-15 cm. long, obtuse, entire, deep green above, paler beneath, the nerves obsolete; stipules 2.5-4 cm. long; peduncles mostly 2-3-flowered; calyx 1 cm. long; petals yellow, 7-8 mm. long, villous inside, chiefly below the apex; stamens 8, about 5 mm. long; fruit 2.5-3.5 cm. long.

Called "red mangrove" in British Honduras; "*tapche*," "*tabche*" (Yucatan, Maya). The mangrove and its associates form an important species association—mangrove swamp—that characterizes many parts of the shore line of all tropical America. These swamps, often reaching to the water but sometimes separated by sandbars, contain

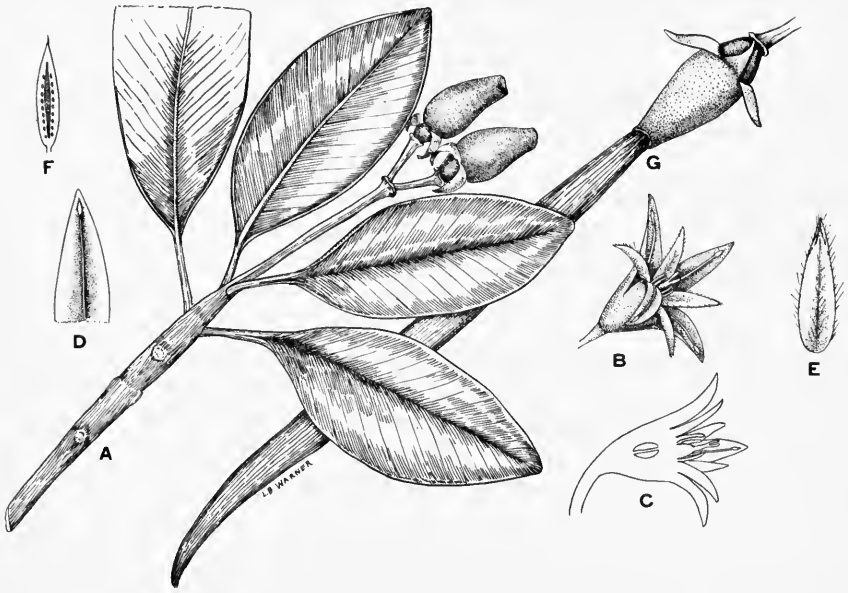


FIG. 45. *Rhizophora Mangle*. A, Tip of a branch;  $\times \frac{1}{3}$ . B, Flower; about  $\times 2$ . C, Longitudinal section of flower; about  $\times 2$ . D, Sepal, inner face; about  $\times 2$ . E, Petal; about  $\times 2$ . F, Anther, inner face; about  $\times 2$ . G, Fruit, nearly mature;  $\times \frac{3}{5}$ .

but little vegetation other than the several "mangroves," although a few other shrubs and occasionally some herbaceous plants often are associated with them. Their branches often bear a small number of epiphytic plants. These trees are confined to salt or brackish water, and the swamps usually are flooded at high tide. *Rhizophora* is especially adapted to an aquatic habitat by its large hard stilt or prop roots that rise far above the soil and are somewhat bowed out, like an arc of a circle. Mangrove swamps are especially well developed about the mouths of streams, whence they spread rapidly seaward, taking advantage of the silt and debris lodged there by the streams. In this manner they are often important agents in extending the land area. The seeds often take root on small islets or in shoals, where they form small islands that gradually increase their area. The floor of these mangrove thickets is one vast slimy tangle of prop roots over which it is all but impossible to make one's way. The roots are often covered with oysters and other marine animals, and are much frequented by spider crabs, spiders, and large grasshoppers. Seen from within, nothing could be less attractive than a mangrove forest.

Viewed from a distance, however, it is beautiful, because of its permanent fresh green coloring. Entering by ship the bay at Puerto Barrios, one has a comprehensive view of large areas of such swamps.

The wood is dull red or reddish brown, sometimes purplish, uniform or with darker stripes; sapwood rather thick and grayish; very hard and heavy, the specific gravity about 1.15; grain variable, from straight to very irregular, fine-textured; hard to cut, rather harsh and splintery, takes a good polish, is strong and durable. The timber is used in some regions for rafters, beams, knees and ribs of boats, and miscellaneous construction, also for posts, piling, and railway ties. In Central America it is much used for charcoal, that obtained from mangrove being said to be the best of all for the kitchen. The bark contains 20–30 per cent of tannin and is much used locally for tanning skins, especially where oak bark is not available. Large amounts of the bark or its extract are exported from tropical America to the United States and Europe. The young shoots are used for dyeing; they give red, olive, brown, or slate colors, according to the salts used in association with them.

The method of propagation is peculiar. While still attached to the tree, the seed develops a radicle about twice as thick as a lead pencil and 30–60 cm. long, which when detached falls like a dart and sticks upright in the mud, ready to put forth leaves and roots. If the seeds are carried away by currents they float upright until they reach a lodging place. Oviedo stated that the fruits, perhaps the radicles, were sometimes eaten by the Indians, "when they can find no better fruit (for it is somewhat bitter), and they say it is wholesome."

### COMBRETACEAE

Trees or shrubs, often scandent, unarmed or bearing spines, the branchlets terete, with few or no lenticels, the pubescence sometimes lepidote; leaves opposite, alternate, or rarely verticillate, coriaceous or membranaceous, simple, petiolate, entire; stipules none; flowers mostly perfect and spicate or racemose, rarely paniculate or capitate, small and green or sometimes rather large, showy, and bright-colored, bracteate; calyx tube adnate to the ovary, terete or angulate, sometimes tubular, the limb with 4–5 lobes or segments, usually campanulate, persistent or deciduous, the lobes valvate in bud; petals none or 4–5, imbricate or valvate; stamens 4–5 or 8–10, inserted on the limb or base of the calyx, sometimes biseriate, the filaments subulate or filiform, inflexed in bud; anthers small, versatile, didymous, sagittate, or oblong, dehiscent by longitudinal slits; epigynous disk sometimes present, lobate; ovary wholly adnate to the calyx, 1-celled; style simple, filiform, the stigma simple, acute or obtuse; ovules 2–6, usually suspended from the apex of the cell on elongate funicles; fruit coriaceous, chartaceous, or drupaceous, often 4–5-winged, sometimes crowned by the persistent calyx limb, inde-

hiscent or rarely dehiscent for its whole length, the stone osseous or crustaceous; seed pendulous, usually elongate and sulcate, the testa coriaceous or membranaceous; endosperm none; cotyledons convolute or plicate, usually carnosose and oily, the radicle small, superior.

About 15 genera, widely dispersed in tropical regions. No other genus is represented in Central America. *Buchenavia* is in Panama.

Flowers in dense globose cone-like heads; leaves alternate. . . . . *Conocarpus*.  
Flowers spicate or racemose.

Leaves alternate; petals none; trees.

Calyx limb deciduous; branches unarmed; fruit often winged. . . . *Terminalia*.

Calyx limb persistent; branches often armed with spines; fruit not winged.  
*Bucida*.

Leaves opposite; petals present.

Calyx limb persistent; fruit obscurely triangulate; erect trees or shrubs; leaves thick and fleshy. . . . . *Laguncularia*.

Calyx limb deciduous; fruit with 4-6 wings or acute angles; plants scandent; leaves not fleshy.

Calyx tube short, constricted above the ovary; native plants. . *Combretum*.

Calyx tube very slender, elongate, tubular, not constricted above the ovary; cultivated plants. . . . . *Quisqualis*.

### BUCIDA L.

Trees, the branches or branchlets sometimes armed with spines; leaves alternate, usually crowded at the somewhat swollen apices of the branchlets; flowers perfect or rarely staminate; inflorescence spicate, axillary; calyx campanulate, shallowly 5-dentate, persistent; petals none; stamens 10, biseriate, the filaments exerted, anthers versatile; fruit a fleshy-leathery drupe drawn up into a neck and crowned with the persistent calyx.

A small genus with 3 or 4 more species, one in Mexico, the others in the West Indies and South America.

Leaves mostly 3-6 cm. broad, coriaceous, glabrous or essentially so, the lateral nerves not very conspicuous below; flowers and fruit sericeous. . . . *B. buceras*.

Leaves mostly 6-11 cm. broad, membranaceous to subcoriaceous, copiously pubescent beneath, at least when young, the lateral nerves conspicuous below; flowers and fruits loosely tomentose. . . . . *B. macrostachya*.

**Bucida buceras** L. Syst. Nat. ed. 10. 1025. 1759. *Cacho de toro; pucte, pocte* (Petén, Maya).

Wet forest or thickets, 1,000 meters or usually lower; Petén; Alta Verapaz; Izabal; Huehuetenango. Southern Florida; West Indies; Mexico; British Honduras; Honduras; Panama.

A tree, usually 9-15 meters high, the trunk often 30 cm. or more in diameter, sometimes as much as a meter, the bark gray, scaly, the young branchlets sericeous,

soon glabrate, the branches often armed with stout brown spines 2-3 cm. long; leaves clustered at the ends of the branchlets, crowded, slender-petiolate, obovate to oval, 3-9 cm. long, very obtuse to rounded and emarginate at the apex, narrowed to the base, glabrous in age, when very young somewhat sericeous; flowers whitish;

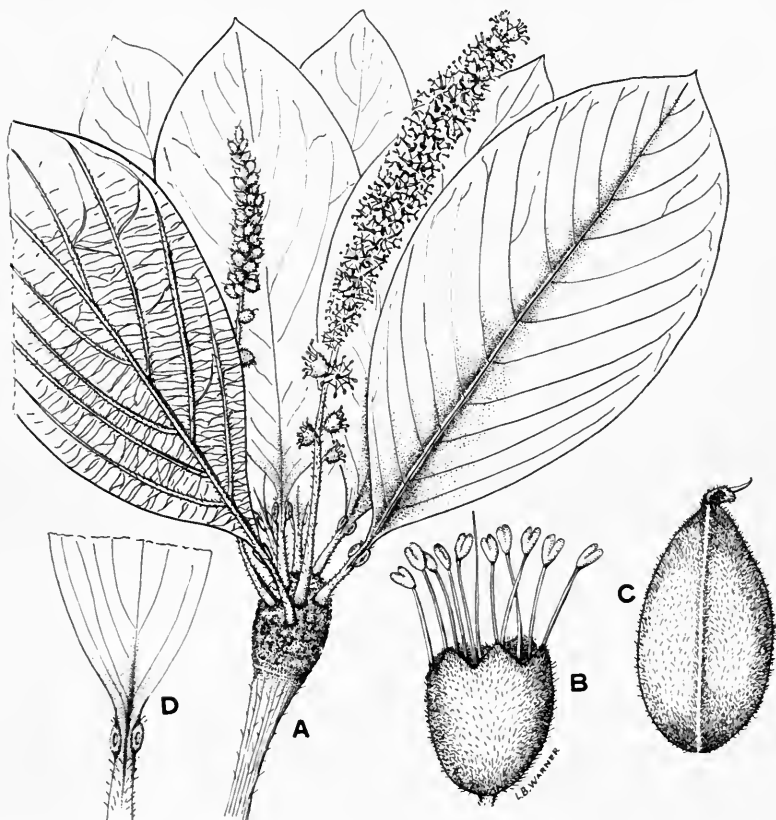


FIG. 46. *Bucida macrostachya*. A, Branch with leaves and inflorescences;  $\times \frac{1}{2}$ . B, Flower;  $\times 3$ . C, Fruit;  $\times 3$ . D, Base of leaf showing glands;  $\times 1\frac{1}{2}$ .

spikes pedunculate, slender, sericeous, 3-10 cm. long, usually interrupted; calyx lobes triangular, acute; fruit ovoid, 8 mm. long, sericeous.

Called "bullet tree" and "bully tree" in British Honduras. The wood is hard, close-grained, yellowish brown, with a specific gravity of about 1.04. In some parts of the range it is utilized for poles, posts, cross-ties, piling, and in general carpentry and construction where strength and durability are important. The bark is sometimes used for tanning.

**Bucida macrostachya** Standl. Field Mus. Bot. 4: 240. 1929.  
*B. megaphylla* Exell, Journ. Bot. 68: 244. 1930 (type from Mexico).  
*Almendo de cerro; roble.*

Dry brushy rocky hillsides, 200–700 meters; El Progreso (type from El Rancho, *W. A. Kellerman* 7744); Zacapa; Chiquimula. Southern Mexico; Honduras. Figure 46.

A tree of 5–9 meters, or perhaps sometimes larger, with a short trunk and dense broad crown, the branchlets usually much thickened at the apex and densely leafy there; petioles rather slender, mostly 2–4.5 cm. long, densely sericeous or tomentose; leaf blades elliptic or obovate-elliptic, mostly 12–25 cm. long, obtuse to broadly rounded at the apex, sometimes apiculate, cuneately narrowed to the base, glabrous above or sparsely pilose on the nerves, densely whitish-punctulate, beneath rather densely pilose with subappressed or spreading hairs, the lateral nerves about 16 pairs, very prominent, ascending at a narrow angle; spikes numerous, pedunculate, with the peduncle 19 cm. long or less, very densely flowered, the flowers green or whitish, the whole inflorescence densely tomentose with lax, mostly spreading hairs; calyx more or less persistent after anthesis, broadly campanulate, thin, 3 mm. broad; fruit ovoid, somewhat costate, fulvous-tomentose, 5–6 mm. long; stamens exserted.

This is a very common small tree on the dry rocky hills between the cities of Zacapa and Chiquimula, where it often is conspicuous. The leaves are shed during the dry season. It is noteworthy for the swollen leaf-bearing tips of the branchlets, which are about 1.5 cm. thick, much thicker than the leafless portion immediately below. As remarked by Exell in describing *B. megaphylla*, these swollen tips look as if they might be inhabited by ants, but apparently they are not.

### COMBRETUM L.

Usually woody vines, the pubescence of lepidote scales or of simple hairs; leaves opposite, rarely verticillate, petiolate, commonly membranaceous; flowers perfect or some of them sometimes staminate only; inflorescence often secund, simple or compound; calyx campanulate, 4 (5) -lobate, deciduous; petals 4 (5), small, inserted between calyx lobes and falling with calyx; stamens 8–10, biseriate; ovary ovoid or oblong, 4–5-angulate, constricted below the calyx; ovules 2–6; fruit coriaceous, indehiscent, with 4–6 angles or wings, 1-seeded, the wings membranaceous or somewhat coriaceous.

Species about 350, in most tropical and subtropical regions of the world. A few other species grow in southern Central America. Often ornamental.

Calyx 3 mm. or less long; flowers small; inflorescence paniculate, segments not secund.

Calyx glabrous; stems spiny . . . . . *C. decandrum*.

- Calyx puberulent or tomentose; stems unarmed.....*C. laxum*.  
 Calyx 4–5 mm. long or longer; flowers large; inflorescence a lateral raceme, usually  
 secund.  
 Calyx 12–14 mm. long; bracts large, subfoliaceous.....*C. Cacoucia*.  
 Calyx 4–6 mm. long; bracts absent or minute.  
 Calyx and fruit pilose to tomentose.....*C. argenteum*.  
 Calyx and fruit lepidote, not pilose or tomentose.....*C. fruticosum*.

**Combretum argenteum** Bertol. Fl. Guat. 412. 1840 (type from Volcán de Agua, *Velasquez*). *C. erianthum* Benth. Pl. Hartw. 73. 1841 (type from Retalhuleu, *Hartweg* 526). *Peine de mico*; *chupamiel*.

Moist or dry thickets, 600 meters or less; Zacapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Suchitepéquez; Retalhuleu. Mexico; El Salvador; Honduras; Nicaragua.

A large vine with brownish or grayish stems; leaves short petiolate, oblong-elliptic to oblong-ovate, mostly 10–15 cm. long, acute or acuminate, rounded or obtuse at the base, glabrous above or nearly so, yellowish-lepidote beneath and more or less puberulent or short pilose; inflorescence simple or branched, often forming large panicles, densely pilose with short spreading yellowish hairs; flowers usually yellowish green to bright yellow; calyx limb 5 mm. long; petals glabrous, about equaling the calyx lobes; fruits 2 cm. long, usually deep red at maturity, pilose or tomentose, broadly winged.

Called "*chupamiel*" in El Salvador. This species is very similar to *Combretum fruticosum* but even at a distance is of easy separation, because in *C. argenteum* the inflorescences are yellow, in *C. fruticosum* various shades of red to almost gray.

**Combretum Cacoucia** Exell in Sandwith, Kew Bull. 1931: 469. 1931. *Cacoucia coccinea* Aubl. Pl. Guian. 450, t. 179. 1775. *Terminalia Cacoucia* Baill. Hist. Pl. 6: 275. 1877, *nom. illegit.* *C. coccineum* Engl. & Diels in Engler, Monogr. Afr. Pflanzenfam. 3: 110, 112. 1899, not Lam. 1785.

Wet thickets, usually in swamps, often in *Manicaria* swamps, at or near sea level; Izabal; possibly also Baja Verapaz and Chiquimula. British Honduras; Honduras; Nicaragua; Panama; southward to Brazil.

A large coarse vine, sometimes suberect; leaves on very short petioles, broadly elliptic to oblong-elliptic, sometimes 19 cm. long and 10 cm. broad but usually smaller, acute or acuminate, cordate at the base, almost glabrous; flowers large for the genus, flame-red, in stout, dense, terminal and axillary spikes 50 cm. long or shorter, the bracts linear-lanceolate, large, green; calyx densely sericeous, 5-lobate; petals acute, exceeding the calyx lobes; stamens long-exserted; fruit 5-angulate, not winged.



The vine is an exceptionally showy one because of its large, spire-like, gorgeously colored flower spikes. It is plentiful about Puerto Barrios, chiefly in swamps, and probably occurs along the Atlantic coast throughout Central America. Exell states (*Flora of Surinam*) that the seeds are "poisonous, used for killing bats," but he does not mention the mode of administering them.

**Combretum decandrum** Jacq. Enum. 19. 1760. *C. Palmeri* Rose, Contr. U. S. Nat. Herb. 5: 136. 1897. *C. nicoyanum* Pittier, Contr. U. S. Nat. Herb. 17: 247. 1917 (type from Costa Rica, *Tonduz* 13503).

Dry or wet thickets, 300 meters or less; Chiquimula; Santa Rosa; Escuintla; Retalhuleu. Mexico; El Salvador; Costa Rica; Panama; northern South America.

A large vine with brown branches, these short-pilose or puberulent, usually armed with stiff hard spines; leaves short-petiolate, membranaceous, elliptic or oblong-obovate, mostly 5–13 cm. long, obtuse to short-acuminate, rounded at the base, glabrate above, pilose beneath along the costa and in the nerve axils; spikes lax, the rachis puberulent, forming small or large and much-branched panicles, the flowers 4–5-parted, white, sweet-scented; petals 2 mm. long, exceeding the calyx; fruit suborbicular, 1.5 cm. long, glabrous, green, the wings very thin.

**Combretum fruticosum** (Loefl.) Stuntz, U. S. Dept. Agr. Bur. Pl. Ind. Seed & Pl. Imp. No. 31: 86. 1914; L. Wms. Fieldiana, Bot. 29: 370. 1961. *Gaura fruticosa* Loefl. Inter Hispan. 248. 1758. *Combretum secundum* Jacq. Enum. 19. 1760. *C. farinosum* HBK. Nov. Gen. & Sp. 6: 110. 1823. *C. Warszewiczianum* Eichler in Mart. Fl. Bras. 12, pt. 2: 110. 1867. *C. Benthamianum* Van Heurck & Muell.-Arg. in Van Huereck, Obs. Bot. 220. 1871 (type from Bay of Fonseca, Honduras). *C. farinosum* var. *phaenopetalum* Donn.-Sm. Bot. Gaz. 23: 7. 1897 (type from Nentón, Huehuetenango, *E. W. Nelson* 3534). *C. superbum* Pittier, Contr. U. S. Nat. Herb. 18: 242. 1917. *C. polystachyum* Pittier, l.c. 243. *C. phaenopetalum* Pittier, l.c. 243. *C. lepidopetalum* Pittier, l.c. 245. *Bejuco de cepillo* (Petén); *chupamiel*; *peineta*.

Dry or wet thickets or forest, 1,200 meters or less; Petén; Alta Verapaz; Izabal; El Progreso; Baja Verapaz; Zacapa; Chiquimula; Jutiapa; Jalapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Suchitépéquez; Retalhuleu; Huehuetenango. Western and southern Mexico; British Honduras to El Salvador and Panama; probably northwestern South America. Figure 47.

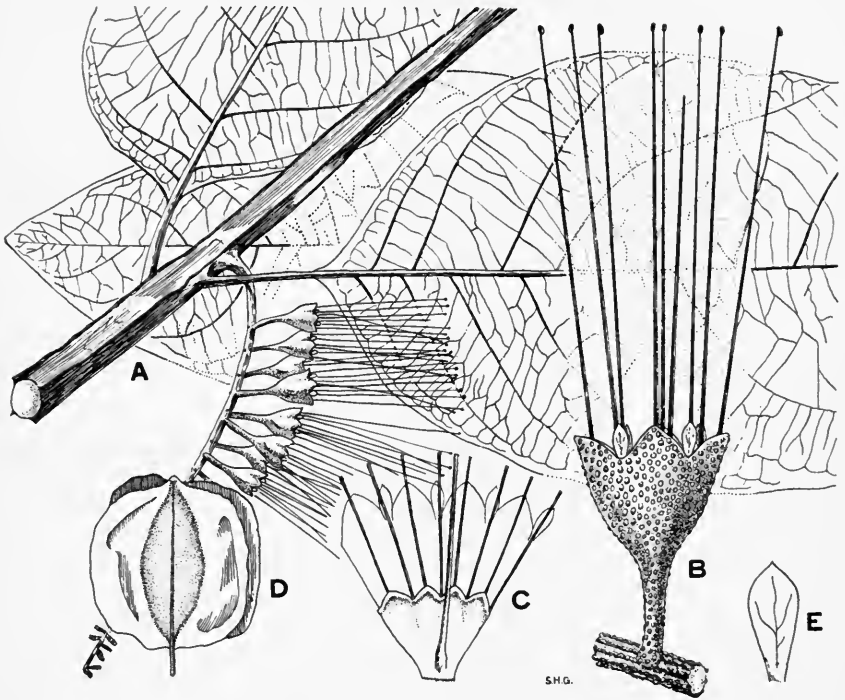


FIG. 47. *Combretum fruticosum*. A, Portion of stem and inflorescence;  $\times 1$ . B, Individual flower;  $\times 3$ . C, Hypanthium, dissected;  $\times 4$ . D, Fruit;  $\times 1\frac{1}{2}$ . E, Petal;  $\times 5$ .

A small or often large vine, climbing over trees, unarmed; leaves short-petiole, broadly oval to elliptic-oblong, 5–15 cm. long, obtuse or short-acuminate, acute or obtuse at the base, lustrous above and glabrous or nearly so, densely lepidote beneath; flower spikes very thick and dense, secund, usually paniculate; flowers sweet-scented, usually blood-red to orange-red; petals 1.5–2 mm. long, obtuse or acute; stamens very long and exserted, red; fruit 2 cm. long, densely lepidote, broadly winged, usually dark red.

Known in El Salvador by the names “*chupamiel*,” “*peineta*,” “*chupamiel de peineta*,” and “*chupachupa*,” called “*tietie*” and “*curassow comb*” in British Honduras. The plant is a common and characteristic one of the forest and thickets of the Pacific lowlands. The showy flowers, full of nectar, are much visited by insects and hummingbirds. It is said that the cut stem yields a considerable amount of sap that may be drunk when water is lacking. In Mexico the branches are used for weaving coarse baskets, and generally they are employed as a substitute for rope, for tying firewood and other temporary uses. In the dry lower Motagua Valley the vine is in

flower in late March. Material referred to *C. fruticosum* is rather variable in size of flowers and other characters, but not remarkably so. We are quite unable to separate most of the species of this group maintained by Pittier (Contr. U. S. Nat. Herb. 18: 241. 1917).

**Combretum laxum** Jacq. Enum. Pl. Carib. 19. 1760. *C. mexicanum* Humb. & Bonpl. Pl. Aequin. 2: 159, t. 132. 1809 (type from Acapulco, Mexico). *C. epiphyticum* Pittier, Contr. U. S. Nat. Herb. 17: 247. 1917 (type from Panama, Pittier 6819).

Wet forests or thickets at or little above sea level, sometimes in mangrove swamps; Petén; Alta Verapaz; Izabal; Escuintla; San Marcos. Mexico; British Honduras to Panama; West Indies; southward to Argentina.

A large vine with tough, brown or blackish stems; leaves short-petiolate, oblong or lance-oblong, mostly 11–20 cm. long, glabrous or nearly so, scarcely at all lepidote, subcoriaceous, acute or acuminate, obtuse or rounded at the base; flowers creamy white, fragrant, 4-parted, usually in large panicles, the spikes mostly dense; calyx finely pubescent, rarely glabrate; petals slightly exceeding the calyx lobes, glabrous; stamens exserted; fruit oblong to suborbicular, 2 cm. long, reddish green or dark red, broadly winged or sometimes only angulate, glabrate, usually sparsely sericeous at first, not lepidote.

Called “*tamborillo*” in Chiapas, Mexico.

## CONOCARPUS L.

Shrubs or trees, glabrous or sericeous; leaves alternate, coriaceous, short-petiolate, biglandular at the base; flowers minute, in small dense cone-like heads, these paniculate at the ends of the branches; calyx tube compressed, truncate, not produced above the ovary, the limb urceolate, 5-fid, deciduous; petals none; stamens 5, the filaments filiform, exserted, the anthers small, cordate; ovary 1-celled, the style short, subulate, villous, the stigma simple; ovules 2, pendulous from the apex of the cell; fruit small, obcordate, angulate, 1-seeded, the fruits densely imbricate, with corky pericarp.

Two species in mangrove swamps of the tropics of America and West Africa; only the following in North America.

**Conocarpus erecta** L. Sp. Pl. 176. 1753. *Mangle blanco*.

Abundant in mangrove swamps or beach thickets along both coasts; Izabal; Escuintla; Retalhuleu; San Marcos; doubtless in all the coast departments. Mexico; British Honduras to Panama. Generally distributed on seacoasts of tropical America and in West Africa.

Variable in size, sometimes a prostrate shrub but usually erect and becoming a tree of 20 meters with a trunk 80 cm. in diameter, the bark dark brown, fissured

into irregular ridges and thin scales; leaves obovate to elliptic or oval, 2-10 cm. long, obtuse or acute at each end, glabrous or sericeous, the petiole with 2 glands on the upper surface at the base of the blade; flowers greenish, the heads 1 cm. or less in diameter; fruit purplish green, cone-like.

Called "buttonwood" and "button-bush" in British Honduras; "*botoncillo*" (El Salvador); "*canche*" (snake tree), "*taabche*," "*tabche*" (Yucatan, Maya); "*mangle*," "*mangle prieto*" (Yucatan). This is one of the usual elements of the mangrove swamps of all tropical America, growing in association with *Rhizophora*, *Laguncularia* and *Avicennia*. In the mangrove swamps of San José, Escuintla, this is the most abundant tree. The wood is fine-textured, hard, heavy, and strong, its specific gravity near 1.00. Locally it is utilized for fuel and charcoal and sometimes for construction. The bark is used for tanning skins. The usual form of the species has glabrous or nearly glabrous leaves. Var. *sericea* DC. (Prodr. 3: 16. 1828) is a form with densely sericeous leaves. We have seen no Guatemalan specimens, but it appears to be common in Yucatan and occurs in Honduras.

### LAGUNCULARIA Gaertner f.

Trees; leaves opposite, petiolate, thick-coriaceous, succulent when fresh, the venation obsolete, biglandular at the base; flowers polygamous, in elongate axillary spikes, sericeous, sessile; calyx tube turbinate, not produced beyond the ovary, bibracteolate, the limb urceolate, 5-fid, persistent; petals 5, minute, caducous; stamens 10, biseriate, the filaments subulate, included, the anthers cordate; ovary 1-celled, the style filiform, glabrous, the stigma bilobate; ovules 2, collaterally pendulous from the apex of the cell; fruit coriaceous, crowned by the calyx limb, elongate-obovoid, subtrigonus, 1-seeded, the angles marginate.

Two species, in tropical America and Africa. Only the following occurs in North America.

**Laguncularia racemosa** (L.) Gaertn. in Gaertn. f. Fruct. 3: 209, t. 217. 1805. *Conocarpus racemosa* L. Syst. Nat. ed. 10. 930. 1759. *Mangle colorado*; *mangle chaparro*; *mangle blanco*.

Common in mangrove swamps of both coasts, growing with *Rhizophora*, *Conocarpus*, and *Avicennia*; Izabal; Escuintla; Retalhuleu; San Marcos; doubtless in all the coastal departments. Southern Mexico; British Honduras to El Salvador and Panama; southern Florida; West Indies; South America; Africa.

A shrub or tree, sometimes 20 meters tall with a trunk 80 cm. in diameter, the bark thin, reddish brown, fissured into long scales; leaves petiolate, oblong to oval, mostly 3-7 cm. long, rounded or very obtuse at each end, glabrous, somewhat

tuberculate-roughened beneath when dry, the blade with 2 glands at its base; flower spikes mostly lax and interrupted, often curved; calyx sericeous, 2-3 mm. long; fruit drupaceous, 1.5 cm. long, 10-costate, reddish.

Called "white mangrove" in British Honduras; "*cincahuite*" (El Salvador); "*zacolcom*" (Yucatan, Maya); "*mangle bobo*" (Yucatan). The wood is hard, heavy, strong, dense, yellowish brown, its specific gravity about 0.86. It is little used except for fuel. The bark is stated to contain about 14 per cent tannin and is often used for tanning skins.

### QUISQUALIS L.

Woody vines with slender branches; leaves opposite or subopposite, membranaceous, petiolate; flowers showy, in short, axillary and terminal spikes or racemes, usually changing their color with age; calyx tube ovoid below, terete, produced above the ovary into a very long, slender tube, deciduous, the limb 5-parted, the small lobes spreading or recurved; petals 5, obtuse; stamens 10, exserted; style filiform; ovules 3-4; fruit dry, oblong, coriaceous, acutely 5-angulate or 5-winged, 1-seeded.

About 17 species, in tropical Asia and Africa, one of them widely cultivated for ornament.

#### *Quisqualis indica* L. Sp. Pl. ed. 2. 556. 1762.

Cultivated in the Parque Central of Guatemala City, and doubtless planted elsewhere in the country. Native of tropical Asia.

Vine woody, often large; leaves short-petiolate, oblong or oblong-elliptic, about 14 cm. long and 5 cm. broad or smaller, acuminate, rounded at the base, sparsely pilose or almost glabrous, spikes with conspicuous linear green bracts; calyx tube sometimes 8 cm. long, very slender, finely pilose; petals white, turning pink and red, obovate-oblong, 12 mm. long, much exceeding the calyx lobes; fruit ellipsoid, 5-costate or narrowly 5-winged, sometimes dehiscent along the angles.

Called "*Santa Cecilia*" and "*barbudo*" in El Salvador. The vine is not a common one in Central America.

### TERMINALIA L.

Trees, unarmed; leaves alternate or subopposite, usually crowded at the ends of the branches, sometimes pellucid-punctate, mostly petiolate and often glandular at the base; flowers small, sessile, perfect or polygamo-dioecious, 4-5-parted, green or whitish, in elongate spikes; calyx tube ovoid or cylindrical, constricted above the ovary, the limb campanulate, generally deciduous; petals none; stamens 10, biseriate; filaments exserted, the anthers small, didymous; style subulate, villous at the base, the stigma simple; ovules usually 2; fruit dry or drupaceous, often winged, the putamen coriaceous or osseous.

Species about 200, widely dispersed in tropical regions. One other species is known from Guatemala by a sterile specimen.

Fruits angled but not winged; leaves broadly obovate, mostly 10–15 cm. broad.  
*T. Catappa.*

Fruits prominently winged; leaves mostly 6 cm. broad or less.

Fruits 3–3.5 cm. high, with hard thick wings; lower surface of the leaves conspicuously reticulate. . . . . *T. nyssaefolia.*

Fruits 2 cm. high or less.

Fruits 2-winged, the wings each about 1.5 cm. or more broad. . . . *T. oblonga.*

Fruits usually 5-winged, 2 wings much larger than the others, each not more than 1 cm. broad. . . . . *T. amazonia.*

***Terminalia amazonia*** (J. F. Gmel.) Exell in Pulle, Fl. Surinam 3: 173. 1935. *Chuncoa amazonia* J. F. Gmel. in L. Syst. Nat. ed. 13, 2: 702. 1791. *Gimbernatia obovata* Ruiz & Pavón, Fl. Peruv. Prodr. 138. 1794. *T. obovata* Steud. Nom. Bot. 2: 668. 1841, not Cambess. 1829. *T. excelsa* Liebm. ex Hemsl. Biol. Centr. Amer. Bot. 1: 402. 1880, *nomen nudum*. *T. Hayesii* Pittier, Contr. U. S. Nat. Herb. 18: 239. 1917. *Naranjo*; *canxún* (Maya); *canxan* (Petén, Maya); *quebracho*; *sisín*.

Wet forest or open savannas, 300 meters or less; Petén; Alta Verapaz; Izabal; Huehuetenango(?). Southern Mexico; British Honduras to Panama; southward to Brazil and Peru.

A tall tree, sometimes 40 meters high, with a tall and rather slender trunk sometimes a meter in diameter above the often high buttresses, the bark smooth, pale brown or brownish, often mottled, peeling off in sheets, the slender young branchlets usually densely pilose with subappressed, yellowish or brownish hairs; leaves mostly clustered at the tips of the branches and appearing verticillate, membranaceous or subcoriaceous, obovate to oblong-oblongeolate, mostly 7–11 cm. long, on very short petioles, rounded to acuminate at the apex, cuneate-attenuate to the base, more or less pilose along the nerves, elsewhere glabrous or nearly so, often with 2 marginal glands above the base; flowers yellow-green or whitish, in elongate axillary spikes, these slender, often numerous; calyx limb 3–4 mm. broad; disk villous; fruit only 4–5 mm. high, the 5 thin wings usually broader than high, with two larger than the others.

Sometimes called "*nargusta*" in British Honduras; in Honduras "*membrillo*" and "*almendro*." One of the most common large trees of the whole Atlantic coast of Central America, and reported as one of the largest and finest trees of the Petén savannas. It grows in swamps, but also upon hillsides, although it does not extend high on the slopes. The wood is lustrous light gray or yellowish, becoming decidedly yellowish upon exposure, the injured portions red or brown; taste slightly astringent; moderately hard and heavy, the specific

gravity 0.65–0.75; grain variable, from straight to roey or curly, medium-textured, easy to cut, takes a good polish, strong, apparently not very durable. The wood is used in the North Coast for general construction and railroad ties, though not highly esteemed for the latter purpose. Although not exported, Record states that it is suitable as a medium-priced wood for furniture, interior finish, and general carpentry. The name “*guayabo*” given the tree in Central America refers to the facts that the bark is much like that of the common guava (*Psidium*). The bark on the lower part of the trunk curls up in thin sheets that can easily be pulled loose; it often falls off and litters the ground.

**Terminalia Catappa** L. Mant. Pl. 128. 1767. *Almendro*.

Native of tropical Asia. Planted commonly as a shade tree throughout the *tierra caliente* of Guatemala, and naturalized in many or most parts of the lower regions, especially near the sea-coast; occasionally seen above 300 meters; Petén; Izabal; Zacapa; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; San Marcos.

A large tree, sometimes 25 meters high with a trunk a meter in diameter, but commonly smaller, the branches rather few, conspicuously whorled and spreading; leaves mostly clustered at the ends of the branches, obovate, 10–30 cm. long, rounded and abruptly pointed at the apex, cuneately narrowed to the obtuse or subcordate base, almost glabrous; flower spikes 5–15 cm. long, the pistillate flowers on the lower part of the spike, green; fruit a woody drupe, ellipsoid, 2-edged, 4–7 cm. long, the seed 3–4 cm. long.

Called “almond” in British Honduras. The usual English name is “Indian almond.”

The wood is hard, close-grained, and red-brown; it supplies useful lumber when available in quantity, but probably is not used in Guatemala. The tree is much planted in parks, especially near the coast, as at Puerto Barrios, San José, and Champerico. It tolerates saline soil better than most trees, and endures neglect. It often is described as *un árbol agradecido*, since it repays by rapid and vigorous growth any care given it. The large thick leaves fall during the dry months and often form a dense rustling cover over the ground. The young leaves as well as those about to fall often are vividly tinted with red and purple, making the foliage very conspicuous. The bark and fruit are rich in tannin. They also yield a black dye that in India is used for staining the teeth black. It is said that in Asia silkworms are fed upon the leaves. The seeds, said to contain 50 per cent oil, are edible, with a flavor suggestive of almonds (hence the name “*al-*

*mendro*”) or filberts, and they often are eaten by Guatemalan children, perhaps also by adults. In El Salvador they are used to give a black dye to textiles. The tree is well known throughout the lowlands of Central America.

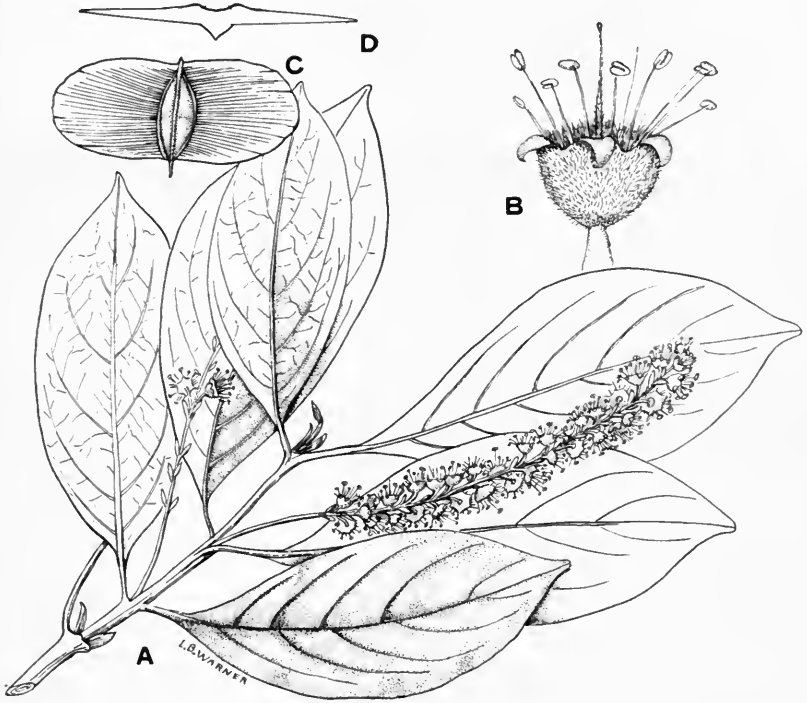


FIG. 48. *Terminalia oblonga*. A, Branch;  $\times \frac{1}{2}$ . B, Flower;  $\times 3$ . C, Fruit;  $\times 1$ . D, Fruit in cross section;  $\times 1$ .

***Terminalia nyssaefolia* Britton, Bull. Torr. Bot. Club 48: 333. 1922.**

At sea level; Izabal (Punta Palma, *Steyermark* 39814). Trinidad.

A tree as much as 20 meters high, the branches slender or stout, brownish-pilose or glabrate; leaves short-petiolate, obovate or oblong-obovate, 7–12 cm. long, 4–6 cm. broad, abruptly acute or short-acuminate, cuneate-acute at the base, green above, lustrous, glabrous or nearly so, paler beneath, somewhat brown-pilose when young but soon glabrate, the veins conspicuously elevated and closely reticulate on both surfaces; flowers spicate, densely brown-pilose, the spikes slender-pedunculate, short, rather few-flowered, much interrupted; fruit glabrous or nearly so, usually 3–3.5 cm. long, strongly compressed, the broad wings very thick and hard.



The occurrence of this tree at this one isolated spot in Central America is curious and not a natural extension of range for a Trinidad tree, although well within the bounds of possibility. It may be that the tree is more widely distributed along the Guatemalan coast or in other parts of Central America, but there is also the possibility that it may have been planted and introduced at Punta Palma.

***Terminalia oblonga*** (R. & P.) Steud. Nom. Bot. 2: 668. 1841; L. Wms. Fieldiana, Bot. 29: 385. 1962. *Gimbernatia oblonga* Ruiz & Pavón, Syst. Veg. 274. 1798. *Chuncoa oblonga* Pers. Syn. Pl. 1: 486. 1805. *T. chiriquensis* Pittier, Contr. U. S. Nat. Herb. 18: 238. 1917. *Volador*; *guayabo*.

Common in forests of the Pacific lowlands, mostly at 600 meters or less, sometimes ascending to 1,200 meters; Santa Rosa; Escuintla; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. El Salvador and Honduras to Panama; southward to Brazil. Figure 48.

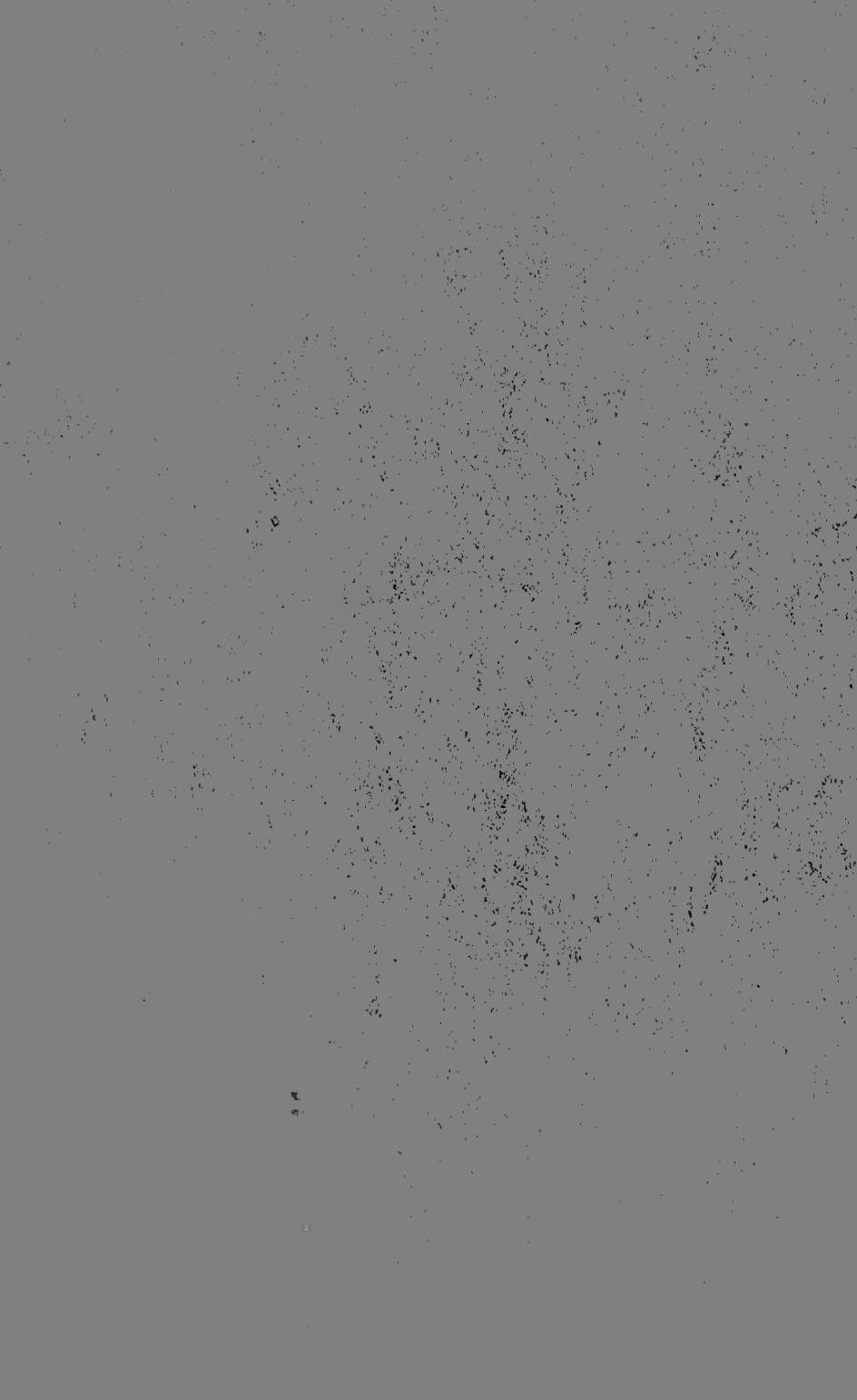
A large tree, similar to *T. amazonia* in most details, sometimes 45 meters tall, with a trunk 75 cm. in diameter, the trunk tall and slender, the crown relatively small and spreading, the bark mottled like that of *Platanus*, the newly exposed portions almost white; buttresses usually present but rather small; leaves usually on longer petioles than in *T. amazonia*, mostly acute or acuminate, almost glabrous, usually without glands, pellucid-punctate; flowers green, the spikes mostly longer than the leaves, slender, interrupted, the stamens long-exserted; fruit with only 2 wings, these subcoriaceous, 2 cm. high or shorter, with each wing about 1.5–2 cm. broad, the wings finely nerved.

This is one of the most common trees of the Pacific plains, often forming extensive and dense stands, usually in association with other trees. It is quite possible that *T. amazonia* may extend to the Pacific slope of Guatemala, but we have seen no specimens that could be referred certainly to it.























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